Women's educational expansion : effects of changes in female participation in the labour market and household formation on inter-household earnings inequality

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Abstract: La tesis fue defendida en la Universidad de Oxford, bajo la dirección de Richard Breen. La tesis estudia qué efectos ha tenido la expansión de la educación según el género de la persona. ¿Se han reducido o eliminado las diferencias educativas de género? ¿Qué relación hay entre las diferencias educativas de género y los cambios en la distribución de la renta entre hogares? La tesis abarca, a diferencia de lo habitual, los recursos de todas las mujeres, no sólo de las casadas y de las que perciben rentas de trabajo. Utiliza la Family Expenditure Survey para el Reino Unido, el Luxembourg Income Study para Los Países Bajos e Italia, y el European Community Household Panel Survey. El análisis de los datos cuestiona que factores como la creciente participación laboral de mujeres con educación alta, la creciente monogamia o las parejas cuyos miembros tienen un similar nivel educativo, aumenten la desigualdad educativa y económica entre hogares. Asimismo, se cuestiona también que los recursos económicos de las mujeres hayan ido influyendo más en el incremento de las desigualdades en los países.

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WOMEN'S EDUCATIONAL EXPANSION. EFFECTS OF CHANGES IN FEMALE PARTICIPATION IN THE LABOUR MARKET AND HOUSEHOLD FORMATION ON INTER-HOUSEHOLD EARNINGS INEQUALITY

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ABSTRACT

This thesis explores the processes by which the educational expansion of women has affected changes in the distribution of earnings between households. Increased education is expected to have promoted women's participation in paid work over time and to have contributed to substantial changes in the composition of families, the most relevant of those being an increase in the proportion of single-adult households and of homogamous couples. All these factors are expected to have the potential to widen earnings differences among households, inasmuch as the earnings potential of uncoupled individuals differs from those of couples, and increasing educational resemblance of partners is likely to strengthen the correlation between their income.

Most of the existing literature has sought to assess the impact of wives' earnings on the distribution of resources between couples. In this thesis, a comprehensive picture that incorporates all women –regardless of their marital status and whether or not they, and their partners, have positive earnings– is provided. In addition, the methods to carry out counterfactual analyses that are implemented allow an accurate treatment of the behavioural grounds underlying the relationship, at the macro level, between changes in the distribution of women's education and changes in employment and family formation.

The results of the thesis neither support the often suggested idea that rising participation in the labour force of highly-educated women, together with increased marital sorting, has made the distribution of household earnings more unequal, nor that women's resources are becoming more salient to explain inequality. This is true in contexts with varying characteristics as regards the extent to which women's education experienced an expansion and the level and trend in total inequality.

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PART I

THE RESEARCH QUESTION AND THE DEBATES

CHAPTER 1. INTRODUCTION

1.1. The Resurgence of Income Inequality in the Research Agenda

The study of the distribution of income has regained attention in recent times, and it seems to have done so not only in mainstream economics but also, albeit later and more timidly, in other fields such as sociology. Economists (Atkinson 1997) and sociologists alike (see, for instance, Morris and Western 1999, Firebaugh 2003, Myles 2003, Myles and Myers 2007, DiPrete 2007) seem to agree on the relative lack of interest in this subject until relatively recently. There has even been some speculation on the specific contributions that can be made by sociology to the interdisciplinary study of economic inequality (Kenworthy 2007, Neckerman and Torche 2007). The rapid growth in earnings and income inequality that countries such as the United States and the United Kingdom experienced at least since the late seventies favoured research on the topic, and the description of inequality patterns became a fertile area of study among economists. A great share of the empirical contributions trying to characterise the time trends, to quantify the size of the increase in income differences, and to seek for potential explanations, have actually focused on these two countries. In this section, a succinct review of the empirical evidence on trends in these two countries in comparison with other industrialised nations is provided, and the main explanations that have been offered in the literature to account for

the various cross-national levels and trends in inequality are presented.

Probably the most recurrent description of long-term historical changes in income inequality lies in the Kuznets curve (Kuznets 1955) –to the extent that some scholars claim that it has "tyrannised the literature on inequality trends" (Lindert 2000: 173). This instrument represents the level of inequality that a society is expected to experience as the share of different economic sectors in the productive system changes, and as per capita income associated with modern activities increases. This relationship follows an inverted-U shape, with inequality being low when most of the labour force is employed in agriculture, then increasing as industrialisation spreads, to decrease after a critical level of development. Despite its popularity and its appealing parsimony as both a stylised description and an explanation of trends in inequality, some of the empirical re-assessments of the evidence do not seem to support its general validity –observed long-term trends in industrialised countries do not always fit the pattern that the curve suggests (see Morrisson 2000 for a historical, pre-1960s, account of changes in inequality in several European countries). Similarly popular was the description of the more recent upsurge in inequality in some industrialised countries known as the "great U-turn" devised by Harrison and Bluestone (1988). This term depicted an equalisation of incomes after the Second World War followed by the rise in inequality starting in the seventies. Some authors have provided empirical support to this assertion (Alderson and Nielsen 2002) for several countries, therefore implying the unavoidable nature of increased income differences. Other scholars, however, have argued that the number of countries in which a clear upward trend in inequality since the seventies can be ascertained is limited (Atkinson 2003). Since there is not an unanimous view in the literature as to what changes over time look like, in the next paragraphs, the evidence for the US and the UK, on the one hand, and some other industrialised countries for which reliable data over time are available, on the other, is discussed.

In the US, where little change in earnings inequality took place between the fifties and the mid-seventies, earnings differences took off during the late seventies and the eighties (Gottschalk 1993), both when annual earnings and wage rates are considered (see Levy and Murnane 1992 for a comprehensive review of the empirical evidence for this country and period). This country displayed the most unequal distribution of positive earnings for both men and women in prime-working ages (Gottschalk and Smeeding 1997) among developed countries usually covered in these types of studies. The growth in returns to the highest levels of education and to experience, together with the fall in the number of hours worked by those with lower education relative to the highly-educated explains part of this increase over the eighties, although there is wide agreement on the parallel rise in wage dispersion within skill and experience groups too (Gottschalk 1997). Total income inequality also increased since the mid-seventies and during the eighties at a rather continuous pace (Gottschalk and Danziger 2005), and this result seems to be consistent regardless of the inequality measures used, units of analysis considered, and a number of other critical analytical decisions (Karoly and Burtless 1995). Income differences continued this upward trend in the early nineties and then slowed down (Brandolini and Smeeding 2007).

The UK, after a marked fall in inequality following the Second World War (Lindert 2000), experienced a very noticeable rise in differences in market income and annual disposable household income during the late seventies and the eighties, particularly at the end of the decade (Atkinson 1993). Similarly to the US picture described earlier, returns to education and to experience, as well as dispersion within these groups, increased significantly over the period (Gottschalk and Smeeding 1997). Atkinson (1993, 1995), examining the effects of the changing composition of the working population in the UK, concluded that the fall in the size of those in work, together with increased earnings dispersion among them, accounted for a great share of the rise in income differences between the mid-seventies and the mid-eighties. The increase that

took place in that country in the second part of the eighties was due to a rise in earnings dispersion as well, but also to widening differences in income between those working and those not working, and to a rise in the variance within the non-working population. However, this trend of increased earnings inequality did not seem to continue in the following decade (Atkinson 2003). Over the nineties, income differences certainly showed fluctuations but no particular trend can be discerned (Brandolini and Smeeding 2007). Whereas trends in earnings differences in the UK notably resembled those in the US, income inequality in Britain experienced an even more remarkable increase during the last part of the eighties. This increase has been shown to be consistent to the use of various inequality measures (Lindert 2000).

The US and UK experiences since the late seventies have fostered the believe –not only among scholars of inequality but also among the general audience– that this pattern of increased income differences was, to some extent, universal (Alderson and Nielsen 2002), or that factors leading to this change would inevitably end up spreading inequality to all industrialised countries. Much of the available empirical evidence on trends in inequality rather suggests that other developed countries over the same period have not systematically run parallel to the experiences in those two countries. Although earnings and income differences have not remained stable over time in a number of industrialised countries –i.e. fluctuations have actually taken place–, the evidence shows that sustained trends are however harder to identify. Using collected national evidence for the last half of the 20th century in OECD countries, Atkinson (2003) concluded that a clear U-pattern –a significant post-war decline, followed by an upsurge in disposable annual income inequality between households– can only be observed in the UK, the Netherlands, Finland, and, to certain extent, the US, and that cross-national changes are sufficiently marked in terms of timing and magnitude to be cautious about broad generalisations. This pattern would be suggesting that the UK and the US might need to be considered

exceptions rather than examples of an unequivocal generalised pattern towards increasing income differences.

As regards inequality in developed countries other than the US and the UK, over the eighties, the distribution of earnings became more unequal, although to varying extents, in a number of OECD countries, particularly marked at the top end of the distribution (Gottschalk and Joyce 1991). Three groups can be broadly identified. Firstly, Canada, Australia and Israel experienced some increase in earnings dispersion over the eighties, although not as marked as the UK and the US. Secondly, in France, the Netherlands, Japan, Sweden and Finland, the increase in inequality that took place was rather small. Finally, Italy and Germany stand out as the two settings displaying no upward trend.[1] Relative earnings for workers at the bottom part of the distribution experienced some decline in a number of these countries, while the relative gains among individuals at the top part of the distribution were generally much more limited than in the US or the UK (Gottschalk and Smeeding 1997). As for the relationship between trends in returns to education and age, on the one hand, and trends in earnings dispersion, on the other, the picture for countries other than the UK and the US is clearly more mixed. Increases in returns to university education –such as those that took place in Finland or Australia– or in the wages paid to more experienced workers –as in the Netherlands– were accompanied by a variety of outcomes in terms of inequality, and countries with relatively similar experiences as regards changes in inequality differed to a great extent in their college and age premium (Gottschalk and Joyce 1998). Changes in within-group variation differed notably across countries too. In addition, it is important to note that upward moves have taken place in countries departing from both very low and relatively high initial levels, and that among countries with similar previous levels of earnings

[1] For a similar conclusion about earnings differences growing in most industrialised countries, but a different ranking of inequality levels across nations, see Kenworthy and Pontusson (2005).

dispersion, variation in outcomes in terms of trends is actually observed. This suggests that a clear-cut clustering of countries according to, for instance, welfare regimes, is not straightforward.

The variety of outcomes in the same period as regards total income inequality –rather than just earnings differences– was remarkable. English-speaking countries such as Australia and New Zealand experienced some increase, albeit weak, in income differences during the period. In countries such as Canada, France and Italy, on the contrary, levels of income inequality remained unchanged over the decade. In Finland and Norway, even some decrease in income dispersion was observed (Atkinson 1993, Atkinson 1995). In one of the most comprehensive accounts of inequality in OECD countries during the eighties, using relatively comparable data from the Luxembourg Income Study, Atkinson *et al.* (1995) identified the Scandinavian countries, together with Benelux and Germany as those with the most compressed distributions of disposable income, while other European countries such as Switzerland and Ireland showed, at that time, a dispersion similar to that in the US. This variation reflects the various and complex forces mediating the relationship between inequality in labour market income and in total household income. Comparing increasingly comprehensive distributions in terms of income components in various developed countries, Gottschalk (1993) offered empirical evidence supporting two conclusions that account for this non-automatic response to increased wage dispersion by total household income. On the one hand, the earnings of members of the family other than heads and non-labour private income had a counteracting effect in a number of nations. On the other hand, government transfers managed to compensate to some extent differences generated by the market over that decade. Decomposing income inequality by source and population subgroups in several countries, Jäntti (1997) confirmed the equalising impact of social transfers during the eighties,

although he assigned a disequalising role to the earnings of spouses.[2]

The following decade witnessed relative cross-country similarity in trends in earnings inequality, with a marked stability after the mid-nineties, but a less clear-cut cross-national pattern as regards income differences. Gottschalk and Smeeding (1997), reviewing a number of contributions on individual countries, reported an important degree of cross-national heterogeneity in trends in income inequality in the early nineties, with a significant rise in Sweden, some increase, although certainly more moderate than in either the UK or the US, in Canada, Denmark, the Netherlands and Belgium, no significant changes in Germany, Portugal, France and Ireland, and some decline in Italy. In countries in which income differences increased, these were not counteracted by changes in income mobility (Gottschak and Smeeding 2000). By the end of the nineties, Scandinavian countries ranked lowest in terms of the gap between the top and bottom ten per cents, followed by Central and Eastern European countries. English-speaking and Southern European countries tended to show similarly high gaps between those deciles (Brandolini and Smeeding 2007).

These conclusions about cross-country differences, and even about trends within the same country, in any event, need to be taken with caution since the national sources of income data on which they are based are not generally devised to address wider comparisons –they vary to a great extent as regards the original purpose for which they were devised, their income definition, unit of analysis, population coverage, and methodology. In addition, there exists, to some extent, a trade-off between the length of the data series for each country and the comparability with data for other countries. On the one hand, long series –as opposed to single observations over a long time span– provide a more accurate description of changes over time (allowing to distinguish real trends from transitory fluctuations) but, since they tend to be based

[2] This issue is discussed at length in Chapter 2.

on data from unofficial –and often diverse– sources, cross-country comparability cannot be granted. On the other hand, other data sources, such as the Luxembourg Income Study, which aim to maximise the degree of comparativeness across countries, are usually based on scarcer time observations and so the dynamics of trends in inequality is not as accurately described.

In the light of this cross-national variation, nowadays there seems to be wide agreement on the complex nature of changes in economic inequality (Gottschalk and Smeeding 2000, Lindert 2000). No matter how accurately they describe the empirical trends, explanations focusing on one single factor are thus increasingly being considered insufficient to the extent that other forces are operating simultaneously, often pushing inequality in opposite directions. For instance, even if economic growth or sectoral changes as conceived by the Kuznets curve or more elaborated versions of this explanation (Nielsen and Alderson 1995) were the main drivers of changes in inequality, there are a number of other causes that would need to be taken into account and that could show counteracting effects on inequality. In the next few pages, some of the most recurrent explanations of trends in inequality and of international differences are discussed.

Much of the literature dealing with the explanation of trends in income differences has pointed out the very strong links between increased earnings dispersion (increased differences in the distribution of personal income from work) and total (personal or household) income inequality. It has thus been argued that the former explains a significant amount of the change in the latter, particularly men's –or household heads'– earnings, although different authors attribute varying weights to this factor (Gottschalk and Smeeding 1997). The most common explanations for increased dispersion in earned income over time include a number of interrelated aspects from both the demand- and the supply-sides. Changes affecting labour supply include population growth –particularly, the aging of the population, and the entry of the baby boom cohorts and immigrants in the labour market–, the increase in the average educational attainment of the population,

and the rise in female labour force participation. Those affecting labour demand are related to changes experienced by the business cycle, de-industrialisation processes and the parallel growth in the service sector, globalisation, and technological changes –these last three phenomena leading, typically, to an increased demand for skilled labour. Despite its popularity in the nineties, the skill-biased technological change hypothesis has been subject to important criticism. It has, for instance, been argued that the upsurge in inequality in countries such as the US started before the diffusion of computing in many occupations, and that some periods of stability have actually taken place as computerisation was becoming significantly widespread (Card and DiNardo 2002). In addition, institutional factors do play a role in fostering or tempering outcomes generated in the market: countries differ in the extent to which de-unionisation and labour de-regulation have taken place, in the existence and amount of a minimum wage, and in the existence of wage bargaining institutions.

The nature and timing of changes in these events across countries, and their often complex interplay need to be taken into account in order to explain international differences in levels and trends in earnings dispersion. For example, the increasing demand for highly-skilled labour due to economic openness and exposure to international competition –i.e. globalisation–, might have actually contributed to increased inequality in settings in which wages are not subject to institutional constraints, such as in the United States. However, in countries in which the welfare state guarantees some minimum wage level, such as in Continental Europe, the expected result of the increasing demand for skilled labour would be a rise in unemployment rather than in wage dispersion (Atkinson 2003).

These explanations have most often focused on examining processes that worsen the relative position of individuals at the bottom part of the skills and earnings distribution, but this is of course only part of the story. Increasing number of more recent studies have described increases in income inequality, particularly in the US and the UK, as being the result of polarisation, thus

showing stronger concentration of income shares simultaneously at the bottom and top part of the distribution at the expense of middle incomes over time (Alderson, Beckfield and Nielsen 2005). According to these authors, this pattern, although less markedly, is also observed in a number of other countries experiencing spells of increased income differences in the last three decades, such as Norway, Belgium, Switzerland or Denmark. Evidence on income concentration at the upper part of the distribution has also stimulated a whole line of research on top incomes in several countries. The rich have become even richer in the US (Saez 2005) and other Anglo-Saxon countries, but not in Continental Europe (Piketty and Saez 2006)[3] and, in contrast to the pattern observed before the Second World War, when the rise in top income shares was a product of capital income gains, in the last thirty years its main driver, in contexts where an increase has actually taken place, has been the growth in wages and salaries. Explanations of the rise in the shares of total income owned by the top percentiles include executive remuneration fostered by certain globalisation in the market for managers (Simon 1957), and the steep increase in the returns that individuals with uncommon and highly rewarded abilities are able to extract (Rosen 1981).

Moving from the explanation of changes in the distribution of individual earned income to changes in total family income requires much more complex frameworks, since the number of factors involved in the final outcome and their interdependences tend to multiply. The complexity stems from the consideration of all members in the household and of all income components. Inequality in the incomes of households would therefore depend on the joint distribution of hours worked and wage rates for all members of the family, since their labour supplies are expected to react to each other's, on the distribution of non-earned income for each of them, and on household structure itself –therefore, on individual decisions regarding family formation and dissolution– (Gottschalk and Danziger 2005). As Gottschalk and Smeeding

[3] Similar conclusions are reached by Atkinson (2003).

(1997) succinctly put it: "The expansion from individual earnings to household disposable income […] raises a whole host of analytical as well as measurement issues. Economic and demographic decisions within the household are endogenous and so complex that empirical research is far from being able to sort out the linkages". This explains why, whereas the literature has tried to move away from the mere description of trends as regards earnings inequality, the evidence on household income inequality, with a few exceptions, has remained significantly more descriptive, and analytical frameworks trying to incorporate all –or most of– these interrelated factors are scarce. As regards attempts to quantify the effects of selected factors other than the abovementioned effect of trends in individual earned income, which tend to be assigned the strongest weight in the explanation, the literature has tried to quantify the effects of two broad sets of changes on total family income inequality: the changing nature of households as regards their structure and labour supply, on the one hand, including the increase in single-person and retired households, increased labour participation by single and married women, and assortative marriage, and on the other hand, institutional factors such as the ability of labour market institutions to moderate market inequalities, and the redistributive role of the welfare state. Explanations focused on the first set of factors are reviewed at length in Chapter 2. However, it is important to note at this stage that there is neither agreement on their relative weight across countries, nor on the share of total inequality that they account for in one particular country (Gottschalk and Smeeding 1997). As for the role of institutions, it has already been pointed out that countries with centralised wage-setting, high union density, and a relatively high minimum wage, have managed to temper income inequality by compressing their earnings distributions. In addition, the redistributive capability of tax policies and the targeting and generosity of social transfers are obvious factors that account for variation in income inequality levels across countries (see Atkinson *et al.* 1995), and for changes over time within individual nations.

Gustafsson and Johansson (1999), using cross-sectional time-series data, tried to assess the relative weight of different factors that are often invoked to explain cross-country differences in trends in household income inequality. They simultaneously put to the test the validity of some of the most common hypotheses and broad explanations in the literature: economic development or different sizes in productive sectors, internationalisation of trade, unemployment and other indicators of macroeconomic performance, factors related to the welfare state, and demographic changes, including female participation in the labour force. Their results provide empirical support to the general idea that a single factor cannot account for the complexity of the phenomenon. Whereas the weakening of the industrial sector, and the increase in the inflow of goods imported from developing countries –although only in non-European countries– were found to have a disequalising effect, macroeconomic and demographic indicators showed no significant effect. Factors tempering income inequality include, according to their estimates, a strong public sector and union density. Lindert (2000) pointed out that, whereas effects caused by internationalisation of trade and immigration explain less than half of wage differences in the US, a great share of the increased earnings differences are accounted for by skilled-biased technological change and the slowdown of skills growth, on the one hand, and de-unionisation and the decentralised nature of wage-setting institutions in that country, on the other –these two factors would explain part of the differences in inequality outcomes when compared with Europe–, together with a trend towards decreased progressivity in fiscal policy. In other countries, such as the UK, according to this author, causal effects are less straightforward to identify (see Hills 1996 for a similar argument).

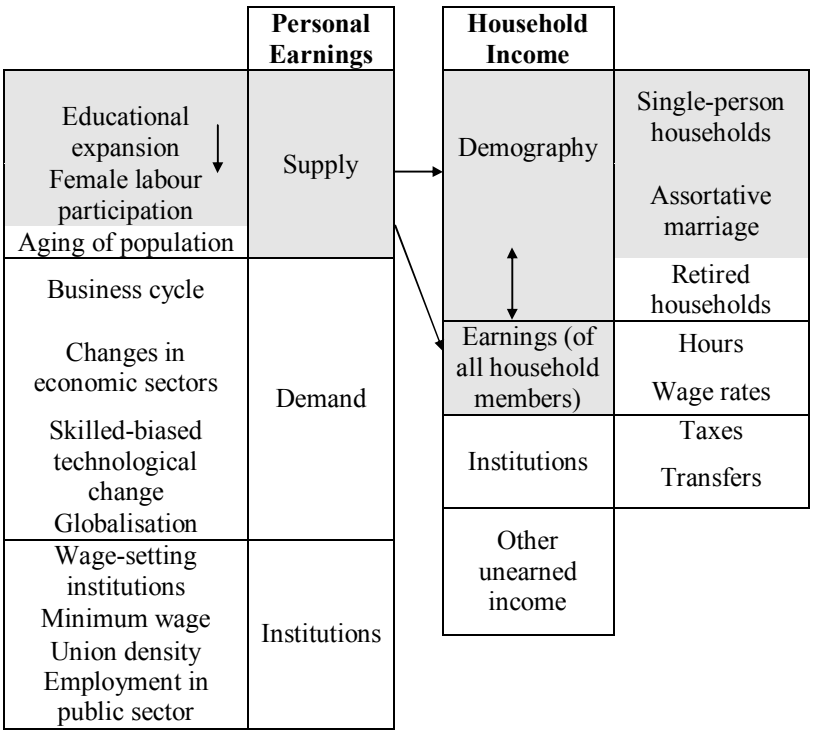
In the following section, the research question, and thus the contribution that, in the context of the literature that has been reviewed, this thesis aims at making, is discussed.

1.2. Research Question

The systematic study of trends in inequality in industrialised countries described thus far, coincided with a certain switch of interest favouring an emphasis on micro processes or micro mechanisms, even when explaining links between variables at an aggregate level (Hedström and Swedberg 1998). Thus, renewed efforts have aimed to explain why and how inequalities in the distribution of resources are generated and vary over time and space, in addition to the description of what they look like (Atkinson 1997), although most contributions still devote most efforts to the description of trends. In line with the literature that tries to analyse how inequalities are generated and why they change, this thesis aims to explain changes in earnings inequality between households by focusing on one of its possible causes, namely women's increasing educational attainment in industrialised countries over the last three decades, and its likely effects on household structure and participation in the labour market. In order to evaluate the relative contribution of this proposed explanation, it is pertinent to contextualise it by mapping a stylised picture of the main elements affecting changes in earnings and income inequality that were described in the previous section, as shown in Graph 1.1. The panel on the left lists families of explanations mainly affecting the distribution of personal earnings, while the panel on the right shows the most relevant factors affecting the manner in which income is distributed across families or households. Shadowed areas indicate the main factors explicitly involved in the explanatory framework that is offered in this thesis, while arrows represent the links between factors that are analysed in the thesis. On the one hand, the effects of rising educational attainment in the population and of increased female labour participation –which are expected to be correlated trends– have affected the distribution of personal earnings by altering the labour supply. Labour supply factors have, in turn, affected both changes in earnings (for instance, returns to education, to gender, or to experience), and in demographic factors such as the increase

in non-marriage and educational homogamy among couples, which might be related with an increase in earnings correlation and, therefore, in a widening of income differences among households. Since income dispersion is evaluated at the household level, the interplay between demographic factors and the determination of personal earnings of all members in the household is considered.

Graph 1.1. Summary of the main explanations of earnings and income inequality



Non-shadowed areas in Graph 1.1 represent factors that fall outside the scope of the processes covered in this study. This does

not imply that they are irrelevant to explain the final inequality outcomes; on the contrary, the processes that are explored in this thesis are obviously unlikely to constitute the single or the most important factors in explaining the unequal distribution of income between households or changes in them, and so, ideally, a thorough explanation of levels and trends in total inequality should include a comprehensive account of all effects presented in the diagram and of the complex relationships between them. Their exclusion does not mean either that they do not have an influence on some of the factors that are explored. Of course demand and supply factors interact in the determination of the prices of labour, and the extent of earnings dispersion is conditioned by the existence of institutions that are able to place a floor to low wages. In addition, many of the effects of specific explanations are not straightforward to isolate; for instance, within the explanations assigned mostly to the demand side, internationalisation of trade might show a net effect on the distribution of earnings if unskilled workers tend to worsen their employment prospects, but it might operate as well via changes in economic sectors in the country – for example, through increased specialisation in human capital-intensive products and services. Similarly, as regards the distribution of total income, the number of hours worked by each member of the household is affected by earned and non-earned income of the rest of household members. Incentives given by the tax-system and the generosity of social transfers affect the joint distribution of the time that each household allocates to work.

It is thus certainly the case that all these factors are relevant to explain inequality outcomes, and that their net effects are hard to establish. Because the logic of the argument in this thesis could be labelled as a supply-side type of explanation, and very little reference to other type of factors is made, the contribution that it aims at making is necessarily relatively limited. However, there are two main reasons why the framework presented in this study implies a relevant contribution. Firstly, the processes that are analysed tackle some of the issues that have less often been addressed in the field, and on which, moreover, the (scarce)

available literature has not come to an agreement, as will be shown when the empirical evidence is discussed in other chapters, even if they are increasingly mentioned in the field as relevant factors to be considered. Secondly, the set of aspects that are addressed in this thesis cover a wide range of the supply-side factors that the literature lists in an interrelated manner, suggesting an explanatory logic that includes changes in the qualifications or skills that individuals attain, and their effects on three of the most often cited factors potentially affecting changes in inequality, namely the increase in single-person households, increased labour supply by single and married women, and assortative mating. Rather than assessing these effects separately, as it has most often been the case in the literature –an approach that would certainly ignore the interdependence of these phenomena–, a framework that explicitly incorporates the links between them on a theoretically grounded basis, and that attempts to assess their relative roles when explaining changes in inequality, is proposed. Therefore, a more comprehensive account of the effects of some of the main possible explanations coming from the supply-side, and a sociological contribution to a topic that has traditionally been neglected in this discipline, are offered.

The specific research question of the thesis is *how* and *to what extent* women's increasing educational attainment has affected changes in the distribution of earned income among households. The first part of the question refers to the micro processes associated with changes in household inequality, whilst the second implies the quantification of the effect. Household earnings are due both to the amount of resources that the various members of the household contribute to the unit and to the nature of those units.[4] The extent to which changes in those resources –different income components– explain total inequality or changes in inequality has been extensively addressed in the literature. It has been common practice in the field to focus on male household

[4] This is the difference between income events and demographic events that has, for instance, been discussed by Jenkins (2000a).

heads in prime working ages as the unit of analysis when addressing individual earnings and income inequality. This narrow choice was usually justified in terms of them constituting the main earnings providers and the group displaying the most permanent commitment to the labour force, and also in terms of the consequent availability and quality of data. Nevertheless, changes in labour participation and demographic trends would suggest a pressing need for a more comprehensive picture, not only including women in the framework but, more generally, all members of the household (earners and dependants). Attempts to explain family or household earned income inequality have been scarcer and have traditionally only included working wives.

Effects caused by changes in the nature of households have been much less commonly addressed until recently, although their relevance to explain several inequality-related issues has often been pointed out (see, for example, Bane and Elwood 1986 and Jenkins 2000a for such an approach to explain poverty, or Burtless 1999 for income). In particular, the need to simultaneously explain the way in which households obtain their resources and the manner in which households are formed has been pointed out, and the need to include them in the research agenda has been put forward (Gottschalk and Smeeding 1997, Morris and Western 1999).

In this thesis a detailed account of (a) changes in women's labour participation, which affects the amount of resources that households have, and (b) changes in the composition of households, which affect the nature of the unit of analysis, and therefore the basis on which earnings inequality is to be assessed, is provided. Coinciding with a notable –although varying across countries– expansion of women's education, the nature of the workforce has experienced marked changes in recent decades. The incorporation of women to the labour market has taken place in great proportions in most countries, although with various timings and pace. The composition of households has also changed over approximately the same period, with higher proportions of unpartnered persons, increases in single-adult households, and

higher proportions of female earners –both constituting dual-earner couples or single-earners. The emphasis is placed on women because they seem to have benefited to a greater extent from the process of expansion –admittedly, this is the case because in most industrialised countries men were already present in formal education in higher proportions. There are two main strengths in adopting this approach, one dealing with the systematic inclusion of women –regardless of whether they are partnered and whether they do any paid work–, and the second referring to the simultaneous consideration of processes that affect the resources that households obtain and processes that affect the nature of those households in the explanation.

In the remaining sections below, the main expected effects of educational expansion on inequality between households are described, the hypotheses are formulated, the selection of cases is justified, the methods and the data used throughout the thesis are briefly explained, and some important definitional issues are justified.

1.3. General Expected Effects of Women's Educational Expansion on the Distribution of Earnings

In this section, an account of the expected effects of women's educational expansion on the distribution of earnings and of the potential individual-level mechanisms through which this relationship might have occurred is provided. The increase, in recent decades, in the proportions of women pursuing further levels of education is a well-documented phenomenon. In this thesis, several links that could derive from women's educational expansion, and that could show a significant effect on changes in the earnings distribution, are suggested. These links refer both to increased participation in paid work and to changes in women's behaviour as regards family formation.

The most straightforward effect of women's educational expansion refers to *increasing female participation in the labour*

market. In terms of inequality among households, the general result of this is a rise in the number of earners across households, that can in turn be fleshed out by noting i) that there is a higher proportion of households with earners (broadly speaking), ii) that there are more households with female single earners, and iii) that an increase in the number of households with a dual-earner arrangement can be observed. As long as women's participation in the labour market increases, everything else being constant, their relevance when explaining total inequality will also increase, regardless of the (equalising or disequalising) effect they have.

Increases in women's education are expected to have led to changes in household formation trends too. On the one hand, a *decrease in the proportions of partnered women* is expected. Its most obvious effect would be an increase in the number of single-adult and single-headed households. In addition, since partnering is in many cases –although less powerfully over time– a prior condition to parenthood, the fact that more women remain unpartnered could well lead to declining fertility, with a consequent reduction in the number of dependants in these households. There is evidence that the group of uncoupled women consists mostly of women who are highly educated and strongly committed to the labour market (Blossfeld and Drobnič 2001). Alternatively, uncoupled men have often been portrayed in the literature as poorly educated, with unstable or even precarious careers. On the other hand, increased women's education –via the narrowing of the gender gap– is expected to have an effect on *increasing educational homogamy*. In dual-earner households, the level of assortative mating is a crucial aspect in order to determine the sign of changes in inequality. If educational homogamy has increased and education is at least as good a predictor of labour market returns (especially earnings) as it traditionally was, then some potential for polarisation is expected. Households would become poor or rich in terms of their human capital and earnings potential with the consequent accumulation of advantages and disadvantages that this entails. This idea has been increasingly mentioned as a potential cause of increased inequality by

sociologists (Kenworthy 2007) and economists (Gottschalk and Danziger 2005). Besides, if there is more educational homogamy at top levels (or if it has been increasing more at the top) as has been suggested (Mare 1991) this polarisation could be further reinforced. Evidence on the increase in the correlation of earnings of couples' members that would reflect this higher homogamy indeed points to a reinforcement of inter-household earnings inequality (Burtless 1999).

The single factor that could act as a potential buffer to these increasing inequalities is found in women's differential propensities to work. If, *ceteris paribus*, it were mostly women belonging to households at the bottom part of the earnings distribution who work, and assuming that men continued to work at almost universal –or at least very high– rates, then some narrowing of earnings differentials across households could take place. If, alternatively, women at the top end of the distribution worked in greater proportions, then some disequalising effect would be expected. Women's increasing educational attainment and the actual growth in labour participation trends suggest that the first scenario –although observable in past decades– is currently expected to be very unlikely.

In the following section, the specific hypotheses to be tested in the empirical analysis are formulated.

1.4. Formulation of Hypotheses

The hypotheses are divided according to the aspect of earnings inequality on which educational expansion is supposed to have an effect, namely the unit of analysis, the earnings differential between different types of units, and differences within each of those types. This framework, in line with de-composition exercises widely extended in this field (see, for instance, Shorrocks 1984), helps to assess the relative weights of different components of inequality on changes in total inequality over time. Changes in household earnings inequality can be broadly due to

changes in the size or distribution of groups (subgroup shares), in the between-group component, and in the within-group component. The between-group component reflects differences in the average household earnings of the groups. The within-group component refers to earnings differences within each of the groups. The choice of a relevant subgroup partition is therefore crucial for this decomposition device.

Ignoring the contribution of adults in the household other than the heads or the two members of the couple[5] (when there is one in the household), the appropriate partition (see Table 1.1) to answer the main research question of this thesis should be able to accommodate different types of households as regards marital status, the earners/non-earners status of their adult members, and their educational level. The first criterion should distinguish between households with an unpartnered male head, an unpartnered female head, and a couple (or, put differently, a partnered head). The second requirement identifies, for uncoupled heads, whether they are working or not; for couples, it needs to allow for all possible combinations of whether each of the members is working or not. Similarly, the third criterion simply refers to the educational level of uncoupled heads and to all possible combinations for couples. Table 1.1 below shows a possible partition that complies with these three requirements. This classification of households allows all possible combinations of women's and men's employment status and educational levels in households formed by a couple and, in addition, it accommodates single men and women and disaggregates their level of education and whether or not they are working. This inclusion of uncoupled men and women explains why, in Table 1.1 below, the category 'Not present' is included in addition to the three possible educational levels of both men and women. Take, for instance, the case of a working man with a medium level of education; if this man was coupled then the classification of his

[5] The results when including other adult members of the household in the analysis are discussed in Chapters 5 and 6.

household would depend on whether his partner is working or not and on her educational level. However, if this man did not have a partner, his (non-existent) wife would be classified as 'Not present' in the table. In addition, in total 16 out of the 64 possible combinations –those marked with an x in Table 1.1– do not exist.

Table 1.1. Subgroup partition: Types of households

Female head - educational level		Male head - educational level							
		Man - working				Man - not working			
		Low	Medium	High	Not present	Low	Medium	High	Not present
Woman-working	Low				x				
	Medium				x				
	High				x				
	Not present	x	x	x	x	x	x	x	x
Woman-not working	Low				x	0	0	0	0
	Medium				x	0	0	0	0
	High				x	0	0	0	0
	Not present				x	0	0	0	x

Cells containing an x are structural zeroes (i.e. household types that cannot be observed); cells containing a zero refer to households with zero earnings.

The first set of hypotheses refers to the potential effects of increased female education on changes in the distribution of household types. Women's increased educational attainment over time should increase their labour force participation, in such a way that the share of households with only a male breadwinner should experience a reduction over time. Along similar lines, the proportion of female-headed households should have increased over time. This should be the case both if there are more single female-headed households and if the proportion of dual-earner types of households increases. The fact that women achieve higher educational attainment over time should also have increased the levels of educational assortative mating, leading to increased proportions of couples with similar educational levels, particularly

at the top. If education is a good predictor of (potential) earnings and if there is more room for educational homogamy, then an increase in the dual-earner type of household should follow. Changes in the distribution of household types are all expected to have the potential to increase inequality, both of the between- and the within-types components, by giving increased weight to households with above-average earnings.

As regards the expected effects on between-group variance, if the share of total earnings that women contribute has increased over time, the variance between those households in which a female earner is present and those belonging to the male breadwinner model should have become larger. All the trends associated with women's increased education are expected, everything else being equal, to increase inequality between groups because the household types that are becoming more common are likely to be those having earnings above the total average. In addition, if the increase in educational homogamy is associated with growing correlation of partners' earnings, then inequality between types is expected to broaden the gap between households.

As for the expected effects of those changes on within-group variance, if the correlation between men's and women's earnings in dual earner couples has become stronger –regardless of whether it is caused by rising homogamy– an increase in the within-group variance in this category is expected to have occurred.

1.5. Selection of Cases

In principle, the relationships between changes in the marginal distribution of women's education and changes in household earnings inequality over time that have been described thus far could be put to the test by simply focusing on a single country. The United Kingdom constitutes an appropriate test case because it shows significant variation in the two main variables of interest. On the one hand, it experienced a marked increase in non-compulsory educational levels and a narrowing of the gender gap

in recent decades. On the other hand, there is agreement within the discipline that earnings and income inequality in that country were the highest in Europe and, in addition, when looking at trends rather than levels, that they experienced large increases in inequality during the eighties and no marked trend, although episodes of changes, thereafter (see, for example, Gottschalk 1997 for earnings inequality and Atkinson 2003 for income inequality).

In this thesis, although the UK is taken as the main case of study, all the empirical analyses are replicated for two additional countries, each of them showing different combinations of the two relevant variables, namely the expansion in women's and changes in earnings inequality in the selected period. Table 1.2 presents the four possible combinations. The UK can be straightforwardly chosen to represent the high-expansion and high-and-growing-inequality combination. Other European countries such as Spain and Italy also experienced notably high expansions in upper secondary and higher educational levels and a narrowing of the gender gap. Alternatively, in countries such as Austria, Sweden, the Netherlands and Germany, a more limited expansion took place and, with the single exception of Sweden, a significant gender gap persisted (Green *et al.* 1999). With regard to levels of earnings inequality, in the eighties the Netherlands tended to belong to the cluster of countries displaying low levels of inequality at the beginning of the period, together with countries such as Sweden or Norway, and rather small increases in inequality over the two decades, while Italy ranked in that period at some intermediate level (Gottschalk and Smeeding 1997, Gottschalk and Joyce 1998), and experienced no marked trend during the eighties (Gottschalk and Joyce 1991) and some reduction in the nineties (Gottschalk and Smeeding 1997). The only country not showing any increase in overall earnings inequality over the eighties and nineties was Germany (Gottschak 1997); in all other European countries inequality experienced some spell of increase –of course with differences in the timing and magnitude. Increases were limited in countries such as Finland, Italy and the Netherlands in this period and more marked

in other countries such as France and Sweden (Gottschalk and Smeeding 1997).

Table 1.2. Classification of cases

Educational expansion (and reduction of gender gap)	General trends in earnings inequality since the late seventies	
	Low/periods of some decrease	High/increasing
Low	Netherlands	--
High	Italy	UK

From this broad description it seems justified that the UK and the Netherlands are the most appropriate cases matching the high-high and low-low cells respectively. Sweden would be an interesting case of study since it displays both one of the lowest levels of earnings inequality in the period covered in this thesis plus a certain reduction in the proportion of people enrolled in education over successive cohorts, even when controlling for the size of the demographic pool. However, two matters militate against this choice. Firstly, this thesis is primarily concerned about educational expansion and not variation in enrolment over time (which would justify selecting countries with contraction and expansion). Secondly, the development of the research design and the comparability of the results would be endangered since the Swedish ECHP consists of cross-sectional data and most cross-sections in the Swedish LIS data contain data on tax units rather than households.[6] The choice of Spain for the high-low combination would be justified in terms of its belonging to the

[6] In the first part of the empirical analysis data from the Luxembourg Income Study (LIS) or from original national data harmonised by LIS are used, and three cross-sections containing the full set of variables of interest are required. In the second part, data from the eight waves of the European Household Panel (ECHP) are used. Details about these data sources are provided in Section 1.5 below and in the empirical chapters.

group of countries with relatively low earnings inequality (and little trend over time) and also showing one of the clearest and fastest expansions in both upper secondary and university education. Nevertheless, there are insufficient cross-sections of appropriate comparable data in the LIS data (that are used in the second part of the empirical analysis). Italy seems to be a good substitute for the high-low cell, with similar features in the earnings element and also a notable increase in both upper secondary and tertiary expansion. Finally, there is no European country covered by appropriate data for which both low educational expansion and high earnings inequality applies. This category will therefore be excluded from the analysis.

It is important to note that any ordering of countries regarding (a) the extent of inequality, and (b) trends in inequality over time available in the literature is necessarily affected by the choice of a particular sample, income definition, data source or inequality measure. For instance, Gottschalk (1993) in his analysis of family income in several countries during the eighties found that the ranking of both levels of inequality and differences over time was very sensitive to changes in the income concept that was used. Results vary too when different inequality measures are considered; this is the case because they tend to be unequally sensitive to different parts of the distribution (see, for example, Gottschalk and Smeeding 1997 for the US). However, the fact that the ranking of countries differs when one –or some– of these factors vary does not challenge the validity of the results. There are possibly as many pertinent choices in this respect as particular research interests in the discipline. Unfortunately, household earnings as defined in this thesis (earnings from labour of unpartnered male and female heads of the household, plus couples, including those with zero earnings) are rarely amongst the conventional income concepts addressed in the discipline –that has most often focused on individual earnings, earnings of husbands and wives, and family income.[7] This prevents the selection of

[7] This evidence is reviewed in Chapter 2.

countries from being based on levels and trends in inequality referring to strictly the same concept of household earnings used in the empirical analysis.

The purpose of this selection of countries is to test the robustness of the results in contexts with alternative combinations of women's educational expansion and household earnings inequality. It is important to note again, as mentioned earlier in this chapter, that of course much of the variation in changes in household earnings inequality in the three countries is likely to be attributable to a number of factors that are not addressed in this study. The aim of this thesis, however, is not to establish an exhaustive set of factors explaining cross-country variation in levels and changes in inequality, but rather to (a) demonstrate, at the micro level, that women's education has an effect on participation and family formation behaviour and that it, in turn, affects household earnings inequality, (b) quantify the effect of increased women's education on inequality net of changes in other related factors, and (c) test whether the size and sign of the effects of women's education are consistent across the three countries.

In the next section, the manner in which the empirical analysis was carried out is outlined, and the various data sources used throughout the thesis are described.

1.6. Research Design, Methods and Data

The empirical analysis of the thesis consists of two distinctly differentiated parts. The first part –Part II of the thesis– offers an exploration of the micro mechanisms that operate behind the relationship, at the aggregate level, between women's educational expansion and changes in earnings inequality between households. In particular, an account of whether and how household formation and labour participation processes at the individual level are related to the acquisition of a particular position in the household earnings distribution is provided, and differences across women's educational levels in the propensity to engage in those processes

and to end up being located in a particular range in the earnings distribution are illustrated.

The position that households attain in the distribution of their earnings can be considered a function of two different factors: the resources that their various members realise in the labour market and the composition or nature of those households. Put simply, if the distribution of personal earnings depends on how earnings are allocated to individuals, then the distribution of household earnings depends, in addition, on how earners and non-earners are allocated to households. The first factor is explained by the amount of paid work undertaken by different persons in the household, whereas the second factor has to do with the manner in which households are formed, change and dissolve. A number of studies have addressed the generation of individual (usually men's) earnings, but even when the earnings of spouses have been analysed, explanations have been restricted to labour participation processes. Less emphasis has traditionally been placed on other processes that affect changes in household earnings and that operate mainly via changing the composition of the household itself (Bane and Ellwood 1986, Jenkins 2000a).

Chapters 3 and 4 present evidence on some of the processes at the micro level that have an effect on the manner in which women's (and their households') earnings are generated accounting for the two types of factors that have been mentioned, namely participation in paid labour, on the one hand, and household composition on the other. The analysis in each of these chapters is twofold. Firstly, returns to women's and their partners' education are estimated taking into account two complications, namely multiple selection and endogeneity. The most obvious source of self-selection occurs because women's earnings can only be observed for women who do some amount of paid work. However, women's participation in the labour market is not –at least not in this thesis– regarded as independent of their coupling and fertility behaviour, and so the three potential sources of selection are taken into account. Endogeneity takes place because factors affecting the generation of earnings levels are likely to, at

least in part, also explain the demographic and labour processes that have an effect on those earnings levels –or, put differently, those demographic and labour processes are likely to be correlated with unobserved factors that might be affecting earnings. Models to estimate simultaneously earnings levels and the tendency for women to belong to specific household types that are associated with those levels are fitted for women with varying educational levels. Secondly, in order to illustrate the size of demographic and labour effects on household earnings levels, expected household earnings are presented for women –households with women– with different educational levels, and consequences for inequality are discussed.

In the first part of the empirical analysis, data from the European Community Household Panel Survey (ECHP) are used for the three cases of study: the United Kingdom, the Netherlands and Italy, for which the complete series of waves (1994 to 2001) is available. The ECHP is a large-scale European survey that combines a representative sampling of households and individuals in each country, the use of standardised questionnaires, coverage of a very wide range of topics –including relatively detailed information on income components– and a panel structure that allows changes over time at the micro level to be uncovered. In the ECHP, in those countries where national panel datasets were being conducted in parallel (SOEP in Germany, PSELL in Luxembourg and BHPS in the UK) there are two different subsets of data overlapping in some waves. In the case of the UK, the ECHP version of the data covers only the first three waves (1994-1996), and so the BHPS version is used in the analysis. However, some limitations in the use of these data for the particular application carried out in this part need to be pointed out. On the one hand, some of the information is not fully consistent across countries, and so comparisons of the results in the three different national contexts should be interpreted with caution. On the other hand, some adjustment to the available data has been undertaken in order to correct for some inconsistencies in the original dataset. Despite these relatively minor drawbacks, that are explained in

Chapters 3 and 4, the survey generally serves the purpose of investigating processes at the individual level for the relevant countries that other existing datasets would not have allowed.

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Once the existence and strength of the associations at the micro level are established, the second part of the empirical analysis –Part III of the thesis– turns specifically towards changes over a long time-span in the marginal distribution of women's educational levels and the measurement of the extent to which it might have contributed to changes in household earnings inequality in the three countries under investigation. For this purpose, several counterfactual analyses are conducted. Their aim is to quantify the impact of increased education that takes place via each of the proposed demographic and labour market processes on changes in earnings inequality between households during the eighties and nineties.

In particular, in Chapters 5 and 6 the question of what would have happened to the earnings distribution at three points in time over the eighties and nineties if the distribution of women's educational attainment had remained constant at their earlier levels is addressed. The analysis takes advantage of the additive decomposability of the Theil index –a synthetic measure of inequality that belongs to a larger family of measures known as the General Entropy class. This property means that total inequality can be expressed as the weighted sum of inequality in the different (exhaustive and mutually exclusive) subgroups into which the total population is split and that, therefore, the contribution of each group to total inequality can be quantified. In this framework, in order to comprehensively capture the demographic and labour processes associated with increased women's education that have been described earlier in this Introduction, subgroups refer to household types defined as combinations of the four variables of interest: women' education,

men's education, women's labour participation and men's labour participation.

An assumption behind many counterfactual analyses (and in most conventional decomposition exercises of inequality) is that changes in key variables need to be conceived as being independent of other variables in the model. A counterfactual result in a decomposition exercise often implies that a change in one of the variables leaves the other variables in the model unaffected. This might be implausible in many instances. In the particular application conducted in Chapters 5 and 6, in which changes over a long period of time in the marginal distribution of women's education are examined, it is argued that a significant rise in the proportion of women with higher levels of education should not be regarded as independent of the rest of the processes involved (e.g. it should have some effect on women's propensity to enter the labour force and to be employed, to remain unpartnered, to intermarry, etc.).

Earlier decompositions of inequality into a between- and a within-group component were generally either limited to the use of a single variable, such as age, to define the groups (as in Mookerjee and Shorrocks 1982); or to several variables in which, however, each was treated separately (as in Jenkins 1995); or a multivariate distribution which was gradually built up adding successive variables (as in Cowell and Jenkins 1995). These approaches would admittedly be subject to the criticism above, inasmuch as the specification of relationships between variables was severely constrained by the method, the number of variables considered and their associations had to remain relatively simple, and so the whole enterprise could be accused of being, to some extent, mechanistic.

The Deming-Stephan decomposition that is carried out in this thesis avoids these shortcomings by providing considerable flexibility in the handling of (a) marginal distributions of all the variables involved in the exercise, (b) all the associations between them, and (c) combinations of distributions and associations. The extent to (and the manner in) which changes in other variables and

in associations between them are considered depend in this approach on the theoretical plausibility of relationships between variables and not on which degree of complexity the method is able to accommodate. In this Introduction and in Chapter 2 (and, more briefly, in Chapter 5), a detailed account of the alleged links between women's increased education and earnings inequality between households is offered. Particular choices as regards the variables and associations between variables that are allowed to change or, alternatively, that remain unaltered strictly derive from those theoretical expectations. In any case, the advantages of using counterfactual analysis as an analytic exercise clearly overcome its shortcomings.

The data for the UK in this part are drawn from the UK Family Expenditure Survey (FES). The FES is a nationally representative, cross-sectional study collecting detailed information on individual and household income and expenditure. The 1979, 1991 and 2000 surveys are used. These cover the range of years that witnessed the most marked increase in inequality in the UK (and in the US) which, at least to some extent, inspired the resurgence of the topic of earnings inequality in the Social Sciences. The FES has been the most commonly used UK original national survey by the Luxembourg Income Study (LIS), and comparisons of the FES with alternative data sources have confirmed its validity (see, for instance, Atkinson, Micklewright and Stern 1988 for a comparison with the New Earnings Survey).

The analysis for the Netherlands and Italy employs Luxembourg Income Study (LIS) harmonised datasets. For the Netherlands, 1983, 1991 and 1999 surveys are used; those derive from the Additional Enquiry on the Use of (Public) Services and from the Dutch Socio-Economic Panel. For Italy, data drawn originally from The Bank of Italy Income Survey for 1986, 1993 and 2000 have been used. The choice of those years aims at covering approximately the same period –the eighties and nineties– in the three countries. Table 1.3 shows the source and survey years used for the analysis of each country.

Table 1.3. Datasets used for each country in Part III of the thesis

Netherlands	LIS 1983	LIS 1991	LIS 1999
UK	FES 1979	FES 1991	FES 2000
Italy	LIS 1986	LIS 1993	LIS 2000

The main advantage of using LIS data, either original national surveys such as the FES or harmonised data, is that a great –albeit imperfect– degree of comparability of measures, concepts and units of analysis across countries regarding earnings distribution is achieved. However, despite the LIS continuous efforts to ensure both consistency in these aspects across countries and years on the one hand and data quality on the other, the analysis cannot be replicated in exactly the same manner in all cases since some differences as regards the definition of income or other relevant variables such as educational level, the extent to which information for all or only certain household members is available, etc. do exist. These differences are addressed in detail in the relevant chapters.

1.7. Definitional Issues

There are several analytical decisions as regards the definition of the unit of analysis, the income concept that is considered, and the samples used, that should be made explicit. First, this study is concerned with households –generally defined as those sharing the same dwelling and having some common living arrangement– and not the family unit. The focus on the family obscures the fact that there might be family members belonging to different households or households in which more than one family unit coexist (Atkinson 1975). Although looking at households could overestimate the degree of resources pooling in household formed by unrelated persons –the assumption of income sharing is not as problematic among households formed by related individuals, there are substantive as well as practical grounds for the focus on

households rather than families in this study. On the one hand, it allows the inclusion of unmarried couples, which would otherwise be classified as separate single-person families. This is a crucial advantage for the research question of this study inasmuch as some of the expected effects on inequality operate via changing marriage patterns. On the other hand, the household has most often been chosen as the unit of analysis in the field, which improves the degree of comparability with previous results, and it tends to be the unit that data allowing cross-country analysis, also those used in the empirical analysis presented in this thesis, have adopted (Atkinson *et al.* 1995).

Second, the distribution of income components other than earnings –defined as incomes from wages and salaries and self-employment– is not considered. The analysis is therefore restricted to the resources that households achieve through their labour participation. There is consistent evidence that the lion's share of household income derives from its member's work –employment and self-employment (Atkinson *et al.* 1995, Atkinson 1997). Wallerstein (1999) argued that the contribution of earnings from labour to total income is such that differences in the distribution of the former explain most of the variance across countries in the latter. Admittedly, despite it consistently constituting the strongest component of total income, the weight of labour income has been falling in developed countries over time. Moreover, it shows varying relevance at different parts of the distribution and at different stages of households' life-cycle, with households at the bottom part of the distribution and in prime-working ages relying more heavily on this income source, and in different counties. However, there are two reasons why earnings rather than other income definition is chosen, one is substantive, the other is of a technical nature. If the research question involved an explanation having straightforward effects on several components of total income, one might wish to compare increasingly comprehensive distributions as regards the various subcomponents that shape total household income, thus testing the relative role that the explanation plays on each of them. However, in the case of the

particular research question that this thesis tries to address, the logic of the explanation does not directly speak to components of disposable income other than earnings. Earned income can be conceived as a direct return to educational attainment, much more so than any other subcomponent of total income such as interest, dividends, rents, or income from benefits, which are, in principle, not as straightforward a consequence of education, and therefore, than total income itself. In addition, earned income can be considered the most consistently defined subcomponent across time and countries. Other components of disposable income are significantly varied as regards their inclusion in survey data, definition, and treatment across countries and over time within nations (Atkinson *et al.* 1995).

This focus on earnings only is of course not inconsequential for the results. On the one hand, to the extent that the weight of earnings on total income has decreased over time, then, generally, earnings have become, over time, a poorer indicator of the well-being that all households actually enjoy. On the other hand, if the idea that the weight of earnings on total income varies across different parts of the distribution holds, then it is likely that increasingly heterogeneous samples of households with zero and non-zero earnings are analysed in latter relative to earlier periods. Amongst working units, if households at the bottom of the income distribution rely more heavily on earnings, the subsample classified as having earnings might be a group adequately representing total incomes of the working population in the lower deciles, while under-representing the real standard of living that relatively well-off working households enjoy. The level of total income inequality would therefore be underestimated by using only earnings. Alternatively, in non-working units, the subsample displaying no income from labour could have become increasingly polarised, with greater shares of households at the bottom of the income distribution relying heavily on benefits (unemployment and pensions), most likely being included in the lowest deciles of the distribution of total income, and increasing numbers of households at the top counting on rents and dividends as their

main income source, thus possibly belonging to the highest deciles when the distribution of total income is examined. Looking only at earned income lumps these very different households together as having zero earnings, thus underestimating the actual level of total income inequality, or the magnitude of its increase. The final extent of total inequality would, in addition, depend on the nature of taxes on labour versus other income sources, and on the progressiveness of social programmes, particularly how able they are to grant a minimum income level in non-working households. A more specific discussion of the effects of the biases potentially incurred by focusing on earnings rather than total income is offered in Chapters 5 and 6 in the light of the empirical evidence presented there.

Third, the earnings of the household head and his/her partner, if present, only, are taken into account when computing total household earnings. Before tackling the issue of a potential bias implied by the exclusion of the earnings of other members of the household, a brief explanation of the definition of heads is provided. The household head in the analyses throughout the thesis can be either a man or a woman, depending on who was designated as the survey unit in the particular datasets. In the original country data, heads are usually defined in family terms in Italy –the husband or the father–, while in the Netherlands any household member older than 18 can be designated the head, although interviewers tend to suggest economic dominance criteria. In the UK, men and older members of the household tend to be assigned such a role. In order to increase comparability across countries and over time, however, in LIS datasets heads are consistently designated to be men among couples, even if the interviewed reported the female member as the head, and so only households in which the woman is not partnered are assigned a female head. As regards the exclusion of the earnings of other individuals, it is obvious that a number of units might include additional earners other than the head and partner. But whereas the educational attainment of the head and the partner, and the associations between them, can be seen, according to the

reasoning offered in this thesis, as having direct effects on their joint labour supply and earnings, they only affect indirectly the labour supply and earnings of other persons in the household, and so the analytical framework to analyse such interdependencies would be extremely complex, including inter-generational issues. However, the exclusion of earnings of other members in the household does not appear to be problematic. In Appendix 5.1 and Appendix 6.1, the proportion of households in each sample in which there are other earners across household types, their mean earnings, and total inequality measures are shown. Both the proportion and their contribution have fallen over time in the UK and in Italy. In the Netherlands, this proportion experienced a decline, and then an increase, and their contribution declined across all household types. As regards the effects on inequality of adopting the more inclusive definition of household earnings, the differences between the two approaches are negligible: the levels and trend in inequality are much the same whether other earners are taken into account or not. Only in Italy, total inequality differs depending on the definition of household earnings that is used, although the general trend remains.

Fourth, this interest in earned rather than total income justifies the selection of the sample of households potentially in working age, i.e. those in which the household head's age is between 20 and 64. In principle, this selection could be including individuals who are actually not working –those who are still enrolled in full-time education and the early retired– and thus a focus on households in prime-working age (25 to 54) could seem more appropriate. However, the aim of this choice is to maximise the chances of selecting households in which at least one of its relevant members has earnings. So, for instance, in a household formed by a couple, and whose head is an early retired male, the selection of prime-working age units would be excluding this household from the analysis even if the female member of the couple worked –and therefore had positive earnings. The implications of this choice are evaluated when the results in Chapters 5 and 6 are discussed.

Last, earnings, whenever the available data allow for it, are considered prior to taxes and transfers. Of course there is not *a* right decision in this regard, and the adoption of a pre- or post-fiscal approach inevitably depends on whether the processes that are analysed aim at explaining inequalities generated in the labour market or, alternatively, the extent to which taxes and transfers have distributional consequences, in which case the choice of disposable income –or the comparison between the distributions of original and disposable incomes– would be more appropriate. The main interest of this thesis is inequality generated in the labour market, not the redistributive role of taxes and benefits (for which, once more, the direct effects of education are significantly less obvious). Although it is true that (a) individual level of education is probably correlated with returns in terms of taxes and transfers, particularly in significantly redistributive systems, and (b) investments in education over a long time period, as well as pre-fiscal incomes, might to some extent be conditional on taxes and transfers received in the past (Lindert 2000), the link between them operates via earned income, since earnings serve as the base for a very large share of taxes are calculated and for eligibility to receive certain transfers (Atkinson *et al.* 1995). Several issues emerge when a post- approach is adopted. Although common definitions of disposable income include some of the most often received benefits, such as unemployment benefits, non-cash transfers such as the public provision of education or health care that obviously have an effect on monetary income are excluded. In addition, tax-rules are different across nations and have experienced changes over time; when there is joint taxation, it is not straightforward to attribute shares of post-fiscal income to each member of the couple. Earnings throughout this thesis refer, then, to pre-fiscal amounts, except for the analysis of Italy in Chapter 6, in which net income variables only are recorded in the original data on which the Luxembourg Income Study draws.

1.8. Structure of the Thesis

This thesis is structured as follows. *Part I* presents the question that drives this research, places it in the context of the relevant theoretical debates existing in the literature and of the pieces of empirical evidence that triggered the whole project. In Chapter 1, the research question is discussed, its relevance is evaluated, and the main hypotheses are proposed. The selection of cases, methods and data are also discussed. In Chapter 2, the manner in which the literature has referred to the links between women's educational attainment and the demographic and labour-related processes that affect inequality is presented and critically assessed. The implications of those links in terms of changes in the ways in which the distribution of household earnings shifts over time are summarised.

Part II explores the effects of women's education at the individual level on the generation of earnings levels and changes in them using data from the European Household Panel Survey (ECHP), and discusses the implications of these micro processes for earnings inequality. Chapter 3 presents a thorough explanation of the methods that are used and presents the results for the United Kingdom. In Chapter 4, the empirical analysis is extended to the other two cases under study, namely the Netherlands and Italy, and a summary of the main findings in the three countries is put forward. *Part II* concludes with a discussion of the implications of those results in terms of earnings inequality and changes in it.

In *Part III*, the existence of the alleged effects of women's increased education on inequality between households over the eighties and the nineties is evaluated. The impact of educational expansion –via family composition and labour participation processes– on inequality and changes in inequality is quantified using several counterfactual analyses. In Chapter 5, the methods used in the decomposition and counterfactual exercises using the Family Expenditure Survey (FES) for three different cross-sections are described at length, and the results for the United Kingdom are presented. In Chapter 6, the analyses are replicated

for the Netherlands and Italy, and the findings for the three countries are discussed.

Finally, Chapter 7 in *Part IV* concludes with a reassessment of the research question and the hypotheses in light of the main findings provided by the study. An account of the limitations of the thesis and of its theoretical and empirical contributions in the context of the relevant literature in the discipline is also offered.

CHAPTER 2. EDUCATIONAL EXPANSION AND EFFECTS OF CHANGES IN WOMEN'S LABOUR SUPPLY AND OF HOUSEHOLD COMPOSITION ON INTER-HOUSEHOLD EARNINGS INEQUALITY. A REVIEW

In this chapter, the research question is put in the context of the main literature that has taken into account the impact of women's increased labour supply and of changes in the composition of households. The potential effects of (women's) educational expansion on those labour and demographic changes are presented, and the empirical literature that seeks to assess their implications in terms of earnings inequality between households is reviewed.

In the first section of this chapter, a succinct description of educational expansion and the narrowing of the gender gap in education in several countries is provided. It is not an objective of this thesis to explain why the expansion takes place or why it occurs to varying degrees across countries and, therefore, throughout the thesis, women's educational expansion will be

regarded as exogenous.[1] The remainder of the chapter is devoted to a discussion of how changes in women's labour supply and in the composition of households should challenge more conventional approaches to the explanation of household earnings differences. Specifically, in Section 2.2, a brief account of changes in men's earnings as the main explanation of inequality between households is given. In the following section, the literature that includes wives in the explanation is presented and discussed. Section 2.4 presents several arguments for the inclusion of women other than working wives. Finally, the last section concludes with a reference to the (scarce) literature that has addressed the effects of changes in household composition on earnings inequality in a more comprehensive manner.

2.1. Educational Expansion in Industrialised Countries: An Overview

Industrialised countries have witnessed a notable educational expansion in the last three decades. Mean educational level has increased substantially and the proportion of people with upper secondary and higher education has also grown very rapidly. In this thesis, educational expansion is taken as exogenous so an explanation as to why women proceed on to further levels in greater proportions over time is not intended. Nevertheless, a brief discussion of the suggested causes for this dramatic increase in the average educational level is provided. These could be grouped into two broad categories.

On the one hand, explanations associated with the fall in the costs of education have been put forward. In particular, it has been

[1] Mare and Maralani 2006, for instance, have analysed how the distribution of education in one generation of women affects, in addition to the level of education at the individual level, the distribution of education in the following generation. Buchmann and DiPrete 2006 have explained why women outweigh men in the completion of university degrees in the US.

suggested that incentives introduced by the state could be determinant. These incentives have been introduced through educational reforms, and specifically, by the extension of further compulsory formal education, i.e. raising the minimum level at which students are allowed to leave education, and decreasing the financial costs associated with education (via the reduction of fees or other material costs).

On the other hand, variations in average educational attainment could be due to changes in individual (students) and/or family expectations. The willingness of individuals to pursue higher levels of education might have been motivated by changes in the value they attach to education as a consumption good (if the value is associated with the fact of studying itself) or as an investment good (if the value deals rather with the returns –usually labour market returns– that they expect to get as a consequence of extending their education). In this latter case, greater pressure for expansion would have been exerted because education is perceived (or actually is) a more valuable endowment in the labour market. In the particular case of women, and since the timing of their incorporation into the labour force roughly coincides with that of expansion, this explanation seems to be rather plausible. Note that this would particularly be the case in countries in which the level of education rather than the type (academic/vocational) is what shapes the actual outcome in the labour market.

In the following pages, the overall trends with regard to this expansion are described. It is clear that much could be written about specific national contexts and about the similarities and differences between them. However, the aim of this section is to explore the points of convergence in different national contexts at a basic descriptive level, rather than providing a very detailed account of the specificities of each national system.

2.1.1. The Size of the Expansion

There is little disagreement within the academic community about the general increase in educational levels in industrialised countries. Gross student enrolment in upper secondary and higher education as well as the proportion of enrolments by demographic cohort have continuously increased. That is to say that the mean educational level of the population in these countries is now higher, and that more people in each demographic cohort moves onto further levels. Of course the size of the expansion in each country is highly contingent on what reference point in time is taken (the timing of the expansion differs across countries) and what room for further expansion was left at that time. In their analysis of thirteen industrialised countries, Shavit and Blossfeld (1993) showed a very clear-cut expansion. Significant inter-cohort changes –across a time span of the seven first decades of the 20th century– were reported in all thirteen countries in terms of their mean educational level. Educational expansion is considered in this study as relative to the size of the cohort, i.e. as the proportion of each successive cohort pursuing a particular educational level. Moreover, considering the different levels separately, the following results were found. Primary education has become universal in all the national contexts, and a generalised marked expansion has taken place at the lower secondary level. At the upper secondary level, expansion has occurred as well, although at varying degrees across countries. The most notable expansions at this level took place, according to Shavit and Blossfeld, in the US, Italy, Japan and Israel. At the tertiary/university level, no expansion was observed in the Netherlands, Taiwan, Hungary and Poland. The authors noted that in some countries access to university remains quite exclusive, and the transition from secondary to tertiary education is severely reduced by bottlenecks. At this tertiary level, one of the clearest differences in the type of education that was expanded lies in the academic/vocational divide. Whereas expansion of general academic education has taken place in countries such as France, vocational education has

been promoted in countries like Germany. This point is taken up again later in the chapter.

Green *et al.* (1999) analysed educational expansion in EU countries during the eighties and nineties to identify convergences and divergences in different outcomes. When participation rates were examined, their main conclusion was that between 1985 and 1994, the number of full-time students aged 5 to 29 increased in all the countries where data were available. Table 2.1 shows gross and net enrolment rates in secondary education (lower and upper levels) in selected countries since 1960. These data show that the timing of the expansion of this level differs greatly across countries and that, by the mid nineties, most of them had net participation ratios above 90.[2]

Since primary and lower secondary education are compulsory in most EU countries, the patterns at the upper secondary and tertiary levels when demographic size is taken into account are expected to more accurately show the real amount of variation across countries in the size of the expansion. At the upper secondary level, and between the mid seventies and the mid nineties, the only case in which any decline in enrolment rates at all has been documented is Austria.[3] All remaining EU countries showed net increases during the same period and using the same type of measurement. By 1994, the highest participation rates within the European Union were found in countries such as Belgium, Spain, Italy and Finland (Green *et al.* 1999: 269).

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[2] In the World Bank data presented in Tables 2.1, 2.2 and 2.3 gross enrolment refers to the ratio of total enrolment, regardless of age, to the proportion of the age groups that officially correspond to that level of education. Alternatively, net enrolment refers to the ratio of the number of children of official school age who are enrolled in a particular level to the population of the corresponding official school age.

[3] The fall in upper secondary participation relative to the 5-29 population is due, according to the authors (Green *et al.* 1999) to a combination of the specific features of its demographic decline and the high participation rate that it already showed at the beginning of the period that their study covers.

Table 2.1. School enrolment in secondary education, selected countries and years, gross and net

	1960		1970		1980		1990		circa 1995	
	gross	net	gross	net	gross	net	gross	net	gross	net
Austria	50	n.a.	89	69	93	91	104	96	103	97
Belgium	69	n.a.	81	n.a.	91	96	103	100	146	100
Denmark	65	n.a.	93	n.a.	105	89	109	88	121	89
Finland	74	n.a.	102	71	100	87	116	95	117	94
France	46	n.a.	73	66	85	94	98	97	111	99
Greece	37	n.a.	63	52	81	75	93	83	95	89
Ireland	35	n.a.	74	63	90	90	100	94	118	100
Italy	34	n.a.	61	n.a.	72	70	83	79	95	93
Netherl.	58	n.a.	75	69	93	93	120	95	131	100
Norway	57	n.a.	83	65	94	84	103	88	118	97
Portugal	n.a.	n.a.	56	30	37	44	67	66	111	90
Spain	23	n.a.	56	40	87	79	104	92	120	92
Sweden	55	n.a.	86	n.a.	88	83	90	85	140	100
Switzerl.	26	n.a.	60	n.a.	94	80	99	81	100	85
UK	66	n.a.	73	67	84	88	86	88	129	93

Circa 1995 refers to the latest available value for the nineties (most often 1995 or 1996).
Source: World Bank 2000.

Tertiary (university and non-university) education has also expanded significantly, particularly in Scandinavian and Southern European countries (Table 2.2). When gross expansion is examined, i.e. when the size of the entrant cohorts is not controlled for, notable differences arise. At the beginning of the seventies, the highest gross enrolments in tertiary education were concentrated in Nordic countries (the Netherlands, Sweden and Denmark), whereas Spain, Ireland and Austria presented remarkably low levels. In all countries some expansion of gross enrolment at this level took place, and the ranking of countries varied markedly. Estimates using other data suggest that, interestingly, it does not seem to be only countries with initial low participation rates (around 1975) that have expanded the most.

Ireland and the UK did grow substantially between 1985 and 1994 despite the fact that, according to the authors' computations (Green *et al.* 1999: 39) they belonged to the low participation cluster in the mid seventies. Austria, despite belonging to this same group, experienced a much more limited expansion at this tertiary level (around 28 per cent, in fact one of the three with the smallest rise). Alternatively, in countries with the highest participation in 1975, the expansion relative to demographic cohorts was moderate (47 per cent in Denmark) or even negative (-13 per cent in Sweden). Amongst countries with medium participation rates in 1975, the expansion has taken place at varying degrees, with the Spanish case showing the highest increase, the German the lowest, and countries such as Italy and Finland displaying notable expansions as well (69 and 64 per cent respectively).

Alternatively, when the rates at this same tertiary (university and non-university) level are reported net of the size of the relevant demographic cohorts, as expected, general increases but much less variation are observed. Overall, a doubling of the EU mean rate since the mid eighties has been reported. Sweden still stood out as the exceptional case with no significant change in participation rates over the two decades. The highest enrolment levels by 1994 were observed in Finland, France, Spain and Denmark, while the lowest rates took place in the UK and Ireland (Green *et al.* 1999).

Despite these variations across countries, a clear generalised expansion has taken place at the two educational levels that are relevant for this thesis. When the time span is reduced to the most recent decades, an increase in mean educational levels is still evident. In the next section, the topic of gender inequalities in enrolment at different educational levels in different national contexts is addressed.

Table 2.2. School enrolment in tertiary education, selected countries and years, gross

	1970	1980	1990	circa 1995
Austria	12	22	35	48
Belgium	17	26	40	57
Denmark	19	28	37	45
Finland	13	32	49	74
France	19	25	40	51
W.Germany	n.a.	n.a.	n.a.	n.a.
Greece	13	17	36	47
Ireland	12	18	29	41
Italy	17	27	32	47
Netherlands	20	29	40	47
Norway	7	26	42	62
Portugal	16	11	23	38
Spain	7	23	37	53
Sweden	22	31	32	50
Switzerland	n.a.	18	26	34
UK	14	19	30	52

Circa 1995 refers to the latest available value for the nineties (most often 1995 or 1996).
Source: World Bank 2000.

2.1.2. The Gender Gap in Education

Shavit and Blossfeld (1993) demonstrated that in all ten countries in which data to address this aspect of expansion were available, a major reduction of the gender gap was detected. Actually, it is nowadays an uncontested fact that the narrowing of the gender gap in education constitutes a universal feature in industrialised countries. In some of the cases (particularly the US, Poland, Germany and Sweden), the gap was found to have been reversed. Girls, therefore, have benefited to a greater extent from

the expansion of national educational systems (whatever the causes underlying such process) than other groups with below-average participation (specifically they refer to boys belonging to the lower classes). The explanations as to why this has been the case vary substantially. Although it is not amongst the main interests of the thesis to discuss in detail the various explanations and their plausibility, the main arguments that have been put forward in the literature are briefly presented.

Firstly, it has been argued that girls opt for educational tracks that do not involve vocational training, and this promotes their accession to further levels (Heyns and Bialecki 1993). The suggestion that women are underrepresented in upper secondary vocational tracks is supported by empirical evidence, especially in certain clusters of countries (see below). Nonetheless, a number of national educational systems' reforms have aimed specifically at facilitating the transition from these vocational tracks to some types of tertiary (university and non-university) education. However, these changes in the system should in principle have a gender neutral character, so it is not a full justification as to why gender differences are still at work.

Secondly, some authors have claimed that families' traditional pattern of inferior investment in girls' education has diminished, most notably among the middle classes (Jonsson 1993). Some sort of discrimination against girls was supposed to be at work in past decades that favoured investments in boys' rather than girls' education. The reasons underlying this lower investment could be related to their relative lower propensity to participate in paid work or to get high returns in the labour market. With demand-driven changes in women's labour opportunities, girls (or their families) could also invest more in education if the importance of marriage (versus own financial independence) has declined.

As Table 2.3 shows, the presence of women in education has increased since the sixties in all countries and at all levels in which a significant gap persisted. The most notable reduction in the gender gap in the last forty years has occurred in tertiary education. In all countries the percentage of women at this level

increased; despite the varying gender gap across countries in 1960, by the mid nineties in all countries there was a reduction in it and a marked convergence took place. Estimates made by the Commission of the European Communities (1996) suggest that women's enrolment in upper secondary education relative to men's increased between the mid seventies and 1990 in all countries, and that in some of them –Spain, Ireland, Portugal, Finland, Sweden and the UK– the previous trend has reversed and women's enrolment has surpassed men's rate considerably. Alternatively, in countries such as Germany, the Netherlands and Austria the gender gap had still not vanished by the beginning of the nineties.

Table 2.3. Percentage of women in secondary and tertiary education, selected countries and years

	Secondary					**Tertiary**				
	1960	1970	1980	1990	c. 1995	1960	1970	1980	1990	c. 1995
Austria	n.a.	n.a.	n.a.	n.a.	n.a.	23	29	42	46	49
Belgium	48	n.a.	n.a.	49	50	26	36	44	48	50
Denmark	n.a.	n.a.	49	49	49	31	37	49	52	54
Finland	n.a.	n.a.	n.a.	53	52	46	48	48	52	53
France	52	51	52	50	49	n.a.	n.a.	48	54	55
Greece	n.a.	43	46	48	49	25	31	43	49	48
Ireland	n.a.	51	52	51	51	30	34	41	46	52
Italy	n.a.	n.a.	n.a.	n.a.	n.a.	27	38	43	48	54
Netherl.	n.a.	45	48	47	48	26	28	40	44	48
Norway	n.a.	n.a.	50	50	48	34	30	48	53	56
Portugal	n.a.	45	n.a.	n.a.	51	30	44	48	56	57
Spain	n.a.	42	50	n.a.	n.a.	23	27	44	51	53
Sweden	50	n.a.	52	50	52	36	42	n.a.	54	56
Switzerl.	n.a.	n.a.	46	47	47	n.a.	n.a.	30	35	38
UK	48	48	50	50	52	n.a.	33	37	48	52

c.: circa
France 1981/1991, Greece 1981/1991, Sweden 1981.
Source: World Bank 2000.

According to the same set of data (Commission of the European Communities 1996), the picture regarding higher education is clear-cut. With only the German case as an exception (where there was some expansion of women's relative enrolment followed by a contraction), in all EU countries there has been a notable narrowing of the gender gap and, again, in a few countries women's presence has even outweighed men's enrolment –the most significant cases being Portugal, Sweden, Denmark and Spain. As was the case for upper secondary education, at the tertiary level a relatively large gap remained –by 1990– in Germany, the Netherlands and Austria. It could be argued that in these countries, where vocational education is very strongly developed, this track attracts males who fail to attain general academic standards, whereas it is not able to provide alternatives for females to a similar extent.

2.1.3. The Convergence across Countries

The general trend of convergence across countries –both in educational expansion of successive levels and in the narrowing of the gender gap– that has been depicted thus far does not preclude the existence of relevant differences –in the timing of both phenomena, for instance. Notable differences appear, for example, regarding the moment in which the main expansion took place. By the mid seventies some countries had already experienced significant increases at all educational levels. The 'when' of the expansion is important because it could be reflecting policy changes (e.g. extensions of the compulsoriness of certain levels, changes in the direct costs of education…) or changes in individual/family decisions about the willingness to continue to further educational levels (e.g. changes in aspirations, in the perceived returns to education…) that take place unevenly in time across countries.

With respect to the patterns in the timing of the gender equalisation of educational enrolment, clear divergences across

countries are observable. The gender gap in upper secondary education has experienced a notable decline in this period. The countries with higher proportions of women relative to men at this particular educational level in the early nineties were Finland, Portugal, Spain and the UK. Alternatively, the widest gender gap was found in countries such as the Netherlands, Austria and Germany. If emphasis is put on how much the gap had narrowed in the fifteen years' time span that was considered, the most significant reductions took place in the same countries that witnessed the highest female relative enrolment ratios, i.e. the UK, Spain and Portugal.

With regard to differences in male and female enrolment at university level, whereas by 1975 the gender gap was around 10 per cent in Denmark, France or Portugal, in other countries such as Ireland, the UK, Spain or Greece, the gap at that point in time was as much as four times larger. By 1990, the gap had disappeared in Spain and Greece, and had narrowed considerably –32 and 37 per cent respectively– in Ireland and the UK (Commission of the European Communities 1996).

Further nuances both in terms of the size of the expansion and of the narrowing of the gender gap can be detected in the across-country picture when different tracks are considered. Enrolment rates have expanded unevenly between general/academic and vocational training at the upper secondary level, and the incorporation of women to these different tracks has not taken place homogeneously. In some countries –remarkably those with strong vocational training closely linked to the labour market– a notable under-representation of women exists.[4] By 1994 in most EU countries women were over-represented –relative to men– in upper secondary general education, especially in the Scandinavian countries (notably Sweden, Finland and Denmark with 144, 140 and 134 girls per 100 boys respectively). The biggest increases

[4] In countries with a strong vocational track (notably Austria, Germany and the Netherlands), the share of students in such programmes relative to all upper secondary educational enrolments stands at around or above 70 per cent (Green *et al.* 1999).

relative to the previous decade took place in Germany and Italy, whereas in countries such as France and Finland the change was negative (Green *et al.* 1999).

With regard to upper secondary vocational education, the pattern is rather different. In 1994 only in the UK, Finland and Spain did women outweigh men in this track. In a number of countries women were significantly underrepresented (notably Greece with 52 females per 100 males and, to a lesser extent, France, Germany, the Netherlands, Denmark and Austria). Despite this under-representation in several countries, an increase in the relative number of women took place between the mid-eighties and the mid-nineties in eleven out of the fifteen countries. Arguably, in these countries a higher proportion of women opt for general/academic programmes when they decide to go on to non-compulsory educational levels. It is also the case that some of these countries show below average female participation in the labour force.

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Ultimately, the objective of this thesis is to explain changes in the distribution of household earnings. The most straightforward effect of education (and of educational expansion) on individual earnings inequality operates via returns to education. These returns are addressed in Part II of the thesis (Chapters 3 and 4). But the connections between educational expansion and household earnings inequality that are of particular interest in this thesis have to do with the inclusion of changes in the labour supply of women and in the composition of households. In the remainder of this chapter, the need to systematically consider (all) women in the study of household inequality is justified in the light of changes in women's participation and family formation trends, and the various attempts found in the literature to include women's earnings in the explanation of inequality between households are discussed.

2.2. The Conventional Approach to the Explanation of Inequality between Households

During the post-war period, characterised by male full-time life-long stable types of work, the incidence of women's employment in most countries was limited. The male breadwinner model was prevalent and women's participation in the labour market remained exceptional, usually taking the form of secondary workers. When addressing changes –across-countries and over time– in the distribution of income and earnings between households, often the strongest explanatory power has been given to changes in the male wage distribution. The UK and, particularly, the US, have received special attention in this respect because they experienced the most marked increases in earnings and income inequality, most notably during the eighties. There is a great deal of descriptive literature on trends in male earnings and how it often runs parallel to changes in individual and household income inequality, especially for the US, but it is not an objective of this thesis to review it exhaustively. Generally speaking, however, it is important to note that, until relatively recently, a large part of the explanations of changes in inequality between households focused almost exclusively on male earnings (usually on full-time full-year male workers). Not surprisingly it soon became commonplace to assume that changes in the characteristics of male workers such as changing returns to age, skills or occupation (see, for example, Gottschalk and Joyce 1998) were the main contributor to increased inequality. However, two different sets of findings started to suggest that this type of explanation was somewhat simplistic.

On the one hand, when other countries were examined, the explanatory power of male wage dispersion proved significantly weaker. The strong relationship that was found in the US did not hold, at least not to the same extent, in other countries, and periods of increasing wage dispersion did not appear to always coincide with periods of increasing income inequality. Blau and Kahn (1996) reported large international variation in the level of wage

inequality for men during the eighties. The same decade was covered by Gottschalk (1993). Although the level of earnings inequality seemed to have risen for all seven countries under study, the increase was not uniform. The US was again found to have experienced the largest increase in male earnings inequality, followed by the UK and Canada, whereas the smallest increase took place in Sweden.

On the other hand, the increasing contribution of women's earnings to household income became evident and, although these effects were not systematically considered, several academics recommend enriching the analyses in the discipline to include sources of income from members of the household besides the male heads. For instance, Burtless (1999) found that about three quarters of total inequality between 1979 and 1996 in the US would have taken place even if there had been no change in the distribution of men's earnings. Taking a longer time span, Gottschalk and Danziger (2005), have recently confirmed that earnings of heads in the US have been falling in the last 25 years whilst working wives contributed an increasing share of family income. Jenkins (1995), using decomposition analyses by income source, reached similar conclusions for the UK.

Obviously the contributions available in the literature have not been restricted to male heads' personal earnings, but they can certainly be considered to represent the most recurrent explanation from the supply side. Alternative types of explanations in the field usually rely either on institutional or political factors, such as the role of unions in wage-setting or the minimum wage (see DiNardo *et al.* 1996, Wallerstein 1999) or on demand-driven factors, where the main explanations refer to technological change, characteristics of the welfare state, and the effects of globalisation (Alderson and Nielsen 2002). In addition, the consideration of –often disregarded– sources of income such as capital and wealth has been suggested (Atkinson 2003). But comparatively few studies have addressed women's earnings in a systematic and comprehensive manner (see below), and it is even more rare to find references to the effects of household composition. In this

thesis, attention is focused exclusively on supply-related factors (labour supply of both men and women are analysed), and so there is no attempt to also include demand-side factors.

2.3. The Picture Gets Broader: Accounting for Women's (Wives') Earnings

2.3.1. Increased Women's Participation in the Labour Force: More Women Work

In approximately the last four decades, dramatic changes have occurred in the division of tasks within the family, and the amount of households in which women contribute substantially to household income through their own earnings has rapidly increased virtually everywhere. Of course both the timing and the level of women's participation in the labour force differ greatly across countries (see Table 2.4). Whereas in Scandinavian and Anglo-Saxon countries women's incorporation into the labour market happened earlier in time, and has reached considerable levels, in Continental Europe their entrance seems to have been slightly delayed. Southern European countries experienced the biggest lag both in terms of timing and of the current observed rates.

Table 2.4. Female labour force participation rates in selected OECD countries and years. Women aged 25 to 54

	1970	1975	1980	1985	1990	1995	2000	2005	Change 85-05	Change 75-05
Australia	43	50	53	57	67	69	71	74	+30	+48
Austria			-	-	-	73	76	80		
Belgium			-	57	61	68	73	77	+35	
Canada			60	69	75	76	78	81	+17	
Denmark			-	85	88	82	84	84	-1	
Finland	71	79	83	87	86	84	85	85	-2	+8
France	50	58	64	69	73	77	78	81	+17	+40
(West) Germany	47	53	57	59	63	69 73	77	79	+34	+49
Greece			-	48	51	55	62	68	+42	
Iceland			-	-	-	88	88	85		
Ireland		26	-	37	45	55	65	70	+89	+169
Italy	28	31	40	48	54	53	58	64	+33	+106
Japan	55	52	57	60	64	65	66	69	+15	+33
Korea			48	48	54	55	58	60	+25	
Luxemb.			-	43	50	53	65	72	+67	
Netherl.		29	37	44	58	66	73	78	+77	+169
New Zealand			-	-	69	72	74	76		
Norway		55	69	76	79	80	84	83	+9	+51
Portugal		48	54	63	69	75	77	82	+30	+71
Spain		28	30	35	47	56	63	69	+97	+146
Sweden	64	74	83	89	91	87	86	87	-2	+18
Switzerl.			-	-	-	75	78	81		
UK			-	68	73	74	76	77	+13	
US	50	55	64	70	74	76	77	75	+7	+36
Europe (mean)	41	44	50	58	61	66	68	70	+21	+59

Source: OECD 2007.

Trends in the distribution of women's individual earnings have often been described in the literature. Not surprisingly, the US has produced larger amounts of evidence, and it has been shown that

changes in the distribution of women's earnings differ from the conventional results available for men. Burtless (1993), for example, studied earnings inequalities in the US in the seventies and eighties. Inequality for men increased during the seventies and, especially, during the eighties, whereas for women, there was a first period with a decrease in inequality in the seventies and a subsequent sharp increase in the following decade. Whereas men had earnings losses during those twenty years, women's wages experienced gains in all parts of the distribution, although the increase was three times larger in the top quintile when compared to the bottom quintile. Most of this rise was due to the growth in wage inequality per se rather than to the different amount of hours supplied in each of the quintiles. Similarly, for the UK Prasad (2001) found for approximately the same time period between 1975 and 1999 that wage inequality had risen more sharply for men than for women. In addition, within-skill-groups inequality – which accounted in that period for the largest part of total inequality–, was significantly lower for women than for men. However, it is clear that changes in the distribution of men's and women's personal earnings do not necessarily need to perfectly reflect changes in household earnings inequality. The latter depend on the different labour that is supplied by uncoupled women and men and, amongst couples, the correlation between wives' and husbands' labour supply and earnings. Trends in labour participation of couples and the correlation in their earnings are examined in the following section.

2.3.2. Wives' Different Propensities to Work and the Correlation between Spouses' Earnings

Parallel to the upward trend in female participation rates, women's (wives') contribution to household overall income has also increased. To provide a couple of examples, Burtless (1999) found for the US a significant increase in the average contribution of wives' earnings to family income. Cancian and Schoeni (1998),

comparing a number of countries in which several points in time could be observed, found that wives' earnings contributed an increasing share of total household income.

Individual labour decisions of members of the couple –and ultimately their labour outcomes– should not be considered as independent behaviours but rather as affected or constrained by other persons' circumstances. Labour decisions are primarily based on the allocation of housework and market work within the family; interactions include both incentives and disincentives that one partner's resources or labour circumstances can provide for the other partner. Since Mincer (1962, 1974) observed that women married to lower income men had a higher propensity to participate in the labour force than women married to better-off men, the argument that women were more prone to work when they were moved by financial reasons obtained much support in the discipline. The so called 'added worker effect' refers to the expectation according to which one spouse –the wife– would react to the husband's unemployment by entering the labour force and eventually employment, to compensate for the household loss of income. This expectation is based on theoretical models of family labour supply (Ashenfelter 1980), in which a very strong assumption is made, namely that married women are indeed secondary earners, strongly affected by circumstantial factors (Mincer 1962). Since these predictions were made, a large amount of research has been conducted which has sought to assess the empirical validity of the proposal. Extensive research assessing the correlation between husbands' wages and wives' labour supply has shown mixed results.

On the one hand, Killingsworth (1983), in a systematic review of the economic literature concluded that most studies found a negative effect of husband's wage on wife's labour supply, be it in terms of employment status or in the amount of labour that was supplied. These results suggested that the wives of men with higher earnings were less prone to be employed and, when they actually were employed, they were likely to work for fewer (weekly or monthly) hours. In general, when controlling for other

relevant factors, husbands' unemployment does not lower wives' reservation wage, which would theoretically increase their propensity to be employed. Some authors have recently made the case that women still remain as secondary or supplementary earners within the family (Bernhardt 1993). For example, the substantial increase in married women's participation in the labour force in the last three decades in Europe is said to have happened in parallel with the expansion of part-time work. Blossfeld and Hakim (1997) have stated that this fact is proof of the unchanged role of (married) women as secondary earners. Further evidence supports this view when pointing out the sensitivity of women's labour behaviour to demand-driven changes, such as unemployment rates (Blossfeld *et al.* 1996).

On the other hand, other evidence has called into question the validity of these conclusions. Cantillon *et al.* (2001) found in their analysis of thirteen OECD countries that it was actually women whose partner was highly skilled (thus potentially receiving high returns to their education) who showed significantly higher employment rates. The authors argued that female employment decisions could not be explained by the (relative lack of) spousal income, although for this assertion to hold, the inclusion of multivariate analyses, along with a more analytical approach, would be required.

Lastly, some other analyses have shown that the results are country-sensitive. McGinnity (2002) analysed the labour force participation of women married to unemployed men in Britain and Germany. A nice characteristic of the paper is that it adopted both a comparative perspective and a longitudinal methodology. The author tried to assess not only the effect of husband's unemployment on wife's employment, but also the disincentive effect that the availability of welfare benefits received by him might have. Notably different effects in the two countries were found. On the one hand, when referring to the transition from inactivity to employment, some 'added worker effect' was found in Germany –especially when husband's unemployment was long-term– whereas in Britain these wives did not tend to look for

employment more than wives of the employed. In Germany, the 'added worker effect' was strongest for women married to unemployed men who were getting assistance benefits, and those who were not receiving any benefit at all. Moreover, in the UK, where such an effect did not seem to operate, a disincentive effect of means-tested unemployment benefits was suggested to be at work.[5] On the other hand, for the reverse transition, namely from employment to inactivity, the results changed substantively. The unemployment status of the husband did not affect wife's exit from employment in either country. Esping-Andersen (2002) also provided some partial support to Mincer's assessment. He argued that in countries with low female participation rates –Spain or Italy– women who work throughout most of their lives constitute a notably polarised group: either highly educated women who are very committed to their careers, or low educated women motivated by financial needs. On the contrary in the Scandinavian countries as well as in the US, continuous employment is much more evenly distributed.[6]

The tendency of wives and husbands to have similar amounts of human capital is important because when the husband experiences a spell of unemployment, even if the wife's reservation wage actually falls, and therefore her incentives to enter the labour force increase, her own characteristics might offset this propensity. Maloney (1991) isolated the transitory nature from the permanent nature of husbands' unemployment,

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[5] The same absence of the effect was reported for ten European countries and the US in Dex *et al.* 1995. The authors found that the wives of unemployed men receiving individual State benefits were not influenced in their labour participation by their partner's unemployment. Alternatively, when such benefits involved the consideration of woman's earnings as well, there was a consistent significant effect on their labour provision.

[6] One of the assumptions that the literature on the 'added worker effect' referred to above makes, is that husband's labour status is portrayed as exogenous to the wife's, as explicitly recognised by McGinnity (2002). Of course the assumption is far from realistic.

and concluded that, whereas the former does not increase wives' probability of participating in the labour force or of employment via lowering their reservation wage, the latter does. The problem is that, although women whose husbands experience permanent unemployment show comparatively low reservation wages –that should, in turn, lead to a higher propensity to participate in the labour force and/or to be employed, they are indeed more likely to be unemployed themselves.

The polarisation idea has been empirically tested by Gregg *et al.* (1999) and Gregg and Wadsworth (2001), in this case referred to employment/unemployment. In the analysis of Britain (Gregg and Wadsworth 2001), they claim that since the mid-seventies, there has been a parallel increase in households with both members of the couple employed, and those with neither of them employed, even if the aggregate employment rate remained unchanged. About 25 per cent of the increase in workless households is due to their changing structure towards single units (mainly in the nineties). The rest of this variation is due to polarisation among households, driven by differential concentrations of employment across areas and across occupational groups. In their broader analysis of thirteen OECD countries (Gregg *et al.* 1996), one of the most interesting findings is that changes in aggregate (un)employment in these countries are not evenly distributed across households, and are only weakly correlated with the extent of concentration of (un)employment at the household level. Employment polarisation, i.e. the parallel rise in completely workless and completely employed households, is reported in seven out of the thirteen countries.[7]

When *changes over time* in the supply of work by couples have been examined, there is evidence of the growing correlation in spouses' amount of paid labour. Karoly and Burtless (1995) found an increasing correlation in the US from the sixties to the

[7] These countries are Italy, Belgium, the UK, Ireland, Greece, Spain, and Germany.

late eighties, and similar results between 1969 and 1989 can be found in other studies (see Juhn and Murphy 1997).

A positive correlation between the labour supply of couples is, however, only expected to lead to a positive correlation between their earnings when they tend to share characteristics that are associated with their earnings potential –most often education. According to Karoly and Burtless (1995), earnings correlation between American spouses was negative throughout the sixties and seventies and positive afterwards. Hyslop (2001) found a positive correlation between wives' and husbands' wages in the US between 1979 and 1985. Callan *et al.* (1998) found for the Irish case that, between 1987 and 1994, the correlation in spouses' earnings had increased. Cancian and Schoeni (1998) compared correlations in annual earnings in ten countries using LIS data. They only found negative correlations in Germany and Switzerland, whereas a strong positive correlation was reported for Australia, Canada, France, Israel, Norway, Sweden, and the US, and a weaker positive one for the UK. In addition, for those countries in which several points in time were taken, married couples' annual earnings correlation seemed to increase. In one of the few studies that have analysed this correlation before and after the union formation, Davies *et al.* (1998) found for the UK case that, at the time of the union formation the correlation in potential earnings was higher than the current one. Interestingly, this was the case for married couples but not for cohabiting ones.[8]

2.3.3. The Contribution of Wives' Earnings to Inequality between Households

The incidence of wives' earnings depends on two related factors that were addressed in Section 2.3.2, namely the different

[8] A similar differentiation is made by Henz and Sundström (2001) for the Swedish case, where annual earnings correlation in cohabiting couples was lower and less significant than in married couples (both the married and cohabiting types excluded those without children).

propensities to work of wives of men (or, more generally, households) with varying resources, and the correlation in spouses' earnings. It has often been argued that in periods or countries in which women remain as secondary earners their effect on the distribution of household income should be an equalising one as more wives at the bottom part of the distribution enter the labour force. Alternatively, as a higher proportion of women enter the labour market as equal (or primary) earners, an accumulation of advantages could take place, leading to higher inequality between households. This is the case if, on average, women are coupled with men with similar educational level, earnings potential, etc. Following on these arguments, the consequences of wives' earnings in terms of household inequality has generated a great number of empirical contributions. In this section, evidence on the contribution of wives' earnings to total inequality between households is presented.

Most evidence on the impact of wives earnings on the distribution of household earnings and income has traditionally been restricted to the US. Treas (1987), in a review of the empirical evidence then available for that country found that working wives' increased participation in the labour market had an equalising effect on the distribution of income between families, even if the data, measures and methods that were used differed to a great extent.[9] Other studies not covered by Treas' classical review tended to provide similar results; in the US and, again, looking only at households with a couple, the earnings of wives were always found to be equalising, although to different extents (Danziger 1980, Gottschalk 1993, Cancian and Reed 1998). Evidence for other countries in different periods offered very similar results. For instance, Machin and Waldfogel (1994) and Harkness *et al.* (1996) found that wives' earnings had equalised the distribution of household earnings in the UK. This positive –

[9] Studies reviewed in Treas 1987 include well-known references such as, for instance, Mincer 1974, Horvath 1980, and Betson and Van Der Gaag 1984.

i.e. equalising– impact of wives' earnings applied to countries where the incidence of women's labour supply –amongst a number of other factors– notably differed, such as Sweden (Björklund 1992), Ireland (Callan *et al.* 1998), Israel (Gronau 1982), Malaysia (Amin and DaVanzo 2004) or Spain (Alba-Ramírez and Collado 1999). In one of the few contributions that have used similar measures of inequality across different countries, Cancian and Schoeni (1998) showed that, despite the rise in the proportion of labour supplied by women married to high-earning men, the effect of wives has tended to equalise the distribution of household earnings among couples. Alternatively, Esping-Andersen (2007) has obtained mixed results: an equalising impact in Denmark, Sweden and the US and a disequalising effect in the UK and in several countries in Continental Europe.

Only in a minority of studies a clear-cut contribution of wives' earnings to increased inequality was found. For the US, Karoly and Burtless (1995) reported that employment, earnings, and wage gains since the late seventies was concentrated among those women married to men in the upper part of the distribution of wages. There has been an increase in male heads' earnings inequality in the last decades, but their contribution (share) to overall inequality has declined. Alternatively, earnings inequality for female heads has declined in the same period, but their relative contribution (share) to total inequality has increased. According to further estimates done by Burtless (1999), more than a tenth of the increase in income inequality in the US from 1979 to 1996 was due to spouses' increasing earnings correlations. He concluded that even if male and female wage inequality had remained constant at the earliest level, around two thirds of the overall inter-household inequality would have taken place anyway, suggesting the strong explanatory power of shifting marriage patterns combined with the varying relative gains in terms of earnings. Low-earning men (precisely those with the largest loss in earnings over time) were the most affected by the fall in marriage rates; alternatively, better-off women in terms of earnings experienced the smallest drop in marriage rates. Jenkins (1995) found some

disequalising effect of increased wives' labour supply in the UK on the distribution of personal income in the early seventies –but not afterwards.

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To restate the argument of this chapter thus far, recent developments in women's educational attainment, labour supply, and family formation processes all suggest a scenario that increasingly has the potential for women's earnings to be disequalising. Firstly, an overall reduction across cohorts in gender inequality in educational attainment has been firmly established by the literature, as shown in Section 2.1. Women have caught up with men in the formal educational level that they attain and, in some countries, they even seem to have benefited more than men from educational expansion (Shavit and Blossfeld 1993). Secondly, the increase in female labour supply is hardly deniable in all industrialised countries, even though some authors have questioned this by arguing that married women's supply is limited mostly to part-time jobs, and that the amount of labour that is actually supplied has not varied much (Blossfeld *et al.* 1996, Blossfeld and Hakim 1997). With women entering the labour force in greater proportions, some changes towards a growing correlation between wives' and husbands' labour supply and earnings have been observed in the last decades. Usually a strong albeit changing tendency for couples to be similar in their 'labour traits' has been reported. Some authors have referred specifically to the association in husbands' and wives' labour status (Henkens *et al.* 1993), occupations (Hout 1982), to the correlation in earnings (Karoly and Burtless 1995), and often some implications in terms of the incidence of those on broader inter-household inequalities have been suggested. This was discussed in Sections 2.3.2 and 2.3.3.

Most analyses trying to assess the effect of women's increased labour supply on inequality between households have focused exclusively on married women, or more precisely, on women

married to working men. In the remainder of the chapter, the need to include all women (regardless of their marital status) and all men (regardless of their status as earners) is put forward by describing different aspects of changes in the size and composition of households that have taken place in the last decades. In addition, the (scarce) empirical literature that has attempted to do so is discussed.

2.4. Including All Women (I): Education and Changes in the Composition of Households

In this section, the main changes that have taken place in the composition of households are reviewed. These are (a) changes in the incidence of marriage and divorce or, more generally, in couple formation and dissolution, (b) changes in educational assortative mating, i.e. in the propensity to form couples with similar educational levels and (c) changes in fertility. These have the potential to modify the approaches taken thus far to explain inequality between households, namely those focused only on prime-age working men and those in which only married women are included in the picture. The emphasis here is put on the impact of changes in education –that were described at the beginning of this chapter– on these various changes in the composition of households.

2.4.1. Changes in Partnership: The Increase in Single-Adult Households

In recent decades, three well-established trends regarding marriage have been extensively explored (Table 2.5). On the one hand, there has been a marked increase in the proportion of unmarried persons, i.e. people marry less than in the past. The decrease in marriage has been accompanied by a substantial increase in cohabitation rates, although it is unclear whether the

increase in cohabitation fully compensates for the decrease in marriage rates; in other words, whether there has been a net rise in non-partnership or only a change in the form of partnership. On the other hand, the age at which marriage eventually takes place has considerably increased as well, i.e. people marry later. Finally, the stability of marriage seems to be more precarious relative to the past. Divorce rates have increased in the last twenty years (with the sole exception of Denmark), although in some countries (such as Ireland or Italy) the current levels could still be considered as relatively low.

Explanations related to education (and educational expansion) are abundant when trying to explain this aspect of household formation. Although some of the arguments that have been posited are somewhat intertwined, the four main broad theoretical approaches that have been taken in the literature are reviewed separately.

The first theoretical approach falls within the so called new home economics and has looked at the effects of education (or, more generally, *acquisition of human capital*) to assess changes in several processes related to household formation and dissolution. In this sense, several studies (Becker 1973, Schultz 1973) have emphasised how the improved educational and labour chances available to women can lead to their greater independence (not only financially but also in terms of partnership and fertility). Women's educational expansion (no matter whether demand or supply driven) would have opened up opportunities for them to prioritise career rather than family related investments. The 'gains'

Table 2.5. Mean age at first marriage, divorce rates and marriages per 1000 persons

	MAFM 2000 Men	MAFM 2000 Women	Divorces (% of marriages) 1980	Divorces (% of marriages) 1990	Divorces (% of marriages) 2001	Marriages per 1000 1980	Marriages per 1000 2001
Austria	30.5	28.1	29	36	60	6.2	4.2
Belgium	29.1	26.8	22	31	59	6.7	4.4
Denmark	32.8	30.3	52	44	40	5.2	6.8
Finland	30.9	28.6	33	53	54	6.1	4.8
France	29.7	27.7	24	37	37	6.2	5.1
Germany	31.2	28.4	29	29	47	6.3	4.7
Greece	30.4	26.6	11	10	21	6.5	4.3
Ireland	-	-	-	-	14	6.4	5
Italy	-	-	4	9	14	5.7	4.5
Luxemb.	30.6	28	27	33	51	5.9	4.5
Netherl.	31	29.1	27	33	51	6.4	5
Norway	32	29.3	30	46	39	5.4	5.6
Portugal	27.5	25.7	28	30	46	7.4	5.7
Spain	29.6	27.7	-	11	19	5.9	5.1
Sweden	32.4	30.1	53	48	60	4.5	4
UK	30.4	28.3	38	44	51	7.4	5.1
US	-	-	49	48	-	10.5	8.4

MAFM: Mean Age at First Marriage.
Source: UNECE 2003.

to marriage would have decreased.[10] Interestingly, this approach would seem to *a priori* accommodate the deterring of partnership but not its deferring. It has sometimes been considered that women's increasing economic independence would potentially explain both the rising rates of non-marriage and delayed marriage (see for example Smock and Manning 1997). Other authors (see Oppenheimer 1997) have quite sensibly argued that it could potentially serve as a basis for explanation of non-marriage but not for the delay in marriage.

A second explanation that has been pointed out in the literature as a potential inhibiting and/or postponing factor of marriage (or cohabitation) is *delayed transition to adulthood* in the youngest cohorts. This delay could particularly be due to young people's longer enrolments in formal education and the consequent delayed transition to the labour market. Blossfeld and Huinink 1991 found for (West) Germany that the later ages at which women enter marriage and motherhood were not due to their increase in human capital measured by their level of education, but rather to the fact that they stayed longer in formal education, and there existed a social expectation relating the end of formal schooling with adulthood and the readiness to marry and have children. After leaving the educational system, therefore, women seemed to catch up with less educated women who made

[10] Economic approaches have been extensively used to explain increased couple dissolution too. Mostly, the literature has analysed the effects of variables which represent (positive or negative) unexpected shocks for the couple, such as sudden income gains or losses, the amount and nature of marital-specific capital (such as children) and aspects related to the marriage market such as the availability of 'superior' or more suitable matches, in line with the literature on partner search that is explained later in this section. See, for instance, Lillard and White 1993, Hoffman and Duncan 1995, and Weiss and Willis 1997 for analyses of couple dissolution in the US and Boheim and Ermisch 2001 for the UK.

these transitions earlier in time.[11] This normative explanation, contrary to what was noted in the human capital explanations, is well-suited then to address postponement of the entry into a union but does not seem able to explain the observed decrease in marriage rates.[12]

A third explanation of the changes in partnership that has received attention in the literature deals with *economic factors faced by the individual and/or the couple*. The common objective of these studies is the assessment of the extent to which good or bad economic circumstances or prospects (at a macroeconomic or at an individual level and measured through a varied array of indicators) affect the probability and/or the timing of the individual decision of getting married. The most basic reason as to why there should be an effect is the supposed need to fulfil some minimum material standards when settling in a couple. Generally speaking, good economic current conditions or future prospects should enable couples to set up an independent household and, therefore, should increase the chances of cohabitation and/or marriage. This mechanism should work both for the decision to marry and the decision to cohabit unless the minimum material requirements demanded by cohabiters are lower –if the financial costs of embracing such a union were smaller.

When the economic circumstances of both members of the couple are considered separately, the specialisation thesis enters the picture (Becker 1981). If specialisation in market work by men and in non-market activities by women raises the gains to marriage then, *ceteris paribus*, all factors favouring males' labour market conditions should increase the probability of marriage whereas those factors favouring females' opportunities would decrease it. The evidence resulting from testing this hypothesis is

[11] Despite this finding, the authors also note that increasing career resources do indeed lead to a postponement of motherhood and even to childlessness, providing some support to human capital related approaches.

[12] Unless some reference to other explanations such as the marriage market nature of educational systems (see below) is made.

mixed. There is certain consensus about the positive effects of male resources on their marriage (see Smock and Manning 1997 for a review). An important drawback of this literature in general is that, despite the importance given to men's economic circumstances, this has often been related to the marriage (or other) behaviour of women whereas men's own behaviour has often been neglected. In the few cases in which this has actually been accounted for, aggregate rather than individual-level data have been used. A refinement of this interpretation –although with similar findings– is provided by Oppenheimer *et al.* (1997) who regard men's poor conditions (in this case poor career entries) as an indicator of the inability to set up an independent household and, therefore, as a sign of uncertainty.

With regard to the impact of women's resources on their marriage likelihood and timing, results point in every direction. Negative effects of women's resources on marriage have been reported (Blau *et al.* 2000). Alternatively, no (or very little) effect has been found by Oppenheimer (1988) and by Oppenheimer and Lew (1995), and even some facilitating effect has been shown (Mare and Winship 1991, McLaughlin and Lichter 1993).

More recently marriage decisions have been analysed using information on the economic circumstances of both members of the couple. Smock and Manning's (1997) findings point to a positive effect of men's favourable economic circumstances on marriage, whereas women's conditions seem to play a very limited role. This result would suggest that, even with the increasing educational and career opportunities available to women, it is somehow expected that men fulfil their role as breadwinners before entering marriage.

A fourth and final broad category in the explanation of these changes in marriage likelihood and timing relates (changes in) education to trends in the processes associated to *partner selection*. Two main theoretical accounts have been suggested in the literature. The first one, represented by Oppenheimer, consists basically in the existence of a partner search process similar in nature to the one that economists depict when referring to job

search. The second, led by Blossfeld and Timm (2003) among others, suggests that there is indeed something of a marriage market, and that it is well represented in the educational system.

Oppenheimer (1988), in her application of job-search theory to partner selection and partly drawing on the previous expectation that marriage generally follows the realisation of the transition to the adult role, came up with an explanation of the postponement of marriage timing. She claims that uncertainty with regard to individuals' future attributes (particularly the timing of the transition to a more or less stable or 'adult' work role) has increased, and that this in turn has affected the potential for (age?) assortative mating. When the gender division of tasks is traditional, women can still marry at earlier ages because uncertainty at that time regarding their attributes plays a very limited role when compared to men's. Alternatively, when convergence between women's and men's economic roles increases, the process of assortative mating changes. Uncertainty associated with female long-term attributes grows and, since a certain period until stable work is attained is required, women's age at first marriage will increase.[13] Moreover, Oppenheimer would claim that great part of the alleged effects of the economic independence hypothesis portrayed by Becker could be explained in terms of the partner search model. Economic independence could reduce the economic costs associated to non-marriage and could help to finance the search process (Oppenheimer 1988: 584).

The findings that educational homogamy has increased in several countries (see below) has led some authors to suggest the

[13] In Oppenheimer's analysis, it remains unexplained why people have preferences for assortative mating and what the basis for it would be. According to her partner-search theory, it seems that what is trying to be matched is something beyond the maximisation of socio-economic status. However, she claims that decisions about marriage are postponed until stable work is attained, and that would be pointing to the importance of human capital or career related aspects as the main criterion for the match.

role of the formal educational system as a marriage market. Blossfeld and Timm (2003), partly drawing on the previous reference to the postponement of the transition to adulthood, have suggested two reasons why this should be the case. Firstly, with educational expansion, time spent in an educationally homogeneous environment significantly increases, so the pool of potential partners is shaped to a great extent by people with similar educational levels. Second, if there is indeed a catching-up process in marriage right after the completion of education, the chances that the partner has been met and chosen amongst this homogeneous pool are expected to rise (this point had already been raised and confirmed by Mare 1991). Expansion of women's longer stays in education would (via the functioning of this alleged marriage market) have increased educational homogamy. Educational homogamy and some reference to its changes over time are important in this framework because they have implications for the types of households that prevail, because this is expected to have an effect on the labour behaviour of these individuals within households which, in turn, will have an impact on the distribution of earnings between households. The following section is therefore devoted to changes in and explanations of educational homogamy.

2.4.2. Changes in Educational Assortative Mating: Accumulating Advantages?

The general propensity of individuals to form households with persons who are similar to themselves, be it in terms of fully ascriptive criteria such as ethnicity or social origins, or in terms of lifestyles, cultural aspirations, educational background… is widely recognised –and sufficiently empirically demonstrated– in the social sciences. This mating pattern (known as assortative mating) at the individual/couple level turns, at the aggregate level, into what is known as homogamy, i.e. the fact that in most societies couples are shaped, to a rather high –albeit varying– rate, by

members who are similar as regards the various characteristics mentioned above.

On the one hand, there can exist a propensity to form couples with similar others, and on the other hand, there can be factors that contribute to the similarity (or dissimilarity) of these individuals once the couple is established. Even if individuals living in the same households are not similar *ex ante*, they might face similar contextual events during the course of their interaction that affect the propensity of members of a household to converge.[14] Since the type of homogamy of interest in this thesis is based on educational attainment, explanations about assortative mating exclusively –and not about contextual factors– will be summarised here since a negligible proportion of couples are expected to change educational levels due to the effect of contextual factors.

Several studies have pointed out the role of educational level as the main (non ascriptive) factor in partner selection (Rockwell 1976, Kalmijn 1991, Kalmijn 1998). Table 2.6 shows the distribution of educationally homogamous versus heterogamous couples in several industrialised countries at different moments in time during the nineties. Two main aspects can be remarked upon. On the one hand, it is worth noting that in none of the countries the rate of educational homogamy was lower than 50 per cent; on the other hand, that there was a great deal of variation across countries, with the Netherlands and Luxembourg representing the least, and Germany, Spain and Italy the most homogamous cases. It is also remarkable that in some countries –Sweden, the UK, Belgium and Italy–, female-dominated couples seemed to be more prevalent than male-dominated ones amongst heterogamous couples. This could actually be due to the narrowing of the gender gap (and even some overrepresentation of women at upper secondary and tertiary levels) amongst the youngest cohorts.

[14] Also, the existence of direct effects of members of the couple on each other could be argued. This point was addressed earlier in this chapter when the changing labour supply of women was explained.

Similar results were obtained in alternative comparative studies. When assessing the extent of educationally homogamous couples in several countries (Blossfeld and Drobnič 2001), its pervasive nature was pointed out –all the countries that were studied showed it to a great extent. In addition, in those countries in which trends in the proportion of homogamous couples could be traced –namely Germany, the Netherlands, and Urban China–, evidence of its increase was found.[15]

Table 2.6. Educational homogamy/heterogamy in thirteen countries. Married/cohabiting couples with head aged 20-44

	Homogamous	Male dominated	Female dominated
Denmark 1992	53.1	26.8	20.1
Norway 1995	52.8	25.1	22.1
Sweden 1995	53.6	21.2	25.2
UK 1995	58.7	16.5	24.8
US 1994	63.2	18.7	18.1
Canada 1994	56.2	21.9	21.8
Belgium 1992	59	18.9	22.1
France 1994	57.1	21.2	21.6
Luxembourg 1994	51.9	24.8	23.3
Germany 1994	76.9	13.9	9.2
Netherlands 1994	50.6	30	19.5
Spain 1990	69.3	19	11.7
Italy 1995	65.1	15.9	19

Source: Cantillon *et al.* 2001: 453. Calculated with data from the Luxembourg Income Study.

[15] The varying degrees of educational homogamy across countries has been studied using aggregate –country-level– data too (see, for example, Ultee and Luijkx 1990 and Smits *et al.* 1998).

Explanations as to why educational homogamy is at work – and as to why it is seems to have grown over time– are varied. The most basic idea has to do with changes in the pool of partners. If education is an important basis for partner selection and education has expanded, the amount of available potential matches should have necessarily been altered. As was shown earlier in this chapter, aggregate levels of education have increased and women have benefited from this expansion to a great extent. Changes in educational homogamy could therefore be mostly reflecting changes in the marginal distribution of educational levels of men and women over time. But apart from this so-called absolute homogamy, changes in the chances that people pair off homogamously can be varying as well. This means that the propensity of people to choose a partner with a similar educational level can increase over time regardless of the changes in the levels of education of the population as a whole (relative homogamy).

One of the first attempts to disentangle changes in relative versus absolute educational homogamy can be found in Rockwell (1976). His expectation was that education could be regarded as a more powerful differentiating feature when there was more educational variation. The author found that homogamy in the US was higher in the seventies than in past decades when considered relative to random mate selection, although in absolute terms it was lower. However, the author's analysis remained at a rather descriptive level and did not provide a convincing explanation as to why education is more valuable for partner choice when it is more unequally distributed.

Three types of explanations of educational homogamy are provided in the literature. First, *preferences for similarity* have been often pointed out. In this sense, education is important because it is supposed to be a very strong predictor of labour market outcomes (most notably earnings), but also because it could be signalling certain lifestyles or tastes (see Kalmijn 1991). Second, and following education as a predictor of 'success' in the labour market, it has been suggested that women's increasing participation in paid work affects the *expectations that both men*

and women have about marriage. Since women start being considered as potential breadwinners, the competition for better-educated women (signalling better returns) becomes stronger, which would lead to the observation of higher educational homogamy (Mare 1991). Third, the so-called *local marriage markets* which favour their interaction might be operating. Oppenheimer (1988), for instance, has stressed the increasingly relevant role of the workplace as a market. Alternatively, authors such as Mare (1991) and later Blossfeld and Timm (2003) emphasise the importance of the educational system. It has been argued that schooling affects the selection of partners and the constraints posed by the marriage markets. Since school itself is a venue for partner selection, Mare suggested various expectations to be likely: first, that the longer the time since school exit, the lower the probability of marrying someone with the same educational level should be; secondly, that homogamy should be higher among the highly educated, since it is more likely that they have met their potential partners at higher levels and age.

Women's increasing educational attainment in the last decades are expected to have somewhat altered the room for educational homogamy. It is not straightforward how and why women's increasing education could have directly affected preferences for similarity. Nevertheless, since higher proportions of women are supposed to have acquired 'educated' lifestyles, educational expansion is expected to have an impact in the pool of potential partners available sharing these similar tastes, which in principle would increase opportunities to make a homogamous match. The link between women's educational expansion and the second and third explanations is much more direct. On the one hand, if competition for better educated women has strengthened, the implication is that highly educated women would *ceteris paribus* have better chances to partner. Nevertheless, if at the highest levels women are overrepresented in education (as is actually the case in some countries), this competition would imply that some highly educated women will either have to partner downwards (i.e. with men with lower educational credentials) or remain

unpartnered. On the other hand, with regard to marriage markets, women's further education could only favour homogamy since their presence in both educational system and the workplace would become more prevalent.

2.4.3. Changes in Fertility: The Decrease in the Number of Dependants

Table 2.7 below shows period total fertility rates and mean ages at birth of the first child for Western European countries and the US in 1980 and in the mid-late nineties. In this period, total fertility rates have declined substantially in most of the countries under study, and for all these cases it has done so significantly below the replacement level). Only in three Scandinavian countries (Norway, Denmark and Finland) plus the US have some increases been observed between the two periods. With regard to mean age at which the first child is born, the picture is much more homogeneous. In all countries without exception people have considerably postponed maternity until later.[16] A third point that can be found in this table relates to the rate of births outside wedlock. This has increased without exception between 1980 and 2001. In the Nordic countries, this type of birth constitutes a similar (if not greater) fraction of all births, whereas at the other extreme in countries such as Greece or Italy it constitutes a marginal aspect of fertility.

[16] Note that all these are low fertility settings. Since this thesis deals with industrialised countries –which belong to this category– the debate on other settings applicable to developing countries will be left aside. For an overview of this literature, see Hirschman 1994.

Table 2.7. Changes in fertility levels, in mean ages at birth of first child, and in extramarital births

	PTFR 1980	PTFR 1996/97	MAC1 1980	MAC1 1996/97	BoM 1980	BoM 2001
Northern Europe:						
Iceland	2.48	2.04	21.9	25.0	39.7	65.2
Norway	1.72	1.86	25.2	27.0	14.5	49.7
Denmark	1.55	1.75	24.6	27.7	33.2	44.6
Finland	1.63	1.74	25.7	27.7	13.1	39.5
Sweden	1.68	1.53	25.5	27.4	39.7	55.5
Western Europe:						
Ireland	3.23	1.92	24.9	27.0	5	31.2
UK	1.89	1.71	24.5	26.7	11.5	40.1
France	1.94	1.71	25.0	28.3	11.4	42.6
Belgium	1.69	1.59	24.5	27.5	-	-
Netherlands	1.60	1.55	25.6	29.0	4.1	27.2
Switzerland	1.55	1.48	26.3	28.3	4.7	11.4
W Germany	1.45	1.39	25.2	28.4	11.9	23.4
Austria	1.65	1.36	24.6	26.7	17.8	33.1
Southern Europe:						
Portugal	2.19	1.46	23.6	25.8	9.2	23.8
Italy	1.68	1.22	25.1	27.9	4.3	9.7
Spain	2.21	1.15	24.6	27.8	3.9	17.7
Greece	2.33	1.32	23.3	26.6	1.5	3.9
Others:						
US	1.77	2.06	23.5	24.8	18.4	33.2

PTFR: Period Total Fertility Rate.
MAC1: Mean Age at Birth of the First Child.
BoM: Births outside Marriage.
Source: For PTFR and MAC1, Council of Europe 1998; for BoM, UNECE 2003.

The overall postponement of parenthood is agreed to be one of the most salient defining features of the so-called 'second

demographic transition'. Since this distinction between changes in the level of fertility and changes in the timing of fertility first raised, one of the open debates in the literature is whether, if it is mostly a postponement effect, cohort fertility would not necessarily be affected since a recovery would be observed at later ages (Lesthaeghe and Moors 2000). There is, nevertheless, some sound empirical evidence of a negative association between both phenomena. A delay in the timing of fertility is supposed to lower the eventual level of total fertility (Bumpass *et al.* 1978), although the strength of the association seems to be diverging across countries (Kohler *et al.* 2001).

How can it be explained that since the 1960s women began to have fewer children (and, at the same time, to delay maternity)? The different approaches that can be found in the literature will be summarised according to the level of analysis. Approaches at a macro level include cultural and institutional explanations; those at the micro level include economic arguments and life-cycle effects, while at an intermediate level, explanations related to social interactions and diffusion have been suggested.

Proponents of cultural explanations (see, for instance, Lesthaeghe 1980) allude to changes in religious and moral beliefs that have increased the scope for individual choice with regard to a broad range of behaviours (including fertility). The strongest criticism to this line of reasoning is that mechanisms causing these changes remain unexplained. Institutional approaches have often tried to put content into the notion of 'culture' in terms of structural or historical changes (McNicoll 1994). More specifically, the influence exerted by family systems, social classes, the existence or absence of certain policies… have been explored. The inclusion of this institutionalist perspective in exclusively a macro level framework might not be completely fair. They have actually sometimes referred to decisions rather than adopting a more variable-centred orientation, but they have aimed at considering the context or structure (however this is defined) in which they are made.

A common feature of many micro level analyses is their emphasis on education (although conceived in different ways). The principal arguments found in the literature through which educational expansion (via different mechanisms) might have affected changes in fertility (i.e. the decline in total period fertility rates and the increase in age at first birth) in low fertility settings such as Western Europe and the US will be briefly reviewed.

First, education might operate via some change in preferences: education itself could be regarded as modifying people's values or beliefs in such a way that, across cohorts, the fact that higher proportions of women are exposed to more education would lead to a stronger incidence of behaviour consistent with fertility decline. What is it about education that affects women's preferences for fertility? The causal mechanisms are not obvious and this is precisely what is highly questionable in the so called *'ideational' explanations* of fertility change that more or less implicitly attribute it to a change in values (see, Kohler 2001 for a summary). It is interesting to note, however, that some differential exists between the actual number of children that women have and the reported number that they wished they had had (see Bernardi 2005 for the Spanish case). So even if preferences had changed, some constraints are at work that prevent women from actually having the number of children that they desire.

Secondly, education could simply reflect an *accumulation of human capital*, in which case what is at stake is a change in costs (particularly opportunity costs) associated with fertility. Becker (1981), trying to account for the decrease in fertility rather than for its delay, placed emphasis on women's increasing investment in education and career-oriented matters that results in the greater independence of women. This will diminish gains to marriage and motherhood because of a rise in the relative cost of having children in terms of foregone earnings and career interruptions. Whereas the former explanation (change in preferences) would seem to apply to fertility decline and postponement, the latter (changes in costs) seems to be better suited to account for childlessness rather than delayed fertility. Econometric literature

addressing specifically the timing of the first child has explored the effects of current husband's income and female earnings. The evidence seems to be mixed with some support for husband's resources favouring and women's resources inhibiting earlier fertility (Heckman and Walker 1990 for Sweden), and contrary findings when other factors such as availability of childcare are controlled for (Tasiran 1995). Theoretical models referring to consumption smoothing (Happel *et al.* 1984) and to how women plan their careers (See Gustafsson 2001 for a review) have both predicted postponement of the first birth. In the former explanation –focused on men's careers only–, provided that a man's earnings profile tends to increase over his career, then household life-cycle utility is maximised when fertility is delayed until the costs of the child can be subsidised by his higher earnings. In the latter case –relating to women's careers–, postponement is beneficial because foregone earnings and loss of human capital due to non-use are diminished (Gustafsson and Wetzels 2000).

Thirdly, education could have an effect because of the *increase in time spent in formal schooling*. The fact that greater numbers of women stay longer in formal education would imply a postponement of transitions into adulthood (including obtaining a job, marrying/cohabiting and having the first and subsequent children). As was mentioned earlier for the decline and postponement of marriage, it has sometimes been argued that some normative expectations exist that prevent people from forming independent households until full educational completion (Blossfeld and Huinink 1991). Although an obvious connection to make, it is still interesting to note that changes in fertility behaviour could not mainly be due to any changes in women's tastes or costs of fertility, but rather to the simple fact that families now take longer to establish relative to previous decades because

of the increasing time spent in education.[17] Note that in this case postponement of parenthood and/or a decrease in the number of children, but not necessarily childlessness, would be observed.

Finally, theoretical positions at an intermediate level are illustrated mainly by social interactions and diffusion theories. Effects of other people on individuals' decisions can operate through different mechanisms (Kohler 2001: 11-12): first, information about methods, benefits and costs of contraception; second, information about other people's preferences regarding the adoption of fertility regulation and family size (see Pollak and Watkins 1993); third, imitative behaviour.

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In Sections 2.3 and 2.4 above, evidence showing changes in the composition of households and supporting the need for a broader conception of them when studying inequality has been offered. Significant changes in the nature of households have taken place. On the one hand, the male-breadwinner model is no longer dominant, and increasing attention should be placed not only on dual-earner couples, but also on (male and female) single-earner households if a realistic picture of women's contribution to changes in inequality is to be pursued. On the other hand, the size and composition of households have become more diverse too. In particular, an increase in single-adult households and in educational assortative mating and a decrease in the number of dependants have been illustrated. All these changes affect the unit of analysis upon which inequality between households is to be assessed. Section 2.5 below reviews some of the studies that have sought to address changes in household composition on household earnings inequality.

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[17] Difficulties to enter a stable work career or to access suitable housing would have equivalent effects, a decrease and/or delay in the creation of independent family units and a decrease and/or delay in parenthood. Note also that in some contexts fertility is strongly conditioned by the prior existence of a marriage.

2.5. Including All Women (II): Changes in the Composition of Households and Earnings Inequality

This section starts by briefly highlighting the potential effects that the three main changes addressed in Section 2.4 might have on the distribution of household earnings.

Firstly, as regards *changes in partnership*, some evidence suggests that, over recent years, women remaining uncoupled are highly educated and strongly committed to their professional careers,[18] whereas unpartnered men tend to be poorly educated and often in a very unstable labour situation. Even if uncoupled people did not constitute nowadays a larger group relative to the past and it was rather a matter of postponing or delaying the couple formation,[19] interesting implications emerge. Remaining longer in education means accumulating a greater amount of human capital that, in turn, could be seen as an investment in future labour market outcomes. If couple formation occurs after gaining some work experience and not right after educational, then further implications follow. The greater the work experience prior to couple formation, the lower should be the propensity of women to abandon the labour market if they get married. The rationale is rather straightforward: the more human capital has been accumulated (via formal education or via on-the-job training), the higher the opportunity cost of retreating from the labour force once they are married.

Secondly, changes in educational homogamy could, on its own, also have a disequalising effect on household earnings inequality. If education and age are strong determinants in the returns that individuals attain in the labour market (Sixma and Ultee 1984), and if people tend to pair off with equal others as regards these features, then a certain polarisation of outcomes

[18] In fact the careers of uncoupled women in industrialised countries are often shown to be identical to those of the average man (see Blossfeld and Drobnič 2001).

[19] This is for example the position of Blossfeld and Huinink (1991) and of Blossfeld (1995).

attained in the labour market could be expected. This would be further enhanced if homogamous couples are more prevalent at higher levels of education (Mare 1991, Bernardi 2003, Schwartz and Mare 2005[20]). Since women's educational attainment has increased and the gender gap in education has decreased, more room for educational homogamy –particularly at the top– exists.

Thirdly, with regard to effects of *changes in fertility*, the connection with household earnings inequality has been made through the varying propensities that women (and households) with different educational endowments show (see Bernardi 2005 for the 'quantum' and Cigno and Ermisch 1989 for the 'tempo' of fertility). If education is a good predictor of labour market outcomes and education and fertility are negatively related (both when only women's education is considered and when the couples' level is taken into account), then those families without children or with very few children are expected to be, other things being equal, better off than those with higher numbers of children.

Throughout this chapter, the need to adopt a broader scope in the study of the distribution of earnings has been justified. In particular, the case for a systematic account of all women's earnings –in addition to all men's– has been made, but a review of the relevant literature reveals that such studies in this area are scarce. It is important to note that this scarcity is principally due to the difficulties involved rather than to a disregard for its relevance. Esping-Andersen (2004a, 2004b), for instance, has blamed technical difficulties with the appropriate inclusion of single persons for the lack of such evidence.

Despite all the possible complications, some attempts to (a) assess the effects of wives' earnings on the distribution of earnings for all households, and (b) include single women in the explanation of household earnings or income inequality have been

[20] Schwartz and Mare (2005), in their study of trends in homogamy in the US over the last fifty years actually found that, since the mid-seventies, increased educational homogamy is mainly explained by decreasing intermarriage not only at the top part of the distribution, but also at the bottom.

made –though most of them provide evidence for the US only. The results in these cases are mixed. Some authors have concluded that changes in marriage patterns and in the proportion of couples with a working woman have substantially contributed to increasing income inequality in that country (Ryscavage *et al.* 1992). Others have similarly found a disequalising impact of family composition and of the growing correlation between the earnings of couples (Karoly and Burtless 1995, Burtless 1999). In a different set of studies, however, the results point to an equalising effect of the distribution of wives' earnings that is explained either by, generally, a poor correlation between wives' earnings and other sources of family income (Cancian and Reed 1999) or, more specifically, by the greater growth in female earnings belonging to families at the bottom part of the distribution (Reed and Cancian 2001) since the seventies.

Unfortunately, some of those have not succeeded in clearly identifying effects that are due to changes in household composition –caused, for instance, by an increase in the proportion of women who remain unmarried– from those caused by changes in women's labour supply. For instance, Ryscavage *et al.* (1992), Karoly and Burtless (1995), and Burtless (1999) could not assess the two effects separately because, as Cancian and Reed (1999) have argued, in their analyses, the non-present partners of single men and non-earning wives are taken to be substitutes. The second group of analyses carried out by Cancian and Reed have, in principle, more accurately drawn this distinction by decomposing income inequality between all households by population subgroup –thus including single persons and couples– and by income sources –assessing the effects of wives versus other sources. However, Cancian and Reed's (1999) counterfactual analyses focus on the impact of wives on inequality both on the distribution of the income of couples and of all households, but they have failed to quantify the effects of the earnings of unmarried women and, in addition, some of their counterfactual exercises suggest implausible scenarios –such as 'what if wives had no earnings'. Reed and Cancian (2001) have overcome the first problem by

separating out the contribution of wives' and all women's income. In both studies, however, the interdependence between –marriage and labour participation– variables is neglected.

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To summarise the main argument of this chapter, the most recurrent explanation from the supply side –or, at least, the explanation that has produced the largest amounts of empirical evidence– for the increase in income and earnings inequality between households in the eighties and nineties in the US and the UK have dealt with changes in the distribution of male earnings. Despite the obvious relevance of that factor, rapid changes in the labour supply of women in recent decades advised against this limited explanation, changes in the distribution of women's earnings started to receive some attention, and some evidence describing their trends came out. However, most often, attempts to measure the effects of women's work on family inequality were limited to wives. Fear that increased labour supply of women with higher levels of education, together with the existence of assortative marriage, would boost inequality prompted a whole new line of research in the field. But the fast transformation in women's behaviour in that period could not be restricted to their stronger attachment to the labour market. Parallel changes in their marriage and fertility patterns (i.e. in the composition of households) would suggest that it is clearly insufficient to examine the effects of women's increased labour supply on inequality by focusing only on wives. This is the case because (a) the labour behaviour of single women and men is not necessarily identical to that of couples, and (b) the fact that the units upon which inequality is assessed (i.e. households) have become more diverse needs to be accommodated. Some of the contributions in the field so far have managed to assess the impact of wives' earnings on the distribution of couples' earnings; some others have managed to test the effect of wives' earnings on the distribution of earnings between all households; however, what is really relevant is to

assess the impact of *all* women's earnings (plus all men's) on the distribution of household earnings between *all* household types.

In this thesis both aspects of the seeming 'revolution' (Goldin 2005, 2006) in women's behaviour (increasing labour supply, on the one hand, and more variation in the types of households that they form, on the other hand) are accounted for. The impact of changes in those two trends on the distribution of earnings between households is analysed and quantified. In addition, the effect of what is conceived to be one of its main driving forces – namely, increased educational expansion and the narrowing of sex differences in educational attainment over time– is analysed. Before proceeding to this analysis (in Part III), Part II of the thesis first examines the micro level relationship between education and labour and family formation processes on the one hand, and between those processes and the generation of household earnings on the other.

PART II

EFFECTS OF WOMEN'S EDUCATION ON THE GENERATION OF EARNINGS LEVELS AND EARNINGS INEQUALITY

CHAPTER 3. FAMILY AND LABOUR DECISIONS, RETURNS TO WOMEN'S EDUCATION, AND IMPLICATIONS FOR HOUSEHOLD EARNINGS INEQUALITY IN THE UNITED KINGDOM

3.1. Introduction

The position that households attain in the earnings distribution can be regarded as the combined result of the amount of economic resources that each member of the household brings in to the unit –i.e. individual earnings– and of the nature of that unit –its composition. Household earnings inequality at a single point in time can therefore be thought of as the result of two aspects, the way in which earnings are distributed among individuals and the way in which earners and non-earners are allocated to households. Similarly, if changes in inequality between households over time are examined, then these could be considered as deriving from either changes in resources, in the nature of the unit or, of course, in both. If this is accepted to be the case, then both labour and family formation processes need to be considered when trying to explain the level of inter-household earnings inequality and its changes over time.

Before exploring the relationship, at the aggregate level, between changes in the distribution of education and changes in inequality (in Part III of the thesis), Part II explores some of the micro processes that contribute to the generation of earnings

inequality between households and to changes in it over time. These are examined for the United Kingdom (in Chapter 3), and for the Netherlands and Italy (in Chapter 4). The expected effects of women's educational expansion and of the narrowing of the gender gap in education on changes in the distribution of household earnings over time have been thoroughly explained in Part I of the thesis. The micro processes underlying this relationship at the aggregate level refer to household formation, on the one hand, and participation in the labour force, on the other, of women with different educational levels. These two types of processes are explored in this and the following chapter across women's educational levels, and the manner in which they are connected with household earnings –and, therefore with the position in the household earnings distribution– is explored.

The literature on the generation of individual earnings within the human-capital approach is abundant. Most of it has traditionally focused on men's earnings; in particular it has been common practice in the field to take male household heads at prime working ages as the unit of analysis when addressing earnings inequality. This narrow choice was usually justified in terms of their constituting the main economic providers and the group displaying the most permanent commitment to the labour force, and also in terms of the consequent availability and quality of data. Studies addressing the generation of household (rather than individual) earnings are scarcer. In this part of the thesis, some of the mechanisms that affect the manner in which household earnings are generated are considered. On the one hand, in order to analyse the generation of household earnings in a static way, women's and their partners' returns to education are calculated; these account for the demographic and labour processes that have been referred to in the first two chapters of the thesis. On the other hand, from a dynamic perspective, the analysis of changes in household earnings that are due to the demographic and labour processes mentioned above is carried out by presenting changes in expected household earnings for women (households) with varying educational levels.

The chapter is structured as follows: in the first section, the main objectives of the chapter in the context of the whole thesis are described, a brief overview of the empirical strategies that have been used in the literature are explained and their drawbacks when applied to the specific research question are detailed. In the second part of the chapter, the nature and problems of the data that have been used are discussed. The remainder of the chapter is devoted to the discussion of the results for the UK. A discussion of the distributional consequences of the full set of results for the UK, the Netherlands and Italy is provided at the end of Chapter 4.

3.2. Analytical Objectives

The main objective of this chapter is to gain an insight into the processes *generating* women's (and their households') position in the earnings distribution and the factors leading to changes in their earnings over time. Rather than estimating returns to education in the labour market (specifically earnings) as a function of some individual and household characteristics and of some indicators of labour status, the aim of this analysis is to estimate *simultaneously* earnings levels and the tendency for women to create specific types of households –resulting from the combination of the previously discussed demographic and labour events– which are likely to generate those earnings levels. On the one hand, women's education should be associated with higher earnings potential –i.e. positive returns to education are expected. On the other, women with higher educational levels should also be more likely to belong to household types correlated with higher earnings. Firstly, when they are unpartnered, they are expected to show a stronger attachment to the labour force; when living in a couple, and because some degree of assortative mating is expected, they are more likely to have higher levels of total household earnings than their poorly-educated counterparts. They should also attain higher earnings than women with low levels of education if they have children, since they are probably more able to overcome a

potential fertility-participation trade-off. In addition, highly-educated women might be more prone than women with lower qualifications to experience transitions leading to increased participation in paid work, to more 'profitable' mating and to lower income losses when they abandon the labour force or a union. Overall, therefore, women's education is expected to be correlated with higher earnings potential because (a) there are positive returns to education, and (b) they are more likely to belong to more 'favourable' household structures. The extent to which these expectations hold has implications for changes in inequality between households to the extent that, as greater proportions of women achieve higher levels of education, some polarisation of household earnings might take place. This should be the case if the sign and strength of the relationship between education, on the one hand, and returns and belonging to advantageous households, on the other, is constant or increasing over time. The empirical analysis consists of two different parts.

In the *static part of the empirical analysis*, returns to women's and their partners' education are estimated. This part of the analysis faces several different (although closely related) complications. Firstly, it must account for the processes generating individual (women's) earnings –and, in particular, the effects of education– in the context of the households that they belong to. There is a long tradition trying to explain why different types or groups of individuals (men vs. women, unionised vs. non-unionised workers, individuals from different ethnic origins, employees with varying educational endowments…) receive different returns in the labour market (particularly earnings). There is a considerable amount of literature within the so-called human capital framework continuously putting forward increasingly refined theoretical and econometric models that have contributed to the understanding of how individual earnings are made up. However, the simple extension of these approaches to account for the generation of household –rather than personal– earnings is problematic. In this chapter (and in Chapter 4) models in line with the human capital literature are fitted to explain women's

earnings, but the households that women belong to are also considered (see below).

Secondly, as has been argued, household earnings are the result of two equally relevant types of processes, namely participation in the labour market of the various members of the household and the composition of households, and therefore both labour and demographic aspects need to be considered. In addition, the two types of events should not be regarded as independent; women's participation in the labour market cannot be analysed in isolation from their fertility decisions or from their marital status. A categorisation that includes whether women do any paid work, whether they live in a couple and whether they have any children is used in the analysis.

The last two issues are more problematic. There is, on the one hand, a potential selection problem. The classic selection issue when analysing women's earnings –i.e. the fact that earnings can only be observed for women who actually do some amount of paid work, who are expected to be a non-random sample of all women– of course applies. But, since, as has already been argued, women's participation in the labour market is not independent of their family formation behaviour, women might more generally self-select into certain types of households as regards (a) whether they work, (b) their marital status, and (c) whether they have any children. Multiple selection therefore needs to be addressed. The last complication is very much connected with this issue and refers to endogeneity of the covariates involved in explaining earnings. It would be rather straightforward to estimate the effects of the types of events that have been described in Chapters 1 and 2 on earnings and changes in earnings if one wished to consider them as having some exogenous influence. However, given the nature of those household formation and labour participation processes, this assumption seems to be unrealistic. The most important factors involved in the generation of women's earnings (women's work, partnership and fertility) are all choice variables, and it is unlikely that they are uncorrelated with some of the unobserved factors that might affect their earnings –i.e. the effect of both types of events

is not exogenous to individual and household earnings. What needs to be pursued is therefore an empirical strategy that allows for this endogeneity. In this part of the analysis, women's earnings levels and their propensity to belong to household types correlated with those levels are estimated simultaneously (women's partners' earnings are estimated too). Yet household types are the combined result of both demographic and labour characteristics and it is not straightforward to disentangle the effect of each of those on earnings levels. The focus therefore turns to the analysis of changes in earnings levels and the extent to which they are affected by changes in each type of process for women with various educational endowments.

In the *dynamic part of the empirical analysis*, therefore, some of the mechanisms that might contribute to the occurrence of changes in household earnings over time –specifically, those related to women's behaviour as regards participation in the labour force and family formation– are explored. The explanation of earnings dynamics of households or families has been less often attempted than dynamic explanations relating to individuals. It is beyond the scope of this study to analyse earnings mobility in detail. A dynamic approach is needed in this part of the thesis to more accurately assess the effect of each type of event on earnings levels, not because conclusions about mobility need to be drawn. A systematic account of the literature in this field is thus not provided. However, some of the empirical strategies that have been put forward in the literature are briefly described, in the next few paragraphs, in the context of the specific requirements of this and the following chapter.

A simple extension of the standard individual human capital tradition to the study of income dynamics would consist in the basic estimation of differences between household earnings at two different points in time as a function of conventional covariates including education, job experience or job characteristics, plus a set of additional covariates referring to the type of household (conceived as a combination of demographic and labour market characteristics of interest). Alternatively, the basic estimation

could be carried out separately for each type of household using an appropriate categorisation of demographic and labour variables. However appealing this approach might be because of its similarity with the estimation of earnings in the human capital literature, it would be subject to the endogeneity problems discussed above. The fact that there are not only changes over time in the earnings that different members of the household receive, but also that the unit of analysis itself is varying (individuals constantly dissolve and create households) needs to be accounted for. In other words, not only the processes generating household earnings, but also those generating households need to be modelled. Gottschalk (1997) and Gottschalk and Smeeding (1997) have pointed out how little understanding there is within the discipline about the processes that generate families and households on the one hand and household income on the other. I would argue, however, that attempts to describe (and in some cases explain) those processes separately, although not widespread in the study of economic inequalities, can be found in the literature. It is the explanation of the interplay between both processes which has been less often attempted. The complexity of such a research strategy might help to explain why most often the analyses have simply been confined to the description of the phenomena rather than their explicit modelling. The lack of appropriate data has admittedly been an important additional drawback until relatively recently.

A very common way of dealing with personal dynamic income is estimating lifetime or permanent income. In the so-called longitudinal variance component models, income (or earnings) and income changes are decomposed into a permanent and a transitory component (see Lillard and Willis 1978 for a classic application to men's labour earnings, and Gottschalk and Moffitt 1994 for a more recent application). The gist of this approach is the latent level of more or less permanent income (or earnings) that an individual is assumed to have (conditional on some observed factors), around which there can be temporary variations. One problematic aspect of this approach is that it might not be

appropriate to examine earnings of groups who do not have a very stable commitment to the labour market –notably women. Moreover, there are a number of events which could lead to permanent income (earnings) changes –such as marriage or divorce– for which the variance component models might not be suitable (as pointed out by Duncan and Rodgers 1991, or Jenkins 2000a). This evidence suggests against using such models to address household earnings dynamics.

Yet another possibility –drawing on a number of analyses in the study of poverty dynamics– would be to estimate the effects of the household demographic and labour covariates of interest on transitions to a different part of the income/earnings distribution using a duration or event history analysis framework. In the poverty literature, the focus is on the duration of the poverty experience and on the probability and timing of entering or escaping poverty. The generalisation of this approach to the whole distribution of earnings (rather than a dichotomisation such as poverty) is, in principle, straightforward (one could, for instance, examine duration in a particular quantile or upwards and downwards transition probabilities from one decile to another). This is, however, less practical to deal with than it would first appear because transition probabilities are likely to be conditional on the actual part of the distribution and therefore as many analyses as initial quantiles would need to be conducted. However, the main drawback of these types of approaches is that they are not well-suited to account for the endogeneity and selection problems that have been discussed earlier in this section.

Another relatively common approach to the analysis of poverty dynamics has been spell-based. In short, spell-based models in their simplest formulation account for the number of spells an individual or a household stays in poverty out of a (usually short-term) time span. A more complex picture can be considered by also taking into account (a) duration of the poverty experience, in order to separate incidental/short stays in poverty from people who are chronically poor, and (b) repetition of spells, to treat differently those who experience isolated poverty spells

and those who at some point manage to leave poverty but fall into it again shortly after that. Bane and Ellwood (1986) for the US and, more recently Jarvis and Jenkins (1997) and Jenkins (2000a) for the UK, constitute examples of this kind of approach. However accurate and detailed a picture of entries into and exits out of a particular state (poverty, in this case) for different types of individuals or households can be drawn, this approach is not suitable given the abovementioned endogeneity problems.

Finally, a much less developed type of modelling consists in the explanation of poverty transitions as a function not of covariates themselves but rather of the *processes* leading to certain earnings levels and changes in those levels. Probably the most salient feature of this approach is its structural or 'behavioural' goal, i.e. it aims at modelling both the dynamics of household and labour market decisions and the manner in which they shape earnings levels and earnings changes. One of the very few examples of this type of strategy, applied to poverty across ethnic groups among young women in the US, can be found in Burgess and Propper (1998). Generally drawing on their research strategy –although broadening the interest to the whole distribution of household earnings rather than just poverty–, in this chapter both demographic and labour transitions, on the one hand, and the position in the earnings distribution (and changes in it) which follow from those, on the other, are estimated for women (and households) in the UK.

The steps involved in the empirical strategy can be summarised as follows. In section 3.4, some descriptive results showing the nature of households in the sample and the extent to which they change their composition and their earnings over time are presented. Section 3.5 explores the generation of household earnings. Correction terms are estimated to account for selection bias stemming from the varying propensities of women to belong to the different types of households (created as combinations of particular transitions in demographic and labour participation processes). Corrected earnings equations are then estimated for women belonging to each of those combinations of demographic

and labour states and, for the working partners of women, their returns to education are also estimated. In the following section (Section 3.6) the focus turns to the dynamics of household earnings, and the effects of women's labour and demographic processes are explored. On the one hand, the effect of education on transition probabilities between combinations of demographic and labour market outcomes is assessed. On the other hand, mean earnings levels for women with various educational levels and their working partners are calculated. Using these two pieces of information, expected household earnings for women (households) with different educational levels and changes in them due to different types of transitions are analysed. The last section reviews the main findings. Before proceeding to the discussion of the results, the data used for the empirical analysis carried out in this chapter are first described.

3.3. Data

Data from the European Community Household Panel (ECHP) have been used. This large-scale dataset consists of eight yearly waves ranging from 1994 to 2001 for all the EU member countries at the time of the survey. The panel offers relatively homogeneous and comparable information across countries at the individual, household and country levels, and covers a broad range of topics. It is usually considered to be well-suited to address income-related issues since it provides a relatively detailed account of income components including both labour and non-labour entries. However, this information is collected only once a year, which unfortunately precludes certain types of analysis. Income variables in the ECHP are retrospective (specifically, at year t information about income in year t-1 is collected). This means that income information for the last calendar year in the panel (2001) is in fact not available. Similarly, although income information for 1993 can be obtained from the first wave of the panel (1994), it unfortunately needs to be disregarded since other variables

relating to the demographic and labour processes which are to be examined are missing. Thus, seven complete waves (1994 to 2000) are used in the empirical analysis presented in this chapter. Household and individual income and earnings are expressed in real (1996) pounds sterling.

As regards educational variables, the ECHP shows some limitations. Firstly, although the age when full-time education was stopped is provided, in practice this variable is available for just three waves and for most observations the information is missing. Secondly, the age at which the highest level of education was completed appears problematic since it actually does not vary across waves, not even for young individuals, some of whom should presumably be still enrolled in education. Lastly, information on the highest level of education attained by the individual is provided, although there are a significant number of cases which show inconsistencies over time. These have been addressed by assigning to each individual the modal value of their educational level(s) across the seven waves. In those cases with more than one mode, a conservative strategy has been adopted by assuming the lowest value as the most accurate level.

Since the variable of interest is earnings rather than income, the sample is restricted to those of working age, and thus women younger than 20 and those older than 65 have been excluded from the analysis.[1]

In this chapter, data for the UK solely have been used. Note that in the ECHP, in those countries where national panel datasets were conducted in parallel (SOEP in Germany, PSELL in Luxembourg and BHPS in the UK) there are actually two different subsets of data overlapping in some waves. In the case of the UK, the ECHP version of the data covers only the first three waves (1994-1996), and so the BHPS version will be the base for this analysis. Although, admittedly, the use of the original BHPS data

[1] Appendix 3.2. shows the results of the main analysis using a more restricted sample of women, namely those aged 25 to 54. The results remain substantially unaltered.

would improve the analysis by providing a longer time span (i.e. a greater number of waves) and additional and more detailed information, the ECHP offers the possibility of comparison across countries, and that comparison serves the purpose of checking for the consistency of the results under different contexts, as was explained in Chapter 1. The data have been arranged in a pooled (N*T: number of individuals times number of waves at which they are observed) structure. The panel structure of the data is therefore not fully exploited, in the sense that time dependence is not explicitly modelled. In all the models, the fact that there are several observations per individual has however been accounted for by appropriately adjusting the standard errors. Different subsets of the data containing the appropriate at-risk individuals are used in the various estimation steps.

3.4. Descriptive Results

As a first exploration of the occupancy of the states referred to earlier in the chapter, in Table 3.1 results from a dynamic decomposition of counts across household types are presented. This is just a (one-way) tabulation that decomposes total counts into a between and a within component. In this type of dynamic decomposition exercise, the different pieces of information should be interpreted as follows. The total overall frequency indicates the total number of possible states times periods, while only n refers to the actual number of women in the sample. The between part of the tabulation provides information about the number of counts in each state regardless of whether some of them refer to the same household. The total frequency and percentage in the between column necessarily add up to a figure above n and 100 per cent respectively because of the fact that transitions do happen since women tend to pass through more than one state (to provide just a couple of examples, they can get married or divorce, they can be working or not working in consecutive time periods, etc.) over the seven waves in which they are observed. The within part of the

tabulation refers to the average number of counts in each state once that state has been visited (the fraction of time a household spends in a particular state). Because the total percentage in the within column reflects the average time spent in a state (in a household type) and because transitions actually take place, this total is necessarily below 100.

Table 3.1 reveals several interesting pieces of information about household types –conceived as the combination of whether women are working or not, whether they live in a couple (including both legal marriage and cohabitation) and whether they have any children. Overall percentages indicate that, considering those household types independently of whether or not they refer to the same individuals, (a) states in which women do not work are far less frequent than states in which women work, (b) children are still unusual when the woman is not living in a union, (c) the partnered state is more frequent (more than 75 per cent of the total). The between count provides information about the number of women who *ever* occupy a particular state. Being a coupled working woman with or without children are the most popular types. These are also amongst the most stable states; according to the within-percentage, women who visit these two household types tend to remain in them for more than 60 per cent of the observed time. Note, however, that the degree of stability in those states is still notably high. This general picture of relatively high stability is of course related to the limited amount of available waves.

Table 3.1. Tabulation of household types in the panel, UK

Types	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
NW,NP,0C	785	3.4	333	7.5	55.7
NW,NP,C	809	3.5	277	6.2	51.9
NW,P,0C	1542	6.6	494	11.1	59.6
NW,P,C	2732	11.7	832	18.8	54.9
W,NP,0C	2797	12	906	20.4	66
W,NP,C	1380	5.9	432	9.7	52.6
W,P,0C	5369	23	1523	34.3	64.5
W,P,C	7963	34.1	1883	42.5	69.5
Total	23377	100	6680	150.6	62.8
		n=4435			

NW: Not working; NP: Not partnered; W: Working; P: Partnered; 0C: No children; C: Some children.

A similar tabulation of participation counts in total, between and within components (Table 3.2) gives the following results. If the panel structure of the data is ignored, 75 per cent of the observations are found to be working; however, when variation in participation between women is considered, then the percentage of those working actually refers to women *ever* (i.e. over the seven available waves) doing any paid work. Note that the discrepancy between the between total (5374) and the number of women in the sample (4436) is due to transitions between both types occurring (i.e. the same woman can visit more than one state over the seven years). The within percentage expresses the total time spent in each of the states. Conditional on a woman *ever* not working, around 65 per cent of her observations (i.e. of the waves in which her participation profile can be traced) are spent in the non-working state. Since, for those who at some point participate, time spent in this state is 87 per cent, it therefore can safely be argued that this is the most stable state.

Table 3.2. Tabulation of women's labour participation in the panel, UK

Work	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not Working	5869	25.1	1697	38.3	64.6
Working	17511	74.9	3677	82.9	87.2
Total	23380	100	5374	121.2	80.2
			n=4436		

Decomposing marital status in a similar manner (Table 3.3), it turns out that being married is the most common state (60 per cent of all women*periods observations). When the focus is turned to women *ever* being married (over the seven available waves), there is virtually no difference between the percentage of those ever getting married and those not doing so. Lastly, the within column describes a pattern of remarkable stability in both states: once a woman in the sample gets married, she tends to remain in that state for almost 90 per cent of the observed time.[2] When the decomposition is carried out with regard to living in a couple rather than only to marriage, the results vary substantially. Disregarding the panel nature of the data, almost 3 out of 4 (women*time) observations live in a couple, and this figure coincides with the percentage of women *ever* being partnered. The within column confirms that it is more frequent to generally make the transition to live in a couple than to marry since, on average, fewer women remain uncoupled in comparison with those who remain unmarried.

[2] When the decomposition relates to cohabitation only (not shown), the results suggest that it is still a rather infrequent state and that, once visited, it is significantly more unstable, i.e. it is, on average, more common to experience a break-up when the union is consensual. These results are available from the author on request.

Table 3.3. Tabulation of women's marital status in the panel, UK

Marriage only	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not married	11559	39.9	3001	56.8	79.7
Married	17415	60.1	3068	58	87.8
Total	28974	100	6069	114.8	83.8
		n=5286			

Living in a couple	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not coupled	7754	26.8	2209	41.8	71.5
Coupled	21220	73.2	3908	73.9	88.9
Total	28974	100	6117	115.7	82.6
		n=5286			

However, it is the transition to having an additional child (Table 3.4) which shows the highest stability. On the one hand, from a cross-sectional perspective, only in 3 per cent of the total (women*time) observations, women were observed to have had an additional child. However, conditional on a woman having had a child during the observed period, in almost 20 per cent of her observations she had an additional child. This would suggest that it is relatively common to have more than one child in a relatively short period (since only seven years are observed).

Table 3.4. Tabulation of women's fertility in the panel, UK

Fertility	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
No	28052	96.8	5267	99.6	97
Yes	929	3.2	740	14	18.7
Total	28981	100	6007	113.6	87.2
			n=5287		

These very basic dynamic tabulations show that it is relatively common for women to experience changes in both the labour participation and demographic processes that, as has been argued, eventually lead to changes in earnings (and, often, in the position in the earnings distribution). Had complete households –rather than individual women– been analysed (by, for instance, showing changes in their composition or in their number of earners over time), this picture of frequent moves would have come about in a fairly similar manner.

Once the incidence of changes in household types has been proved, the focus turns towards the extent to which changes in household earnings do take place. Table 3.5 below shows some basic indicators describing the overall extent and range of household earnings mobility using a balanced panel of the sample. The sample is split into earnings quintiles at each of the seven available waves. On the one hand, the percentage of households that remain in the same part of the earnings distribution between different time points serves the purpose of straightforwardly assessing how many units in the sample do move.[3] Assigning a synthetic measure of mobility to different points in time does not however reveal any information about the direction of the moves, nor about their range, and so, on the other hand, two further

[3] The percentage of households not changing quintiles provides approximately the same result as 1 minus Shorrocks' index of mobility M (Shorrocks 1978a).

aspects of mobility are examined by also considering moves to an adjacent quintile. These various percentages are presented for the whole distribution –in the first panel–, and conditional on being located at the lowest and highest part of the household earnings distribution in the earliest period (first wave) –in the second and third panel.

Table 3.5. Some mobility indicators using household earnings quintiles (balanced sample of households), UK

All households	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	70.7	59.1	53.7	48.8	45.3	42.9
% in the same or ±1 quintile	95.3	90.3	86	83.3	80.6	78.7
% moving 1 quintile above	12.9	15.9	16.3	19.5	19.5	20.6
% moving 1 quintile below	11.7	15.3	16.1	15	15.8	15.1

Households in the two lowest quintiles (1 and 2) in w1	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	72.6	63.4	57.7	53.2	49.1	45.4
% in the same or ±1 quintile	95.8	90.3	86.9	85.7	83.4	81.8
% moving 1 quintile above	16	17.9	19.6	23	23.8	26.5
% moving 1 quintile below	7.1	9	9.7	9.6	10.4	9.9

Households in the two highest quintiles (4 and 5) in w1	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	73.1	59	53.7	49.6	46.2	44.3
% in the same or ±1 quintile	94.8	89.7	86.3	81.8	79.8	76.9
% moving 1 quintile above	7.5	10.7	11	12.7	12.8	13
% moving 1 quintile below	14.2	20.1	21.6	19.6	20.8	19.6

The results for the whole balanced sample show, as expected, that the percentage of households remaining in the same quintile (i.e. the weight of the diagonal in the transition matrix) monotonically declines as the time interval increases. More than seven out of ten households did not change their relative position in the earnings distribution from the first to the second wave,[4] but movements become more frequent the longer the time gap is extended, in such a way that when the complete seven-wave(year) interval is considered, more than half of the sample appears to have changed quintiles. Despite this apparent high degree of mobility, the second row in the table shows that it is actually significantly short-ranged. Most of the movements across quintiles do not go beyond the neighbouring earnings group –although, again, this is less true the longer the time interval is extended. Amongst those households moving just one quintile, the single pair-wise comparison would point to an even share of those moving up and down. However, as the time interval increases, upward moves appear to be, in general, more frequent.

The second and third panels in Table 3.5 constitute a very basic illustration of the differences in the mobility patterns described thus far when different parts of the earnings distribution (in the first wave) are examined. Households at the bottom part of the distribution tend to be slightly less mobile than those at the top end; a higher proportion of them remain in the same or neighbouring earnings group, although among those that do change quintiles, upward moves are more frequent than they are in the two highest earnings groups (taking into account that moves below quintile 1 and above quintile 5 are of course impossible).

To summarise, there is a significant degree of mobility across earnings groups and it tends to increase as the accounting time is extended, although most of those moves do not actually extend beyond one neighbouring quintile. Of course overall mobility and

[4] These calculations have been carried out for the rest of pair-wise single wave comparisons (not shown), and the degree of mobility proves to be similar.

specific moves could be further analysed by, for instance, considering more earnings groups, comparing moves at different stages of the life-cycle (age of the head of the household) or for different household types (using for example a detailed categorisation of the earners in the household). Instead, in the remainder of this chapter this significant degree of mobility, that has been described in this section in a simplistic and incomplete manner, is connected with actual demographic and labour events that women (and households) experience over time in order to provide with a more systematic account of the processes.

Before concluding this descriptive section, and given that the main concern of the chapter is about the relationship between changes in labour and family events and household earnings, and that some consequences in terms of total inequality are to be put forward, a final exercise is carried out to specifically address the extent to which mobility contributes to the equalisation of the household earnings distribution. Shorrocks (1978b) suggested an interesting index, R, a synthetic measure of earnings (or income) rigidity or immobility which has a straightforward computation and several different possible interpretations. An interesting feature of this measure is that it reflects the extent to which, as the time period is extended, incomes or earnings are equalised. This index is constructed as follows:

$$R = \frac{I(Y)}{\sum_m w_m I(Y_m)}$$

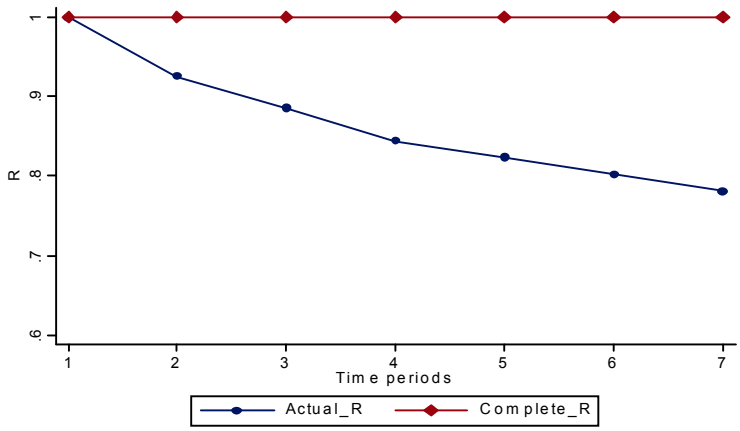
where the numerator is inequality (I)[5] in the pooled earnings for all the considered periods taken together (Y), and the denominator is the weighted sum of inequality in each single period m. Weights (w_m) are the proportion of total –aggregate or averaged– earnings that are obtained in each period m (average earnings in each period divided by longitudinal average earnings). R takes value 0 when there is complete mobility and 1 when there is complete immobility or rigidity. Following on this approach but ignoring the relationship between stability and inequality, the measure can be straightforwardly regarded as reflecting income/earnings mobility (strictly speaking, rigidity or immobility over time). Immobility in this sense would stand for an approximation to permanent inequality or the share of total inequality which is attributable to some stable conditions or characteristics of individuals or households. Similarly, mobility would then refer to the degree to which the earnings of individuals or households experience changes over time and could also be considered as a rough indicator of the transitory component of inequality, i.e. deviations from stable or permanent levels which are usually short-ranged (understood both as duration at those

[5] Inequality can be measured using several indices –the Gini coefficient and the Generalised Entropy (GE) family of inequality indices such as the Theil index, the half the coefficient of variation squared or the mean log deviation–, but, for the sake of consistency with the rest of the empirical analyses in the thesis, in this chapter the Theil index only will be used in the application of R. Admittedly, the use of other measures could somewhat alter the results presented here since the various measures are sensitive to different parts of the distribution to varying degrees. The Gini index, for instance, is more sensitive to observations in the middle part of the distribution, whereas the coefficient of variation and the Theil index are more sensitive to differences at the top of the distribution relative to differences at the bottom or the middle (Jarvis and Jenkins 1998, Cantó 2000). This is explained by the use of differences between household earnings and mean household earnings in the computation of the last two measures and not in the first.

income/earnings levels and as the size of the deviation from average or permanent levels).

Graph 3.1 below plots the R index when household earnings are longitudinally averaged up to seven years for the subset of the sample for which household earnings are observed throughout the seven waves (i.e. a balanced panel).[6] The value corresponding to period 1 on the horizontal axis represents earnings rigidity or immobility when the first year only is considered. The value at period 2 represents rigidity when earnings at periods 1 and 2 are averaged, and similarly R at each successive point involves a `+1 year´ averaging. Of course this also entails a measurement of the degree of equalisation involved in the averaging process.

Graph 3.1. Degree of equalisation of household earnings when averaged over seven years, UK



[6] It could be argued that the use of a balanced sample affects the results of R since households affected by attrition are probably more likely to be those experiencing more earnings/income shocks in the short-term. If this were the case, this particular piece of evidence based on the balanced sample/panel would probably be underreporting the degree of total inequality and of earnings mobility.

The flat line (constant at value 1 on the vertical axis) reproduces a situation of complete rigidity, i.e. that in which (a) households never move from their initial position in the earnings distribution, no matter for how long they are observed, and (b) the aggregation of household earnings over a longer time period does not have any (equalising) impact on the distribution or, put in a different way, that in which there is no transitory component of earnings inequality between households. The decreasing curve refers to the actual trend of inequality (as measured by the Theil index) when the accounting period is extended. Note that there is a significant degree of mobility/equalisation (more than 20 per cent) when household earnings are averaged over the seven available years (1994 to 2000).[7] This result has implications about the extent to which the transitory component of inequality is significant when focusing on earnings mobility, and it suggests that considerable earnings differences or earnings inequality still remain when the permanent component of inequality only is considered. The results therefore speak about the existence of relevant fluctuations around some permanent level of inequality – that nevertheless remains at a significantly high level. Despite being cautious about direct comparison due to the use of different data, unit of analysis, income/earnings concept, inequality measurement, etc, results from this descriptive section can be said

[7] The results of the R index offered by Jarvis and Jenkins 1998 point to an equalisation of about 12 per cent using the Theil index after four years of the British Household Panel Survey. Note, however, that their definition refers to net household equivalent income. When household income (rather than earnings) is considered using the seven available waves of the ECHP, the degree of equalisation/mobility goes up to 27 per cent (not shown). In addition, tests using personal (rather than household) earnings and income have been carried out (not shown); mobility/equalisation in those cases are 17 per cent and 19 per cent respectively. These lower(higher) values of Rigidity(Mobility) are consistent with the fact that income tends to be more stable, i.e. to have a weaker transitory component than earnings. These results are available from the author on request.

to be generally in line with those reported in other studies of earnings mobility in the UK (Jenkins 2000a, Jenkins 2000b, Jarvis and Jenkins 1998) insofar as the incidence of labour and demographic transitions and of changes in earnings has been proved. The extent to which the demographic and labour events that have been described earlier in this thesis affect the position that households attain in the earnings distribution and changes in it will be addressed in the remainder of the chapter.

3.5. The Generation of Household Earnings: (Corrected) Returns to Women's and their Partners' Education

In this section, the effect of women's education on their (and their partners') earnings are estimated. To account for the existence of multiple selection –deriving not only from whether women work, but also from their family formation behaviour– the estimation is conducted using a two-step method. In the first step, women are classified according to their status in each of the three variables that might be causing the selection bias, namely whether or not they are working, whether or nor they live with a partner[8], and whether or not they have children. All the possible relevant combinations of outcomes in each of these three variables are transformed into a single combined state. The result is a variable that classifies women in the sample as shown in Table 3.6.

[8] Couples include both legal marriages and cohabiting persons. Same-sex couples have been excluded.

Table 3.6. Combined demographic and labour states for the estimation of selection terms

Combined States
1. Not working
2. Working, not partnered, no children
3. Working, not partnered, children
4. Working, partnered, no children
5. Working, partnered, children

In the first step, then, a multinomial logit model for the occupancy of each of those five overall states is then fitted using Maximum Likelihood estimation, with 'Not working' as the reference category,[9]

$$(1)\quad \Pr(y = j) = \frac{\exp(\beta' x)}{1 + \sum_j \exp(\beta' x)}$$

where the dependent variable y takes j values (1 to 5 in Table 3.6), x is a vector of the covariates, and the $\beta's$ are the coefficients, which are allowed to differ for each value of the dependent variable. The purpose of this estimation is to create selection correction terms to be later included in the earnings regressions –one for each of the combined states– in the second step, which are simply estimated using Ordinary Least Squares.

[9] 'Not working' is chosen as the reference category because it is the only overall state which is necessarily associated with having no earnings, and therefore no earnings regression needs to be fitted for not-working women. Since the selection issue can be disregarded in this case, this category is not further disaggregated to account for the presence of a partner and/or children.

Table 3.7 shows that, relative to not working, younger women are more likely to be childless. Women who were employed in the previous period are more likely to also be working one year later, and higher women's personal earnings in the earlier period make them more likely to occupy a working state. The higher the household income is, the less likely it is for uncoupled women to occupy a working state. For unpartnered women, this effect could be signalling longer stays in education with parental financial support. For women living in a couple, higher household income (most often husband's labour earnings) could allow women to work when children are present. The control at the aggregate level that was introduced (regional female unemployment rate) always shows a negative sign, but it is only statistically significant for two of the categories. Education does not tend to be correlated with a higher propensity to occupy a working state.

Table 3.7. Selection variables: combined demographic and labour situations, UK

	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Age	-.400*** (.037)	.357*** (.055)	-.144*** (.030)	.462*** (.034)
Age squared	.004*** (.000)	-.005*** (.000)	.001*** (.000)	-.006*** (.000)
Educ=medium	.174 (.188)	.067 (.216)	.304* (.148)	-.049 (.122)
Educ=high	-.130 (.153)	-.056 (.175)	.122 (.123)	-.174 (.108)
Working t0	2.948*** (.201)	2.792*** (.179)	3.396*** (.171)	3.169*** (.131)
Care t0	-1.436*** (.139)	-1.092*** (.133)	-1.157*** (112)	.832*** (.087)
Personal earnings/1000 t0	.510*** (.032)	.343*** (.035)	.493*** (.031)	.418*** (.031)
Household income/1000 t0	-.081*** (.011)	-.145*** (.011)	-.024*** (.006)	.017*** (.004)
In education t0	.736*** (.125)	.340* (.138)	.497*** (.117)	.355** (.111)
Regional female unemployment rate	-.060 (.043)	-.104* (.047)	-.078* (.033)	-.039 (.030)
Constant	5.754*** (.702)	-7.107*** (1.080)	.114 (.614)	-11.265*** (.698)
		N=14949 Chi^2=4832.70 Pseudo R^2=0.41		

Reference category: 'Not working'. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

In order to convert the results from this model into variables that can correct for selection into each of those states (conceived as 'summaries' of outcomes in the family formation and labour participation processes), the predicted probabilities obtained from this model have been transformed into selection terms using Lee's procedure (1983) for selection variables with more than two (unordered) categories. For each outcome in the equation, the inverse Mills' ratio, usually represented as λ, which is the standard normal density function divided by the standard normal distribution,

$$(2)\quad \lambda(Z) = \frac{\phi(Z)}{\Phi(Z)}$$

is estimated. Each of the resulting terms is then incorporated, in the second stage, into the standard earnings equations to try to control for selection into those combined states. Separate earnings equations using OLS[10] one for each of the combined states where the woman is working, are fitted.

$$(3)\quad y_i = \beta_0 + \beta_1 x_{i1} + \ldots + \beta_k x_{ik} + \lambda_i + \varepsilon_i$$

where, for each equation, y is the dependent variable, x_1 to x_K are the covariates included in the model, β_0 is the intercept, β_1 to β_k are the parameters indicating the effects of the independent variables on y, and ε is the error term. The

[10] The use of linear regression in the second stage of the model ensures that consistent estimates are obtained.

inclusion of covariates follows relatively closely the standard human capital framework. In line with various available models with endogenous sample selection (see Heckman 1979 for the classic two-step example on women's earnings, Lee 1983 for a discussion and an application of polytomous-choice models, and Maddala 1983, Winship and Mare 1992, and Breen 1996 for a general review on models with self-selectivity), the additional variable to control for selection into each state is also introduced. Table 3.8 below presents the results obtained from this second step in the estimation.

Table 3.8. Women's (corrected) earnings equations, UK

	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Age	1229.8***	888.5**	941.4***	699.1***
	(165.3)	(258.1)	(133.0)	(145.0)
Age squared	-14.6***	-10.8**	-11.9***	-8.4***
	(2.0)	(3.1)	(1.7)	(1.8)
Education=medium	1224.9	-502.8	-291.8	471.8
	(662.8)	(600.2)	(387.8)	(277.8)
Education=high	1948.4***	489.1	1235.7**	1288.7***
	(399.3)	(598.2)	(391.6)	(235.6)
Tenure	9.8	195.6**	27.9	85.2***
	(43.8)	(57.6)	(24.8)	(20.7)
Public sector	264.9	945.7*	-48.4	397.4*
	(472.6)	(463.7)	(292.6)	(201.8)
Fixed-term contract	-904.3	-993.9	-1587.7***	-1587.4***
	(759.2)	(825.3)	(414.6)	(309.5)
Occupation (ref. Managers)				
Professionals	-620.5	-1713.7	-1461.6	-436.6
	(1024.1)	(1595.0)	(822.5)	(680.2)
Technicians	-2063.5*	-3432.7	-2390.3**	-1834.3**
	(896.1)	(1761.0)	(689.1)	(637.0)

	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Clerks	-2783.9*** (698.0)	-4702.9* (1852.1)	-3897.3*** (635.2)	-3123.0*** (571.0)
Service workers	-4546.3*** (754.6)	-6064.4*** (1715.4)	-4462.3*** (627.2)	-4557.0*** (581.3)
Skilled agricultural workers	-5881.6*** (1109.8)		-458.9 (862.4)	
Craft workers	-416.3 (1384.9)	-4188.7* (1726.5)	-2717.4** (910.5)	-3578.0*** (733.5)
Plant and machine operators	-3690.3*** (941.9)	-5380.7** (1952.2)	-5323.2*** (704.3)	-4382.6*** (675.6)
Elementary occupations	-4162.3*** (828.3)	-6027.2** (1908.7)	-5057.5*** (670.9)	-4790.5*** (628.1)
Hours/week	106.7*** (20.4)	120.9*** (20.8)	109.5*** (23.9)	193.0*** (8.9)
Ill health	-571.6 (517.0)	180.7 (546.7)	244.4 (491.8)	-173.2 (319.7)
N children		-210.0 (280.5)		-336.6* (139.9)
Children under 3		15.8 (720.4)		1049.7** (385.0)
Partner's earnings/1000			94.4* (37.3)	36.0*** (9.4)
Selection term	-3518.5*** (687.1)	2545.6** (834.9)	-5674.9*** (612.2)	918.5* (400.0)
Constant	-11579.9*** (2135.3)	-14266.2** (5033.5)	-4249.2* (2163.8)	-10893.2*** (2685.7)
N	1124	542	1989	2832
R^2	0.51	0.57	0.41	0.58

Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

The results confirm that earnings profiles are subject to a concave pattern as women age. Education generally has a positive and significant effect as expected –the only exception is in the group of single-mothers, for whom the effect is not statistically significant. The job tenure variable is only significant amongst women with children (and in those cases, it is associated with higher earnings); this might be separating out women depending on the length of the break from the labour force that they took after having a child.[11] Earnings of women working in the public sector do not generally differ from those in the private sector, except for mothers, whose earnings are higher when they are civil servants –this could be reflecting the fact that the participation-fertility trade-off is softened in the public sector. Having a fixed-term temporary contract generally makes earnings levels decrease: however, the effect is significant for coupled women only. As expected, the higher the number of hours worked per week, the higher earnings are for all four types of women. Relative to being a manager, the rest of the categories in the available variable referring to occupation tend to decrease women's earnings across all four groups or combined states. Partners' earnings are significantly associated with higher earnings of women; this result is pointing towards processes of assortative mating on earnings.

Once the explanation of the formation of women's earnings has been attempted, and since the interest of this chapter focuses on household (rather than individual) earnings, attention is now turned towards the male partners of women in the sample, and a brief account of their earnings is provided. For observations belonging to women who actually have a couple, their partners' earnings have been regressed (using OLS) on a set of covariates drawing on the earnings models for women presented earlier (Table 3.9).

[11] Experience (calculated as current age minus age at which first job was started, following one of the standard practices) has been excluded from all four models because it showed notably high collinearity with the age variable.

Table 3.9. Women's partners' earnings equations, UK

	Male partners' earnings
Age	761.4***
	(116.1)
Age squared	-8.2***
	(1.4)
Education=medium	1001.3*
	(419.8)
Education=high	2653.6***
	(442.2)
Tenure	120.7***
	(32.6)
Public sector	-1084.3**
	(374.2)
Fixed-term contract	-2326.4***
	(618.2)
Occupation (ref. Managers)	
Professionals	-2208.3***
	(618.5)
Technicians	-2967.3**
	(948.0)
Clerks	-6600.6***
	(544.0)
Service workers	-7204.1***
	(633.4)
Skilled agricultural workers	-9699.3***
	(933.5)
Craft workers	-6363.1***
	(583.0)
Plant and machine operators	-7222.1***
	(606.4)
Elementary occupations	-8385.7***
	(605.1)
Hours/week	157.3***
	(21.4)

	Male partners' earnings
Ill health	-544.5
	(526.4)
N children	341.4*
	(148.8)
Children under 3	454.3
	(453.5)
Partner's earnings	53.4
	(45.4)
Partner's education=medium	1208.1
	(683.7)
Partner's education=high	809.1
	(448.1)
Constant	-7506.7**
	(2176.3)
N	7253
R^2	0.23

Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

The results are in line with what was expected as regards the concave pattern of earnings by age, the positive effects on earnings of educational level, job tenure and the number of hours worked per week, and the negative effects of working in the public sector, holding a fixed-term temporary contract, and all categories of the occupational variable relative to men working as managers. Woman's personal earnings do not appear to have any significant effect on her partner's earning, although her education helps to increase his level of earnings (at the edge of significance).

In the following section, the static perspective taken so far to examine how household earnings at a single point in time are generated is abandoned, and the focus turns to the dynamic aspect of household earnings –what makes them vary over time. As explained earlier in the chapter, this approach will help in the

understanding of how changes in women's labour participation and family status contribute to changing the position in the earnings distribution of the households that they belong to.

3.6. The Generation of Changes in Household Earnings: The Effects of Demographic and Labour Transitions on Expected Household Earnings

The analysis presented in Section 3.5 has shown evidence of women's and their partners' positive returns to education, and of the positive correlation between particular household structures and higher earnings levels. However, the effects of labour and demographic status on earnings levels have not been systematically distinguished because household types have been conceived as combinations of outcomes in each of those. In order to help to assess their impact, a dynamic perspective is adopted, and the extent to which, for women (households) with different levels of education, changes in each of the processes –entries into and out of employment, and couple formation and dissolution– lead to changes in household earnings is illustrated. In particular, expected household earnings for women in different household structures –by women's educational levels– are calculated. Two different sets of information are required for this purpose. On the one hand, relevant mean transition probabilities between different household types (demographic and labour states) are computed, and the extent to which they differ for women with varying levels of education is assessed. On the other hand, using the regression results shown in Table 3.8 and 3.9, the educational gradient in mean earnings levels of women and their partners is analysed. These two sets of information are put together at the end of the chapter to illustrate the ways in which different demographic and labour processes affect changes in the position in the earnings distribution that households have, and how these effects might vary for women with varying education.

At each time point (each year) women are conceived to belong to an overall state, which derives from the combination of their outcomes in two separate aspects, namely partnership and participation in the labour market. The two possible outcomes deriving from partnership are partnered and not partnered; participation refers to whether the woman has done any paid work during the survey year or not. The four initial states (or household types at t0) that are used in the analysis are the result of combinations of those states (Table 3.10). Note that there is no further disaggregation as regards the number of children or the type of work, although the stock of children at t0 and some controls for the type of work are included in the relevant models (see below).

Table 3.10. Initial states (household types at t0)

1. Participation	2. Couple	**Initial States**
Not working	Not partnered	1. Not working, not partnered
	Partnered	2. Not working, partnered
Working	Not partnered	3. Working, not partnered
	Partnered	4. Working, partnered

Eight destination states (or household types at t1) are in principle possible (Table 3.11). Each of these states are, again, combinations of outcomes in the partnership and participation processes (as in the categorisation of initial states), but now fertility is also considered by further differentiating between women who had an additional child between t0 and t1 and those who did not (and thus the number of children they had at t0 remained unchanged at t1). The eight resulting destination types are summarised as follows:

Table 3.11. Destination states (household types at t1)

1. Participation	2. Couple	3. Children	**Destination States**
Not working	Not partnered	No additional child	**1. Not working, not partnered, no additional child**
		Additional child	**2. Not working, not partnered, additional child**
	Partnered	No additional child	**3. Not working, partnered, no additional child**
		Additional child	**4. Not working, partnered, additional child**
Working	Not partnered	No additional child	**5. Working, not partnered, no additional child**
		Additional child	**6. Working, not partnered, additional child**
	Partnered	No additional child	**7. Working, partnered, no additional child**
		Additional child	**8. Working, partnered, additional child**

Table 3.12 shows a matrix with the actual occurrence of those transitions. Since the data relate to changes from one year to the following, stability (i.e. staying in the same state from one year to the next) is the norm, and the number of observations actually experiencing a transition is low, particularly when more than one aspect is involved. For instance, it is relatively uncommon to experience a single transition from the first initial state; only 1.4, 3.8 and 12.6 per cent of the sample have a child, start living in a couple, and start working, respectively, but when more than one

transition at a time is involved the percentages becomes almost negligible.

Table 3.12. Transitions between initial (household types at t0) and destination states (household types at t1), UK

Origin (household type at t0)	***Destinations (household type at t1)***								
	1	2	3	4	5	6	7	8	Total
Not working, not partnered	79.6	1.4	3.8	0.6	12.6	0.1	1.8	0.1	100%
Not working, partnered	2.2	0	83.6	3.2	0.4	0	10.2	0.3	100%
Working, not partnered	4.0	0.1	0.3	0.2	85.3	0.4	9.5	0.3	100%
Working, partnered	0.1	0	4.2	0.4	2.2	0	89.8	3.2	100%

Percentages might not add up to exactly 100 because of rounding. Destinations are: 1: Not working, not partnered, no additional child; 2: Not working, not partnered, additional child; 3: Not working, partnered, no additional child; 4: Not working, partnered, additional child; 5: Working, not partnered, no additional child; 6: Working, not partnered, additional child; 7: Working, partnered, no additional child; 8: Working, partnered, additional child.

Transitions between states at t0 and t1 (i.e. between each of the four initial states and each of the eight destination states) are estimated by considering the probability of moving to each of the possible states at t1 conditional on being in a particular state at t0. Specifically, for women belonging to each of the four initial states shown in Table 3.10, one multinomial logit model has been fitted.

In each of those models, the dependent variable is the destination state (household type at t1), and therefore, *in principle*, the categories of the dependent variable are the eight possible states at t1 that were shown in the last column of Table 3.11. However, since, as has been shown in Table 3.12, there are a number of moves (particularly those that involve multiple transitions) that very rarely take place, some of the categories of the dependent variable have been excluded from the estimations. Note that four separate models are fitted (one for each possible combination of marital and labour status at t0) because the transition probabilities are obviously expected to differ across initial states.

Covariates include a basic common set such as age, level of education, health status, number of children, household income, whether the women was enrolled in education in the previous year, variables indicating household's ability to make ends meet, and whether taking care of someone prevents them from doing the amount of paid work they would like to do. In addition, specific variables for each of the initial states are included; on the one hand, in those states in which the woman is in a couple, the duration of the relationship and the partner's level of education are included in the model; on the other hand, in states where the woman is working, her earnings and sector (public/private) are included to account for incentives to remain in work. All regressors refer to initial states (states at t0) unless otherwise stated.

The main results of the four multinomial logit models can be summarised as follows (the models are shown in Appendix 3.1). Education tends to benefit transitions implying starting to work (and/or not abandoning it). Once working, higher personal earnings are associated with a lower propensity to stop working. However, household income (i.e. total income minus women's personal earnings from labour) tends to make women more prone to abandon the labour force when they have a couple in the initial state, but no effect is found for women not living in a couple.

In order to better illustrate whether any differences actually exist across educational levels in the propensities to make the

various transitions, some particularly relevant mean predicted transition probabilities are shown for each educational level of women. Table 3.13 shows the mean values, for each level of women's education and for each initial state (t0) and conditional on the set of covariates described above, of the probabilities of making a transition to each of the destination states (t1).[12] Note that not experiencing a transition (i.e. staying in the same state) always shows the highest probability. The probabilities of starting a union are higher if the woman is initially working, and when this is the case, higher levels of education seem to be associated with higher probabilities of getting partnered in the following year. The transition to work is significantly more likely when women are uncoupled, but a low level of education implies a lower probability of a work transition regardless of marital status –there is hardly any difference between medium and high levels of education. For women who are working, education is (weakly) associated with lower probabilities of leaving employment, although these are rather infrequent transitions in the comparison of year-to-year observations.

[12] Note that the probabilities for each initial state and educational level do not add up to one because not all the transitions that are in principle possible were actually estimated.

Table 3.13. Mean transition probabilities across educational levels, UK

t0: not working, unpartnered	Low education	Medium education	High education
pr(staying)	0.86	0.74	0.74
pr(having a child)	0.01	0.01	0.01
pr(starting couple)	0.03	0.04	0.05
pr(working)	0.09	0.21	0.20
t0: not working, partnered	Low education	Medium education	High education
pr(staying)	0.88	0.81	0.83
pr(having a child)	0.02	0.05	0.04
pr(ending couple)	0.01	0.01	0.007
pr(working)	0.08	0.13	0.12
t0: working, unpartnered	Low education	Medium education	High education
pr(staying)	0.89	0.88	0.87
pr(starting couple)	0.08	0.11	0.11
pr(leaving work)	0.014	0.008	0.012
t0: working, partnered	Low education	Medium education	High education
pr(staying)	0.94	0.92	0.92
pr(leaving work)	0.02	0.01	0.01
pr(ending couple)	0.02	0.02	0.01

Table 3.14 below shows mean predicted individual earnings levels stemming from the OLS regression models presented in Section 3.5 above (Tables 3.8 and 3.9) for each of the four groups of working women, and for the three educational levels of women and their partners (when present). The results confirm a positive educational gradient in women's own earnings and in their partners' –i.e. the more educated women and partners are, the higher their earnings. Women's education does not have a strong effect on their partners' earnings, although the differences between the returns of men living in couples in which both members have high qualifications and those in most other combinations are very

marked. Finally, men's earnings are systematically higher than their female partners' and relatively less disperse.

Table 3.14. Mean predicted earnings of women (and their partners) across educational levels, UK

	Women's education		
	Low	Medium	High
Working, not partnered, no children	6477 (2960)	8979 (3159)	10528 (3428)
Working, not partnered, children	8412 (3110)	8994 (3369)	11109 (3826)
Working, partnered, no children	6297 (3543)	7795 (3411)	10612 (4161)
↳ Partners of these women			
Low level of education	11226 (3779)	12390 (4233)	11636 (3968)
Medium level of education	13243 (3895)	13179 (4287)	13574 (3793)
High level of education	15938 (3798)	15710 (4370)	16583 (3697)
Working, partnered, children	7121 (2957)	8915 (2857)	10940 (3546)
↳ Partners of these women			
Low level of education	12557 (3468)	13636 (3678)	13760 (3935)
Medium level of education	14347 (3803)	16166 (3913)	14867 (3466)
High level of education	16728 (3876)	19493 (4055)	18287 (3674)

Standard deviations in parentheses.

To recapitulate, two main sets of results have been presented so far in this section. On the one hand, given the state of women at

t0, the probabilities of making transitions to selected states (including staying in the same state between t0 and t1) have been estimated. On the other hand, predicted earnings levels of women and their partners (when present) have been computed. Both components are used to calculate expected household earnings – i.e. earnings levels weighted by the probabilities of making each transition– at t1. Specifically, the comparison of expected household earnings at t1 across the three possible educational levels of women and the four possible initial states is presented. The results are presented in Table 3.15 below.

For the first initial state (women who are not working and do not have a partner at t0), three expected earnings levels at t1 are presented, those owing to (a) staying in the same state, (b) starting a union, and (c) getting employed. Note that predicted earnings associated with staying in the same state are always necessarily zero (since individual earnings when the woman is not working are zero). Women in this group are generally expected to get higher household earnings when they start living in a couple than when they start to work. This is the case across all three educational levels. But the transition to starting a union is significantly less likely than the transition to getting employed. It is interesting to note that low-educated women are less likely to make any of the two transitions, but whereas the differences in the transition probabilities of starting a couple are very similar across the three levels of education, the probability of starting to work are three times lower for these women compared to those having at least medium levels of education. Total household expected earnings for women belonging to this initial state are higher the higher their educational level is.

Table 3.15. Expected household earnings, by women's level of education, UK

t0: not working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
staying	0.86	0	0.74	0	0.74	0
starting couple	0.03	13771	0.04	15962	0.05	16095
working	0.09	7991	0.21	9567	0.20	11300
E(household earnings) t1	**1132**		**2648**		**3065**	

t0: not working, partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
staying	0.88	13771	0.81	15962	0.83	16095
ending couple	0.01	0	0.01	0	0.007	0
working	0.08	21148	0.13	24232	0.12	27240
E(household earnings) t1	**13810**		**16079**		**16628**	

t0: working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
staying	0.89	7991	0.88	9567	0.87	11300
starting couple	0.08	21148	0.11	24232	0.11	27240
leaving work	0.014	0	0.008	0	0.012	0
E(household earnings) t1	**8804**		**11084**		**12827**	

t0: working, partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
staying	0.94	21148	0.92	24232	0.92	27240
leaving work	0.02	13771	0.01	15962	0.01	16095
ending couple	0.02	7991	0.02	9567	0.01	11300
E(household earnings) t1	**20314**		**22644**		**25335**	

For the second initial state (women who are not working but are partnered at t0), the expected earnings deriving from (a) staying the same, (b) ending their union, and (c) starting to work at t1 are shown. Remaining in the same state (and thus relying on partner's earnings only) is associated with lower earnings than starting to work regardless of the educational qualifications that women have but, again, having higher levels of education is more profitable for any transition, and also as regards total expected earnings.

The third initial state (working women who are not partnered at t0) allows the comparison of three different levels of expected earnings associated with: (a) remaining employed and uncoupled, (b) getting a partner, and (c) interrupting work at t1. Predicted earnings are higher (at all educational levels) if they start living in a couple than if they remain in the same state. However, there is a good deal of inertia and the transition probability to the same state (i.e. no transition) is again the most likely event. The comparison of predicted earnings across educational levels shows the positive returns to women's education that was found in the earnings equations earlier in the chapter. Given the relatively similar mean probabilities of finding a partner in this case, the educational gradient could be reflecting positive assortative mating. Better educated women in this initial state are always better-off regardless of what transition they make.

Finally, for the fourth initial state (working women living in a couple at t0), in principle the relevant comparisons are expected household earnings when: (a) staying the same, (b) leaving employment, and (c) finishing a union. In this case the probabilities of actually making a transition at all are almost nil, indicating that this particular state, at least when considering year-to-year transitions, is remarkably stable. Women belonging to the three educational levels have very similar chances of staying in the same state, although still there is an educational gradient in their predicted earnings deriving from positive returns to women's and to their partners' education. Interrupting work entails a less

significant penalty for women with the highest level of education (they have equal probabilities of making this transition, but the associated household earnings loss is lower). Having a higher level of education is again found to be correlated with higher total expected household earnings.

3.7. Conclusions

Results obtained in this chapter point to significant differences across educational levels in the real affordability of certain transitions and in the expected earnings associated to them across women's educational levels. On the one hand, it has been shown that, even when correcting for selection into occupancy of different types of households (constructed as combinations of outcomes in labour participation and demographic processes), higher levels of education imply higher earnings. In addition, positive returns to education among male partners of women in the sample and some evidence of assortative mating on earnings have also been found. These results suggest that households that are rich in terms of human capital are more likely to occupy a position at the top part of the household earnings distribution.

When attention is turned towards the effects of household structure on the position of the household in terms of earnings, the effects of education are more mixed: women's education tends to clearly have an effect on women's labour participation processes (it benefits strategies associated with working more and with staying longer in employment), although its influence on family formation processes is less evident. In any case, given that year-to-year (and no longer) transitions have been analysed, stability is the norm regardless of the initial conditions. Despite this general picture of stability, when both estimated transitions and women's (and, when pertinent, their partners') estimated earnings are considered jointly, women with higher levels of education (or households with highly-educated women) would tend to be better-off than poorly-educated women when facing alternative

transitions. On the one hand, this is the case because of the direct returns to education in terms of earnings, which allows them to (a) more easily afford risky strategies such as separation, and (b) benefit from higher earnings from their potential partners, since some degree of assortative mating exists. On the other hand, they also seem to be less constrained in their choices, if only in the sense that they seem to be more prone to make transitions which are income-generating such as becoming employed, remaining employed and, to some extent, finding a partner.

Further research could account for the earnings of members of the household other than women and their partners, and could more explicitly analyse the effects of assortative mating in the couple formation process on the generation of household earnings and changes in them. In addition, since the generation of household earnings has only been explored for those households in which there is a woman, this narrow picture could be incorporated into the whole household earnings distribution. Household earnings changes have been shown to become more frequent as the time span gets longer; this framework could therefore be put to the test comparing periods longer than a year (even though this would be ignoring intermediate moves within that period). Despite these limitations, some basic foundations regarding the generation of the position in the distribution of household earnings are believed to have been offered. In the following chapter (Chapter 4) the analysis is replicated for two additional countries, the Netherlands and Italy, and a discussion of the implications of the complete set of results for household earnings inequality and changes in it is put forward.

APPENDIX 3.1. TRANSITION MODELS IN THE UNITED KINGDOM

Results of the four multinomial logit models are reported in terms of relative risk ratios. Relative risk ratios are just an exponential transformation of the estimated coefficients and can be interpreted as the ratio of the probability of two outcomes. When a relative risk ratio equals one, there is no difference in the probability of one outcome relative to the reference outcome when the independent variable experiences a one-unit change. Alternatively, relative risk ratios greater(lower) than one indicate that when the independent variable increases by one unit, the probability of one outcome relative to the reference outcome is greater(smaller).

Table A3.1.1. Transitions from initial state 1: Not working, not partnered, UK

	Not working, not partnered, additional child	Not working, partnered, no additional child	Working, not partnered, no additional child
Age	8.810*	.999	1.179
	(7.737)	(.107)	(.071)
Age squared	.959*	.999	.997***
	(.015)	(.001)	(.000)
Educ=medium	.734	.902	1.349
	(.808)	(.480)	(.408)
Educ=high	1.866	1.489	1.604*
	(1.173)	(.598)	(.372)
Care	.645	.873	.797
	(.546)	(.424)	(.247)
Ill health	2.404	.754	.333**
	(1.709)	(.337)	(.114)
N children	1.200	1.101	.804*
	(.565)	(.156)	(.086)
Ends meet	.523	.850	1.011
	(.384)	(.306)	(.240)
In education	.299	.732	1.258
	(.352)	(.367)	(.304)
Housing		.335*	.621
		(.144)	(.205)
Hhd income	.964	1.008	1.002
	(.041)	(.007)	(.007)
N=1102			
Pseudo R^2=0.15			

Reference category is not working, not partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A3.1.2. Transitions from initial state 2: Not working, partnered, UK

	Not working, not partnered, no additional child	Not working, partnered, additional child	Working, partnered, no additional child
Age	.734*	1.535*	1.124
	(.092)	(.290)	(.073)
Age squared	1.004**	.991**	.998**
	(.001)	(.003)	(.000)
Educ=medium	1.235	.810	1.010
	(.691)	(.266)	(.233)
Educ=high	.651	1.160	1.248*
	(.446)	(.389)	(.266)
Care	1.598	1.828	.857
	(.804)	(1.035)	(.192)
Duration of couple	.940**	.948	1.023
	(.022)	(.033)	(.017)
Ill health	.747	.895	.384***
	(.342)	(.371)	(.097)
N children	.699	.633	.974*
	(.176)	(.176)	(.076)
Ends meet	.532	.804	.907
	(.226)	(.193)	(.139)
In education	.000***	1.065	2.446**
	(.000)	(.606)	(.672)
Housing	2.732	1.774	1.151
	(1.511)	(.884)	(.255)
Spouse's education	.920	1.243	1.150
	(.191)	(.170)	(.102)
N=2450			
Pseudo R^2=0.16			

Reference category is not working, partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A3.1.3. Transitions from initial state 3: Working, not partnered, UK

	Not working, not partnered, no additional child	Working, not partnered, additional child	Working, partnered, no additional child
Age	.730*	1.975	1.126
	(.096)	(.735)	(.071)
Age squared	1.004*	.989*	.998*
	(.002)	(.005)	(.001)
Educ=medium	.888	.000***	1.192
	(.578)	(.000)	(.242)
Educ=high	2.262	.696	1.264*
	(1.033)	(.540)	(.215)
Care	2.190	5.820*	.678
	(1.034)	(4.138)	(.191)
Ill health	1.831	.000***	.495
	1.062	(.000)	(.236)
N children	.1.521	.505	1.156
	(.393)	(.370)	(.106)
Ends meet	1.096	.552	1.051
	(.424)	(.419)	(.158)
In education	1.016	.171	.878
	(.442)	(.221)	(.127)
Housing	.729	1.129	1.445
	(.327)	(1.143)	(.355)
Hhd income	.957	.946	.999
	(.027)	(.031)	(.008)
Public sector	1.167	2.409	.886
	(.525)	(1.869)	(.150)
Personal earnings	.631***	.823	.996
	(.050)	(.082)	(.006)
N=2551			
Pseudo R^2=0.09			

Reference category is working, not partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05

Table A3.1.4. Transitions from initial state 4: Working, partnered, UK

	Not working, partnered, no additional child	Working, not partnered, no additional child	Working, partnered, additional child
Age	.765***	.853*	2.285***
	(.056)	(.065)	(.296)
Age squared	1.003***	1.001	.986***
	(.001)	(.001)	(.002)
Educ=medium	.994	.1.162	1.227
	(.320)	(.333)	(.229)
Educ=high	1.110	.504*	1.491*
	(.264)	(.138)	(.234)
Care	1.500	1.339	1.845**
	(.370)	(.347)	(.344)
Ill health	4.927***	2.438*	.716
	(1.200)	(.893)	(.264)
N children	.994	1.526**	.474***
	(.127)	(.192)	(.053)
Ends meet	1.351	1.089	.893
	(.299)	(.217)	(.133)
In education	.740	.804	.734*
	(.183)	(.160)	(.094)
Housing	1.010	1.369	1.016
	(.296)	(.565)	(.316)
Hhd income	1.006*	.610***	.996
	(.003)	(.034)	(.008)
Public sector	.977	1.882*	.992
	(.229)	(.466)	(.137)
Personal earnings	.727***	.982	.986
	(.036)	(.021)	(.130)
Spouse's education	1.051	1.281*	1.042
	(.116)	(.154)	(.053)
N=7536			
Pseudo R^2=0.25			

Reference category is working, partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

APPENDIX 3.2. REPLICATION OF THE ANALYSES FOR THE YOUNG SAMPLE, UK

Table A3.2.1. Women's (corrected) earnings equations, UK

	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Age	11131.4***	854.0*	1824.0***	874.8***
	(293.7)	(323.8)	(260.3)	(196.7)
Age squared	-14.1***	-10.3*	-22.3***	-10.6***
	(3.7)	(3.9)	(3.2)	(2.5)
Education=medium	2388.5	-315.8	-478.6	509.1
	(1222.0)	(614.6)	(380.1)	(288.3)
Education=high	1883.5**	387.7	1546.0***	1325.5***
	(628.1)	(685.3)	(376.5)	(242.2)
Tenure	-16.7	213.1**	28.8	80.9***
	(54.2)	(66.6)	(28.9)	(21.4)
Public sector	-11.4	982.6	-172.3	371.9
	(650.9)	(508.2)	(332.6)	(208.8)
Fixed-term contract	180.3	-827.3	-2115.7***	-1637.5***
	(1485.1)	(891.8)	(597.0)	(341.5)
Occupation (ref. Managers)				
Professionals	-758.8	-2040.8	-1839.7*	-549.6
	(1131.7)	(1662.0)	(887.5)	(687.0)
Technicians	-2831.7**	-3752.2*	-2780.7***	-1820.5*
	(1108.7)	(1859.9)	(743.5)	(.644)
Clerks	-3601.8***	-5207.9*	-4389.2***	-3159.6***
	(813.8)	(2004.6)	(674.8)	(579.5)

	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Service workers	-6271.4***	-6567.3***	-5149.4***	-4625.2***
	(942.0)	(1870.3)	(632.1)	(592.3)
Skilled agricultural workers			-1133.8	
			(930.6)	
Craft workers	-1648.7	-4521.8*	-3067.9**	-3481.4***
	(1679.4)	(1826.5)	(922.7)	(719.6)
Plant and machine operators	-4791.8***	-5976.1*	-6023.1***	-4552.9***
	(1176.9)	(2127.6)	(732.4)	(687.5)
Elementary occupations	-5717.7***	-6773.7**	-5523.5***	-4745.8***
	(1092.3)	(2096.2)	827.7)	(634.8)
Hours/week	118.1***	115.4***	119.7***	193.7***
	(26.5)	(22.2)	(22.1)	(9.3)
Ill health	-715.9	304.8	-46.5	-291.6
	(698.3)	(619.5)	(505.5)	(332.6)
N children		-195.1		-347.1*
		(309.9)		(142.7)
Children under 3		41.1		1167.9**
		(757.2)		(401.3)
Partner's earnings/1000			106.4*	38.6***
			(44.5)	(9.3)
Selection term	-1891.2***	2323.8**	-5361.1***	991.5*
	(494.6)	(758.8)	(645.1)	(451.2)
Constant	-10926.8*	-12788.3*	-22681.6***	-14177.6***
	(5403.7)	(6175.2)	(4546.9)	(3661.1)
N	653	481	1522	2658
R^2	0.43	0.56	0.46	0.58

Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A3.2.2. Women's partners' earnings equations, UK

	Male partners' earnings
Age	791.7***
	(196.2)
Age squared	-8.6**
	(2.4)
Education=medium	914.8*
	(446.0)
Education=high	2756.0***
	(498.0)
Tenure	109.5**
	(36.2)
Public sector	-1175.4**
	(410.7)
Fixed-term contract	-2731.9***
	(707.5)
Occupation (ref. Managers)	
Professionals	-2246.1**
	(652.5)
Technicians	-2761.7*
	(1060.6)
Clerks	-6599.8***
	(596.8)
Service workers	-6946.8***
	(696.6)
Skilled agricultural workers	-9958.8***
	(990.8)
Craft workers	-6392.1***
	(631.2)
Plant and machine operators	-7308.3***
	(662.1)
Elementary occupations	-8597.5***
	(677.2)
Hours/week	169.4***
	(24.2)
Ill health	-600.0
	(567.6)

	Male partners' earnings
N children	327.3*
	(156.8)
Children under 3	393.6
	(512.1)
Partner's earnings	51.1
	(47.1)
Partner's education=medium	1432.1
	(769.7)
Partner's education=high	868.0
	(503.5)
Constant	-8415.8*
	(3452.3)
N	6227
R^2	0.21

Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A3.2.3. Expected household earnings, by women's level of education, UK

t0: not working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.81	0	0.79	0	0.73	0
Starting couple	0.04	14110	0.04	16613	0.05	16697
Working	0.13	8372	0.15	10453	0.20	11732
E(household earnings) t1	**1653**		**2232**		**3181**	

t0: not working, partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.84	14110	0.79	16613	0.77	16697
Ending couple	0.007	0	0.009	0	0.011	0
Working	0.12	21295	0.14	24810	0.16	28048
E(household earnings) t1	**14408**		**16598**		**17344**	

t0: working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.89	8372	0.90	10453	0.87	11732
Starting couple	0.10	21295	0.09	24810	0.11	28048
Leaving work	0.008	0	0.005	0	0.009	0
E(household earnings) t1	**9581**		**11641**		**13292**	

CHAPTER 4. FAMILY AND LABOUR DECISIONS, RETURNS TO WOMEN'S EDUCATION, AND IMPLICATIONS FOR HOUSEHOLD EARNINGS INEQUALITY IN THE NETHERLANDS AND ITALY

4.1. Introduction

In Chapter 3 the effects of women's education on some of the processes that affect the generation of household earnings –and that were explained at length in Part I of the thesis– were tested using data for the United Kingdom. In this chapter, the consistency of the results is put to the test using data for two additional countries, the Netherlands and Italy. In order to ensure the use of similar measures and variables, data from the European Community Household Panel (ECHP) for each of the two countries are again used. As explained in Chapter 3, all income variables in the panel are retrospective, and so this information for the last calendar year in the panel is missing. Similarly, although there is income information for 1993 in the first wave of the ECHP, the lack of other relevant variables for that year prevents from increasing the number of waves. Seven waves are therefore used for the analyses in this chapter. All income and earnings variables are expressed in real (1996) units of the respective national currencies (in thousands for Italy).

The empirical framework –and the steps involved in the estimation of earnings corrected by selection stemming from both

family formation processes and women's participation in the labour market– were explained in detail in the previous chapter, and will therefore not be addressed again. The structure of this chapter is as follows. In the first section, some descriptive evidence showing (a) the incidence of single transitions regarding partnership, fertility and labour participation, and transitions between household types –regarded as combinations of demographic and labour states–, and (b) the incidence of changes in household earnings over time is presented. The main analysis then follows, with the estimation of the effects of education on corrected women's earnings and of their partners' earnings, on the one hand, and expected household earnings associated with various family and labour transitions of interest across women's educational levels. The chapter concludes with a discussion of the Dutch and Italian results when compared with those obtained for the UK in Chapter 3, and of their implications for inequality between households in the three countries.

4.2. Descriptive Results

Table 4.1 below presents the results from a tabulation of household types and the decomposition of total counts into a between and a within component for the Netherlands and Italy. Household types are, in line with what was presented in Chapter 3, created as the combined outcome of whether or not women are working, whether they live in a couple (including consensual unions) and whether or not they have any children. The percentages reveal interesting differences between the two countries. In the Netherlands, in line with the results shown for the UK, it is much more common for women to be working and the working states are much more stable (working women remain for longer periods in the labour force) than in Italy. Being a working coupled woman is in the Netherlands –as it was in the UK– the most common state for women; alternatively, in Italy more than a third of all women*time counts belong to coupled mothers who

are not working. The two countries coincide in that having children is very uncommon when the woman does not live in a couple. Once more it is worthwhile noting that in all states and in both countries the degree of stability is very high due to the limited length of the panel.

Table 4.1. Tabulation of household types in the Netherlands and Italy in the panel

Netherlands	Overall		Between		Within
Types	Freq.	Perc.	Freq.	Perc.	Perc.
NW,NP,0C	752	3.3	330	6.6	56.5
NW,NP,C	405	1.8	151	3.0	54.8
NW,P,0C	2894	12.8	907	18.2	67.9
NW,P,C	4445	19.7	1348	27.0	61.7
W,NP,0C	2204	9.8	795	15.9	72.1
W,NP,C	546	2.4	196	3.9	57.7
W,P,0C	4592	20.4	1518	30.4	64.7
W,P,C	6718	29.8	1864	37.3	67.7
Total	22556	100	7109	142.3	65.4
		n=4994			

Italy	Overall		Between		Within
Types	Freq.	Perc.	Freq.	Perc.	Perc.
NW,NP,0C	5799	14.0	1794	21.5	70.4
NW,NP,C	967	2.3	311	3.7	62.0
NW,P,0C	3139	7.6	1153	13.8	55.1
NW,P,C	14386	34.7	3416	40.9	77.4
W,NP,0C	4706	11.3	1515	18.1	62.8
W,NP,C	820	2.0	252	3.0	60.3
W,P,0C	2336	5.6	962	11.5	48.3
W,P,C	9308	22.5	2350	28.1	69.7
Total	41461	100	11753	140.7	67.6
		n=8354			

NW: Not working; NP: Not partnered; W: Working; P: Partnered; 0C: No children; C: Some children.

The decomposition of labour participation (Table 4.2) shows markedly different patterns in the two countries. In the Netherlands more than 60 per cent of all women*periods belong to the working state. When the panel structure of the data is considered, this percentage goes up to 73. Among those women ever doing any paid work in that country, on average more than four out of five women are always working. In Italy the picture looks rather different. Significantly fewer women are found in paid labour, regardless of whether the data are read in a cross-sectional or panel fashion, and women ever falling into non-work are most likely not to leave that state.

Table 4.2. Tabulation of women's labour participation in the Netherlands and Italy in the panel

Netherlands	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not Working	8830	37.4	2552	50.3	69.9
Working	14799	62.6	3711	73.1	82.6
Total	23629	100	6263	123.4	77.4
		n=5074			

Italy	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not Working	24294	58.6	5871	70.3	82.6
Working	17172	41.4	4344	52.0	75.4
Total	41466	100	10215	122.3	79.5
		n=8354			

When marital status is decomposed (Table 4.3), women in the two countries experience similar marriage events (60 per cent of all women*periods observations), although when all couples (including consensual unions) are inspected significant differences come out. Only 20 per cent of Dutch women*years in the age

range do not live in a couple –in Italy the equivalent figure is 30. Note that the figures for the UK were very similar as regards marriage.

Table 4.3. Tabulation of women's marital status in the Netherlands and Italy in the panel

Marriage only	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not married	9807	32.9	2518	42.4	83.0
Married	19981	67.1	3982	67.0	92.4
Total	29788	100	6500	109.4	88.8
		n=5941			

Marriage only	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not married	16283	32.0	3620	40.2	84.4
Married	34599	68.0	6248	69.3	92.4
Total	50882	100	9868	109.5	89.5
		n=9013			

Living in a couple	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not coupled	5314	18.6	1592	27.2	76.7
Coupled	23251	81.4	4755	81.3	94.4
Total	28565	100	6347	108.5	89.9
		n=5847			

Living in a couple	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
Not coupled	15431	30.3	3447	38.2	83.0
Coupled	35451	69.7	6502	72.1	91.7
Total	50882	100	9949	110.4	88.7
		n=9013			

The transition to having an additional child (Table 4.4) shows, as was the case in the UK, a remarkable stability. With such a short time-span to be observed, of course the occurrence of births is very rare.

Table 4.4. Tabulation of women's fertility in the Netherlands and Italy in the panel

Fertility	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
No	29346	98.5	5934	99.9	98.5
Yes	442	1.5	384	6.5	17.4
Total	29788	100	6318	106.4	93.6
		n=5941			

Fertility	Overall		Between		Within
	Freq.	Perc.	Freq.	Perc.	Perc.
No	49825	97.9	8990	99.7	98.0
Yes	1064	2.1	936	10.4	19.9
Total	50889	100	9926	110.1	90.4
		n=9013			

These basic descriptives illustrate the extent to which women experience changes in the demographic and labour participation processes that might contribute to changing the position that households have in the distribution of household earnings. Attention is now turned to the extent to which changes in household earnings do take place. In Table 4.5 below some indicators describing the overall extent and range of household earnings mobility using a balanced panel of the sample are shown.

Table 4.5. Some mobility indicators using household earnings quintiles (balanced sample of households) in the Netherlands and Italy

Netherlands

All households	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	71.1	63.7	58.9	53.3	50.5	47.1
% in the same or ±1 quintile	92.6	90.6	88.3	85.4	82.7	80.2
% moving 1 quintile above	11.1	15.0	16.0	17.4	18.3	17.9
% moving 1 quintile below	10.4	11.9	13.4	14.7	13.9	15.2

Households in the two lowest quintiles (1 and 2) in w1	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	73.3	67.4	62.6	57.4	53.6	51.7
% in the same or ±1 quintile	92.7	91.1	88.5	86.4	84.6	82.5
% moving 1 quintile above	13.4	16.7	18.5	20.7	22.7	22.1
% moving 1 quintile below	6.0	7.0	7.4	8.3	8.3	8.7

Households in the two highest quintiles (4 and 5) in w1	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	72.5	63.7	58.6	53.4	50.9	46.4
% in the same or ±1 quintile	92.0	89.2	87.2	85.0	81.2	79.4
% moving 1 quintile above	7.0	10.2	10.9	11.1	10.8	10.7
% moving 1 quintile below	12.5	15.3	17.7	20.5	19.5	22.3

Italy

All households	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	62.1	54.7	50.5	48.2	45.0	42.6
% in the same or ±1 quintile	88.9	84.5	82.9	80.6	77.5	75.1
% moving 1 quintile above	14.6	17.6	17.9	18.4	19.0	19.3
% moving 1 quintile below	12.2	12.2	14.5	14.0	13.5	13.2

Households in the two lowest quintiles (1 and 2) in w1	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	64.9	55.3	51.5	48.8	44.7	41.7
% in the same or ±1 quintile	89.2	86.2	83.9	81.5	79.2	76.9
% moving 1 quintile above	17.9	23.3	23.3	23.9	25.2	25.9
% moving 1 quintile below	6.4	7.6	9.1	8.8	9.3	9.3

Households in the two highest quintiles (4 and 5) in w1	w1-2	w1-3	w1-4	w1-5	w1-6	w1-7
% in the same quintile	64.4	58.1	53.9	51.4	49.0	47.1
% in the same or ±1 quintile	88.1	82.7	82.2	80.0	76.4	73.5
% moving 1 quintile above	10.0	10.7	10.7	11.1	11.4	11.7
% moving 1 quintile below	13.7	13.9	17.6	17.5	16.0	14.7

The results for the whole sample (first and fourth panels) show, for the Netherlands and Italy respectively, that most cases concentrate in the diagonal of the transition matrix. This means that remaining in the same earnings quintile is the most common

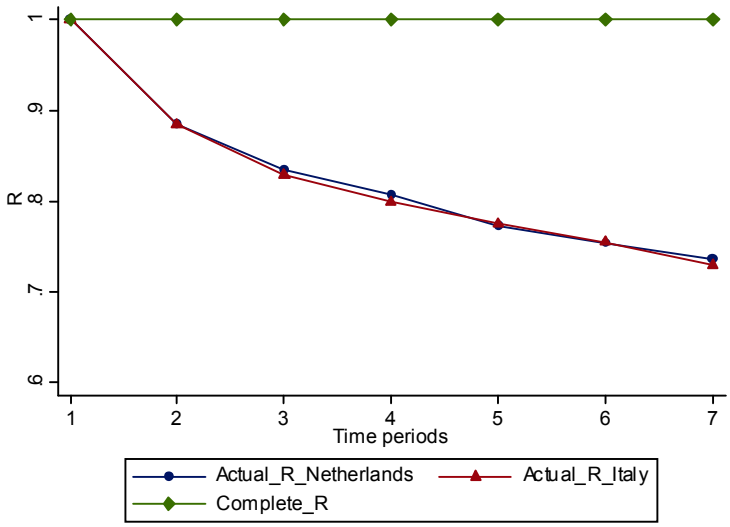
result, although, as the accounting interval gets longer, the percentage not changing quintiles declines in such a way that by the last wave more than half of the households had changed quintiles in the to countries.[1] As was the case for the UK, most of the movements are rather short-ranged –they take place within the neighbouring quintile, particularly in the Netherlands. In the two countries there are greater proportions of households changing to a better rather than a worse position as the accounting period is extended. The comparison of households at different parts of the distribution reveals that households in the lowest quintiles are relatively more unlikely than households in the highest quintiles to change their position in the Netherlands.

Graph 4.1 shows the extent to which the fact that there actually is mobility between different parts of the distribution over the seven observed years contributes to equalising longitudinal household earnings using Shorrocks' R index[2] (Shorrocks 1978b) for a balanced sample of the panel (those for which household earnings are observed throughout the complete panel). The results show that the degree of equalisation is almost identical in the two countries and, in is slightly higher than in the UK.

[1] The amount of mobility in the rest of pair-wise single comparisons is similar (not shown).

[2] The construction and interpretation of the R index were discussed in detail in Chapter 3.

Graph 4.1. Degree of equalisation of household earnings when averaged over seven years in the Netherlands and Italy



The incidence of labour participation and family changes, on the one hand, and changes in the position in the household earnings distribution, on the other, has been briefly described. In the rest of the chapter the effects of both types of processes on the generation of household earnings –and of changes in them– are examined.

4.3. The Generation of Household Earnings: (Corrected) Returns to Women's and their Partners' Education

In line with the reasoning and structure followed in Chapter 3, in this section the effect of women's levels of education on their own earnings (and the earnings of their partners) are estimated accounting for multiple selection as regards women's labour,

partnership and fertility. In the first step of the two-stage estimation method that is carried out, women are classified according to their status in each of the three variables that might be causing the selection bias, and all the combinations of outcomes in each of the variables are transformed into a single value. Table 4.6 presents the variable that summarises women's situation in these three aspects.

Table 4.6. Combined demographic and labour states for the estimation of selection terms

Combined States
1. Not working
2. Working, not partnered, no children
3. Working, not partnered, children
4. Working, partnered, no children
5. Working, partnered, children

The estimation of occupancy of each of these states is conducted using a multinomial logit model, where the five values shown in Table 4.6 are the categories of the dependent variable and 'Not working' is the reference category. The results of this model are presented in Table 4.7 below. Education is significantly associated with working except for single mothers. A positive effect of any labour attachment at previous time points –working and personal earnings at t0– is generally found. As was found for the UK, higher household income is associated with less work, except for the group of working partnered mothers.

Table 4.7. Selection variables: combined demographic and labour situations in the Netherlands and Italy

Netherlands	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Age	-.266***	.703***	.073*	.432***
	(.036)	(.112)	(.028)	(.034)
Age squared	.002***	-.007***	-.001***	-.005***
	(.000)	(.001)	(.000)	(.000)
Educ=medium	.346*	.406	.238*	.394***
	(.074)	(.219)	(.100)	(.072)
Educ=high	.741***	.455	.551***	.489***
	(.165)	(.294)	(.123)	(.104)
Working t0	3.024***	3.442***	3.807***	3.610***
	(.198)	(.218)	(.161)	(.126)
Care t0	-1.959***	2.564***	-2.070***	1.873***
	(.155)	(.266)	(112)	(.109)
Personal earnings/1000 t0	.041***	.005	.042***	.036***
	(.008)	(.010)	(.008)	(.008)
Household income/1000 t0	-.061***	-.097***	-.000	.007***
	(.004)	(.005)	(.001)	(.001)
In education t0	1.079***	.440	.363**	-.003
	(.138)	(.232)	(.124)	(.108)
Constant	4.689***	-18.490***	-3.381***	-11.942
	(.658)	(2.453)	(.554)	(.672)
		N=18091		
		Chi^2=7674.32		
		Pseudo R^2=0.51		

Reference category: 'Not working'. Standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Italy	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Age	-.104***	.568***	.187***	.513***
	(.025)	(.091)	(.032)	(.024)
Age squared	.000	-.006***	-.003***	-.006***
	(.000)	(.001)	(.000)	(.000)
Educ=medium	.485***	.053	.445***	.211**
	(.074)	(.188)	(.105)	(.065)
Educ=high	1.008***	-.241	.906***	.596***
	(.157)	(.342)	(.186)	(.126)
Working t0	2.992***	3.345***	3.311***	3.609***
	(.106)	(.225)	(.138)	(.100)
Care t0	-1.904***	.697***	-2.111***	.987***
	(.095)	(.149)	(122)	(.066)
Personal earnings/1000 t0	.093***	.111***	.099***	.093***
	(.007)	(.008)	(.007)	(.006)
Household income/1000 t0	-.006**	-.063***	-.011***	.004**
	(.002)	(.008)	(.002)	(.001)
In education t0	-.004	-.355	-.293*	-.533***
	(.079)	(.211)	(.115)	(.095)
Constant	.138	-17.140***	-6.779***	-14.31***
	(.429)	(1.8770)	(.585)	(.507)
		N=32041		
		Chi^2=9383.14		
		Pseudo R^2=0.50		

Reference category: 'Not working'. Standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

The predicted probabilities obtained from this model are, in the second step of the estimation, converted into selection terms using Lee's procedure (1983) for selection variables with more than two unordered categories. This procedure was explained in detail in Chapter 3. The resulting terms are then plugged into the earnings equation to control for women's self-selection into those

demographic and labour states. One separate OLS regression, one for each of the combined states in which women are working (shown in Table 4.3), is then fitted. The results of these models in the two countries are presented in Table 4.8.

Table 4.8. Women's (corrected) earnings equations in the Netherlands and Italy

Netherlands	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Age	1217.5**	1048.4	1335.2***	562.0
	(423.8)	(623.3)	(346.2)	(571.3)
Age squared	-13.4*	-11.0	-15.9***	-6.0
	(5.1)	(6.9)	(4.1)	(6.5)
Education=medium	60.7	1212.5	739.0	563.3
	(1692.6)	(1369.8)	(636.6)	(1298.0)
Education=high	1988.4	3862.5*	4754.9***	2196.4
	(1697.8)	(1714.93)	(1002.0)	(2190.6)
Tenure	115.82	313.6*	226.7**	256.4***
	(97.9)	(116.4)	(81.0)	(44.8)
Public sector	-1729.6	792.1	-174.9	-91.9
	(1263.6)	(1395.2)	(871.0)	(725.2)
Fixed-term contract	-8600.0***	-8060.3***	-1475.9	-5082.4***
	(1474.3)	(1722.9)	(3229.7)	(851.1)
Occupation (ref. Managers)				
Professionals	6598.8*	4493.1	1270.5	-1889.6
	(2468.2)	(2925.4)	(3587.2)	(2042.6)
Technicians	-1806.7	-671.8	-5185.2	-5312.8**
	(1556.5)	(2490.4)	(3098.4)	(1693.9)
Clerks	-2533.5	-1306.2	-7643.6*	-6223.1***
	(2063.9)	(2506.0)	(3000.4)	(1751.6)
Service workers	-5954.1*	-1159.2	-9640.6**	-9921.4***
	(2204.9)	(3076.1)	(2890.5)	(1877.1)
Skilled agricultural workers	8696.4***	-	4180.6	-10880.5***
	(2301.0)		(10752.7)	(2051.1)
Craft workers	-7982.0***	-5164.1	-6701.3*	-11725.6***
	(2195.0)	(5150)	(3244.6)	(2203.8)
Plant and machine operators	-6054.4*	-178.1	-5931.3	-11608.3***
	(2389.9)	(3856.9)	(3734.9)	(2332.1)
Elementary occupations	-9026.2***	-3834.9	-10041.3***	-10370.5***
	(2021.5)	(2743.8)	(2824.3)	(2088.3)

Netherlands	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Hours/week	664.6***	718.7***	702.7***	598.3***
	(120.6)	(96.9)	(59.7)	(45.8)
Ill health	478.6	425.3	-315.2	-158.7
	(1495.1)	(1126.1)	(1212.0)	(940.5)
N children		765.4		375.5
		(671.0)		(560.1)
Children under 3		2434.4		2256.4
		(2190.9)		(1369.6)
Partner's earnings/1000			18.9	-7.7
			(19.3)	(8.3)
Selection term	-2466.7*	-291.3	-2756.4***	-1129.8
	(889.8)	(534.4)	(763.4)	(586.3)
Constant	-13656.1	-23213.3	-16487.4*	-1570.9
	(7540.6)	(14504.7)	(8258.5)	(12501.6)
N	1188	265	2201	2501
R^2	0.20	0.63	0.17	0.23

Standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Italy	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Age	437.3**	-1040.3**	468.9*	23.9
	(144.5)	(372.0)	(216.9)	(201.0)
Age squared	-4.0*	12.0**	-5.3*	.632
	(1.9)	(4.3)	(2.594)	(2.3)
Education=medium	927.1*	3045.8***	1584.2*	1830.0***
	(439.3)	(795.7)	(639.6)	(429.8)
Education=high	4036.7***	9555.8*	4034.6**	5101.2***
	(1084.7)	(3967.3)	(1291.5)	(812.7)
Tenure	191.2**	239.1**	248.6***	176.7***
	(55.4)	(68.0)	(70.0)	(29.2)
Public sector	1976.5***	469.1	1483.0	1103.4*
	(530.7)	(818.8)	(802.0)	(432.6)
Fixed-term contract	-3977.0***	-2967.3	-2701.1***	-5011.9***
	(444.2)	(1544.8)	(745.7)	(458.1)

Italy	Working, not partnered, no children	Working, not partnered, children	Working, partnered, no children	Working, partnered, children
Occupation (ref. Managers)				
Professionals	-4578.8* (2099.8)	6801.0 (3716.7)	1489.1 (2074.1)	-5011.9*** (458.1)
Technicians	-5814.5** (2105.7)	5753.1 (3499.4)	685.1** (1703.9)	-15360.1** (4952.3)
Clerks	-7068.0** (2026.4)	4471.7 (3361.5)	-462.3 (1660.7)	-16772.2** (4943.3)
Service workers	-9795.8*** (2009.7)	3391.9 (3378.9)	-3096.8 (1818.6)	-17328.2** (4969.8)
Skilled agricultural workers	-10601.9** (3243.9)	-6698.7* (3343.9)	-8375.8*** (2265.5)	19719.2*** (4983.0)
Craft workers	-9990.0*** (2046.4)	2233.6 (3449.1)	-4220.1* (1904.6)	-23623.2*** (5096.7)
Plant and machine operators	-9025.8*** (2047.5)	3117.9 (3390.1)	-3373.5 (1916.4)	-20435.8*** (4991.9)
Elementary occupations	-11187.0*** (2003.4)	2452.6 (3317.4)	-5487.0** (1913.0)	-22317.2*** (4970.1)
Hours/week	266.1*** (29.5)	279.7*** (57.4)	255.0*** (40.6)	321.7*** (26.6)
Ill health	185.5 (780.4)	738.6 (727.2)	-195.1 (809.3)	-79.3 (448.2)
N children		-75.0 (390.3)		-673.8** (246.1)
Children under 3		1288.0 (1415.8)		358.0 (633.6)
Partner's earnings/1000			48.6 (25.3)	53.6*** (14.5)
Selection term	-2103.5*** (441.0)	-4082.4*** (734.3)	1617.3* (675.8)	-1778.8*** (313.6)
Constant	7588.1* (3464.9)	31124.2** (9647.6)	864.3 (5442.3)	23326.8*** (6510.5)
N	2065	424	907	4440
R^2	0.40	0.59	0.43	0.48

Standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

The effects of the covariates in Italy are very much in line with the expectations. Higher levels of education, job tenure and higher number of hours worked all are associated with women's higher earnings, whereas clear negative effects are found in having a fixed-term temporary contract, most occupations relative to working as a manager and the number of children. Having a job in the public sector, when significant, leads to increased earnings levels, and the same holds for partners' earnings of women who live in a couple. These results are generally in line with those reported for the UK. In the Netherlands, the effect of women's education on their earnings is only significant at the highest level. Tenure and the number of hours worked have a positive effect on earnings whereas the effect of having a temporary contract has the opposite sign. There appears not to be much of a difference in the earnings of women working in occupations at the top, although belonging to the rest of the categories does reduce the earnings of Dutch women. Working in the public sector and having children does not have a significant effect in that country, and the same holds for the earnings of women's partners. This would suggest that, even in the presence of educational similarities between members of couples in the Netherlands, it does not translate into an accumulation of resources –which was observed in both the UK and Italy.

Table 4.9 shows equivalent earnings regression for the partners of women. The results for the Netherlands and Italy do not differ from those shown in the previous chapter for the UK, and they support the idea that standard human capital models tend to 'travel' across countries more accurately than women's. Education, tenure, and a higher number of hours worked, are all associated with partners' higher earnings levels. Alternatively, having a fixed-term contract, working in a public sector and any occupation compared to managers tend to decrease the earnings of these men. Whereas women's earnings do not show a significant effect on their partners' earnings in Italy, their effect in the Netherlands is negative, although higher educational levels of

women in the two countries are associated with higher earnings levels of their partners.

Table 4.9. Women's partners' earnings equations in the Netherlands and Italy

	Male partners' earnings	
	Netherlands	*Italy*
Age	1823.2***	604.0**
	(321.5)	(210.4)
Age squared	-17.1***	-6.0*
	(3.8)	(2.4)
Education=medium	3630.2***	2079.2***
	(915.2)	(407.5)
Education=high	11000.1***	11045.1***
	(1309.4)	(1187.3)
Tenure	190.6**	219.6***
	(68.1)	(32.6)
Public sector	-2533.4**	-782.0
	(839.8)	(443.5)
Fixed-term contract	-8427.0***	-4898.1***
	(1372.9)	(555.2)
Occupation (ref. Managers)		
Professionals	-2902.4*	-15487.1***
	(1226.6)	(2670.9)
Technicians	-5883.3***	-16324.5***
	(1134.3)	(2570.5)
Clerks	-8146.3***	-18025.9***
	(1413.9)	(2532.1)
Service workers	-9855.8***	-20227.7***
	(1622.0)	(2524.7)
Skilled agricultural workers	-15818.8***	-24935.3***
	(1743.7)	(2628.3)
Craft workers	-10909.9***	-21585.3***
	(1502.9)	(2501.8)
Plant and machine operators	-12014.2***	-19542.9***
	(1294.3)	(2509.3)
Elementary occupations	-13745.2***	-23004.5***

	Male partners' earnings	
	Netherlands	*Italy*
	(1356.4)	(2483.3)
Hours/week	493.3***	360.1***
	(46.1)	(31.2)
Ill health	-2801.0*	-1845.9**
	(1210.2)	(670.1)
N children	757.2	314.0
	(385.9)	(182.3)
Children under 3	-186.0	347.6
	(623.1)	(609.9)
Partner's earnings	-81.9***	2.8
	(19.9)	(24.9)
Partner's education=medium	1519.3*	2080.9***
	(773.3)	(428.7)
Partner's education=high	950.7	2801.1*
	(1020.5)	(1050.7)
Constant	-20622.0**	12311.8*
	(6872.5)	(4845.8)
N	9334	9804
R^2	0.16	0.38

Standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

In the following section, the focus is turned to the assessment of the extent to which changes in women's work and family status take place across educational levels and to the impact of those on changes in expected household earnings.

4.4. The Generation of Changes in Household Earnings: The Effects of Demographic and Labour Transitions on Changes in Expected Household Earnings

In Table 4.10 below the matrix showing all possible transitions between initial and destination states is shown. Note that stability

between two consecutive years is the norm, even more so in the Netherlands and Italy than in the UK. Since multiple transitions – those involving more than one aspect– are negligible, the same procedure explained in Chapter 3 is adopted and only single transitions that actually take place are considered. In order to analyse those, four multinomial logit models –one for each initial state– have been fitted. The dependent variable in each of the models is the destination state, with, in principle, eight possible destination states; however, because of the inexistence of several of those transitions, single transitions only are estimated. The four models for each of the two countries are presented in Appendix 4.

Table 4.10. Transitions between initial (household types at t0) and destination states (household types at t1) in the Netherlands and Italy

Origin (household type at t0)	*Netherlands*								
	Destinations (household type at t1)								
	1	2	3	4	5	6	7	8	Total
Not working, not partnered	79.0	0.4	1.4	0	18.0	0	1.2	0	100%
Not working, partnered	1.0	0	85.0	0.9	0.2	0	12.7	0.1	100%
Working, not partnered	4.4	0	0.1	0	87.4	0.	8.1	0	100%
Working, partnered	0.1	0	7.1	0.2	0.8	0	89.5	2.3	100%

Origin (household type at t0)	*Italy*								
	Destinations (household type at t1)								
	1	2	3	4	5	6	7	8	Total
Not working not partnered	85.6	0.1	2.2	0.1	11.6	0	0.3	0	100%
Not working partnered	0.9	0	91.5	2	0.1	0	5.4	0.2	100%
Working, not partnered	9.0	0	0.4	0.1	85.8	0.1	4.3	0.1	100%
Working, partnered	0.1	0	8.9	0.6	1.0	0	86.6	2.9	100%

Percentages might not sum up to exactly 100 because of rounding. Destinations are: 1: Not working, not partnered, no additional child; 2: Not working, not partnered, additional child; 3: Not working, partnered, no additional child; 4: Not working, partnered, additional child; 5: Working, not partnered, no additional child; 6: Working, not partnered, additional child; 7: Working, partnered, no additional child; 8: Working, partnered, additional child.

Covariates in the multinomial logit models include a basic set of common variables across initial states, such as age, the level of education, several indicators of household income and the trade-off between care and participation, and whether the woman is enrolled in formal education, and specific variables for each initial state; in initial states in which the woman has a couple, the duration of the relationship and the partner's level of education are included in the model; in those states in which the woman is working, her earnings and whether she works in the public or private sector are considered to account for incentives to remain in work. All regressors are measured at t0.

The main results of the models suggest that in the Netherlands, women's education is positively associated with starting to work and with lower probabilities of leaving the labour force once employed. However, household income does not have any effect

on this latter probability. This is in agreement with the result shown in Table 4.9, where the earnings of partners did not have any effect on women's own earnings. When they are employed, the higher women's earnings are the less likely it is that they abandon the labour force if they do not live in a couple. Education does not show a significant effect on the probability of finding a partner, although it does increase the likelihood of dissolving an existing union. In Italy the effects of women's education is also associated with higher probabilities of starting to work or remaining employed, although less consistently, but its effects on fertility and couple formation and dissolution are not significant. Among working women, higher personal earnings are associated with longer permanence in the labour force.

Table 4.11 shows the mean values of the probabilities of making these single transitions for each initial state and across women's educational levels, conditional on the set of covariates described above. Staying in the same state always shows the highest probabilities. In Italy, the higher the educational level of a woman is, the more likely it is that they start working or continue to work if they already had a job, and the less likely it is that they abandon it relative to women with low levels of education. Alternatively, the transitions to breaking a couple and starting it do not show a very clear educational gradient. In the Netherlands, the difference between the probabilities of getting employed between women with low and medium or high levels of education is fairly marked, particularly for women who are unpartnered. Such educational differences do not come about very clearly in the case of couple formation and dissolution.

Table 4.11. Mean transition probabilities across educational levels in the Netherlands and Italy

	Netherlands		
t0: not working, unpartnered	Low education	Medium education	High education
pr(staying)	0.92	0.73	0.67
pr(working)	0.08	0.27	0.33
t0: not working, partnered	Low education	Medium education	High education
pr(staying)	0.89	0.82	0.79
pr(ending couple)	0.01	0.01	0
pr(working)	0.10	0.16	0.18
t0: working, unpartnered	Low education	Medium education	High education
pr(staying)	0.87	0.89	0.89
pr(starting couple)	0.08	0.08	0.09
pr(leaving work)	0.04	0.02	0.02
t0: working, partnered	Low education	Medium education	High education
pr(staying)	0.91	0.94	0.93
pr(leaving work)	0.07	0.03	0.03
pr(ending couple)	0.008	0.004	0.009

	Italy		
t0: not working, unpartnered	Low education	Medium education	High education
pr(staying)	0.89	0.83	0.74
pr(starting couple)	0.02	0.02	0.04
pr(working)	0.08	0.14	0.23
t0: not working, partnered	Low education	Medium education	High education
pr(staying)	0.93	0.88	0.80
pr(working)	0.05	0.08	0.14

	Italy		
t0: working, unpartnered	Low education	Medium education	High education
pr(staying)	0.90	0.91	0.93
pr(starting couple)	0.05	0.05	0.04
pr(leaving work)	0.05	0.04	0.03
t0: working, partnered	Low education	Medium education	High education
pr(staying)	0.90	0.92	0.94
pr(leaving work)	0.07	0.04	0.02
pr(ending couple)	0.009	0.006	0.005

Once transition probabilities across states have been illustrated, in Table 4.12 mean predicted earnings levels –as obtained in the OLS regression models in Table 4.8– for each of the four groups of working women, and for the three educational levels of women and their partners (when present) are shown. There is not a clear ordering of states according to the earnings levels associated with them in any of the two countries, although there clearly is an educational gradient, in such a way that the higher the educational level of women and their partners is, the higher their earnings tend to be. In contrast to what was noted for the UK, women's education does have a positive effect on their partners' earnings, and the returns of men belonging to couples in which both members have high qualifications are markedly higher than those in most other combinations. It is worth pointing out that, in the Netherlands, when average returns of men are disaggregated by their partners' education, the figures obscure the educational gradient that was found in the earnings regression (Table 4.9), and the returns of men with a medium level of education appear to be lower than those with the lowest level.

Table 4.12. Mean predicted earnings of women (and their partners) across educational levels in the Netherlands and Italy

	Netherlands		
	Women's education		
	Low	Medium	High
Working, not partnered, no children	21662	24130	32570
	(8329)	(8178)	(8952)
Working, not partnered, children	20781	23518	30753
	(7548)	(7076)	(8016)
Working, partnered, no children	20417	22880	32188
	(8539)	(7703)	(8146)
↳ Partners of these women			
Low level of education	39219	43202	47199
	(9871)	(9224)	(8837)
Medium level of education	32720	37945	38089
	(7980)	(9192)	(9091)
High level of education	46539	51755	52883
	(7977)	(6978)	(7128)
Working, partnered, children	19310	22496	28425
	(6831)	(6092)	(6520)
↳ Partners of these women			
Low level of education	44263	48921	51289
	(8804)	(7946)	(7724)
Medium level of education	38307	43682	43968
	(8708)	(8956)	(8732)
High level of education	52179	59928	57633
	(8244)	(5721)	(7088)

Table 4.12. Mean predicted earnings of women (and their partners) across educational levels in the Netherlands and Italy (continues)

	Italy		
	Women's education		
	Low	Medium	High
Working, not partnered, no children	16639	20630	25420
	(4698)	(4160)	(3667)
Working, not partnered, children	15619	19919	25846
	(4948)	(4293)	(4053)
Working, partnered, no children	16580	22366	25977
	(4663)	(3832)	(3350)
↳ Partners of these women			
Low level of education	21637	23372	25429
	(4612)	(4121)	(5392)
Medium level of education	24522	27550	29733
	(4761)	(4834)	(5215)
High level of education	no observ.	38875	42018
		(6553)	(6388)
Working, partnered, children	16876	22703	27285
	(5079)	(4485)	(5220)
↳ Partners of these women			
Low level of education	23061	26585	27915
	(4760)	(4442)	(4371)
Medium level of education	27992	30716	33055
	(5489)	(5106)	(6131)
High level of education	39760	42136	43125
	(7370)	(7511)	(7848)

Standard deviations in parentheses.

Finally, the two pieces of information presented thus far in this section –transition probabilities and predicted earnings in different states– are assembled in order to obtain a comprehensive picture of the effects of labour and family formation and dissolution processes on household earnings. Expected household earnings,

that is, earnings levels of women and their partners weighted by the probabilities of making each transition, are presented for women with different levels of education and belonging to each of the four initial household types (Table 4.13).

In the first initial state (women who are not working and do not have a partner at t0), women's transition to starting a union are associated with higher earnings levels than starting to work in Italy but, since the former probability is significantly less likely than the latter, particularly at the two highest levels of education, the transition to work is markedly more rewarding. The results are in agreement with those reported in the UK in the sense that the probabilities of starting to work are three and four times greater in Italy and the Netherlands respectively for women with high education relative to low-educated women. Total expected household earnings in this initial state are higher as women's educational level increases.

For the second initial state (women who are not working but are partnered at t0), an educational gradient in total expected earnings is also observed in the two countries. Similarly to the UK, staying in the same state, thus having earnings from their couples only, is associated with lower earnings levels than a transition to work for all three educational levels, although education grants the access to higher resources for any single transition having higher levels of education is more profitable in any single transition.

The results for the third initial state (working women who are not partnered at t0) are again in line with those observed among British households. Predicted earnings levels tend to be higher when women only start a union than when they stay in the same state, and this is the case for women with the three educational levels. Since the probabilities of starting a couple do not differ across levels the educational gradient in household earnings could be taken to reflect positive assortative mating. When total expected household earnings are compared, women belonging to this household type are also found to be better-off the higher their qualifications are.

Table 4.13. Expected household earnings, by women's level of education in the Netherlands and Italy

	Netherlands					
t0: not working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.92	0	0.73	0	0.67	0
Working	0.08	22239	0.27	25013	0.33	32978
E(household earnings) t1	**1779**		**6754**		**10883**	

t0: not working, partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.89	41981	0.88	45161	0.79	48718
Ending couple	0.01	0	0.01	0	0	0
Working	0.10	60147	0.16	66662	0.18	78104
E(household earnings) t1	**43378**		**50408**		**52546**	

t0: working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.87	22239	0.89	25013	0.89	32978
Starting couple	0.08	60147	0.08	66662	0.09	78104
Leaving work	0.04	0	0.02	0	0.02	0
E(household earnings) t1	**24160**		**27595**		**36380**	

t0: working, partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.91	60147	0.94	66662	0.93	78104
Leaving work	0.07	41981	0.03	45161	0.03	48718
Ending couple	0.008	22239	0.004	25013	0.009	32978
E(household earnings) t1	**57850**		**64117**		**74395**	

Italy

t0: not working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.89	0	0.83	0	0.74	0

Starting couple	0.02	24443	0.02	30597	0.04	38131
Working	0.08	16187	0.14	20516	0.23	25912
E(household earnings) t1		**1784**		**3484**		**7485**

t0: not working, partnered	Low level of Education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.93	24443	0.88	30597	0.80	38131
Ending couple	0.01	0	0.002	0	0	0
Working	0.05	42137	0.08	53722	0.14	65264
E(household earnings) t1		**24839**		**31223**		**39642**

t0: working, not partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.90	16187	0.91	20516	0.93	25912
Starting couple	0.05	42137	0.05	53722	0.04	65264
Leaving work	0.05	0	0.04	0	0.03	0
E(household earnings) t1	**16675**		**21356**		**26709**	

t0: working, partnered	Low level of education		Medium level of education		High level of education	
	probability	predicted earnings	probability	predicted earnings	probability	predicted earnings
Staying	0.90	42137	0.92	53722	0.94	65264
Leaving work	0.07	24443	0.04	30597	0.02	38131
Ending couple	0.009	16187	0.006	20516	0.005	25912
E(household earnings) t1	**39780**		**50771**		**62240**	

Lastly, for the fourth initial state (working women living in a couple at t0), the similarity of the results with those found for the UK is again remarkable. There is an educational gradient in the predicted earnings of staying in the same state, stemming from positive returns to women's and their partners' education. The probabilities of putting an end to the couple are lower as women's education increases and, in addition, the income loss induced by leaving paid work –i.e. the difference in household earnings between the first and second transitions– significantly augment as women's education increases. It is also the case in this initial state that total expected household earnings are positively correlated with education.

4.5. Conclusions

The inspection of (at least part of the) processes that, it has been argued, generate household earnings –namely family formation and dissolution, labour participation and returns to education in terms of earnings– generally supports the idea that highly-endowed units in terms of human capital are more prone to be located in more advantageous positions in the distribution of household earnings in the three countries that have been analysed in Chapters 3 and 4. This is the case, on the one hand, because positive returns to women's education exist even when controlling for selection into household types associated with those earnings levels. Amongst women living in a couple, the earnings of partners positively co-vary with their education too, and some evidence that of assortative mating plays a role in determining earnings, particularly in the UK and Italy, has been shown. On the other hand, education was also found to promote household structures associated with higher earnings. Households with highly-educated women are more prone to experience income generating events such as staying longer in paid work, and to benefit to a greater extent from the earnings of their current and potential partners. These 'educated' households are also more

successful in handling events associated with income losses such as couple break-up or an exit from the labour force. Table 4.14 below summarises the results across the three countries.

Table 4.14. Summary of the main results in Part II

	United Kingdom	**Netherlands**	**Italy**
	Effects of education on transitions		
Couple formation	+	ns	ns
Couple dissolution	ns	+	ns
Fertility	+	+	ns
Labour participation	+	+	+
	Effects on women's earnings		
Women's own education	+	+	+
Women's partners' earnings	+	ns	+
	Effects on women's partners' earnings		
Partner's own education	+	+	+
Women's earnings	ns	-	ns
Women's education	ns	+	+

The sign + refers to a positive effect; the sign - refers to a negative effect; ns refers to an effect that is not statistically significant.

Admittedly, the results presented in Chapters 3 and 4 can only prove this beneficial effect of education in the nineties –the period that the panel covers. Although it could well be argued that the relationship between education and earnings might be weaker or stronger in earlier and later periods as a result of a varied array of factors,[3] its positive sign has rarely been called into question in the human capital literature, and in this part of the thesis this is taken as a proof of the existence of such relationship regardless of its

[3] For instance, demand factors such as changes in economic sectors or in technology etc.

strength. If this is accepted to be the case, then changes over the last decades in the educational attainment of women that have been described in Part I of this thesis might enhance the differences in terms of earnings between households with high- and low-educated individuals, hence exerting some disequalising effect on the distribution of household earnings.

The processes generating household levels have been explored only in households in which there was a woman, and therefore constitutes too narrow a picture to draw accurate conclusions about consequences for the whole distribution of household earnings, particularly because one of the main disequalising effects that are discussed throughout the thesis is expected to derive from an increased proportion of unpartnered individuals in the population. In Part III of the thesis (Chapters 5 and 6 below) these conjectures are put to a systematic empirical test for the United Kingdom, the Netherlands and Italy –three countries with varying combinations as regards the extent of women's educational expansion and trends in earnings differences between households. Repeated cross sectional data over a long time-span covering the eighties and the nineties are used to test the effects of changes in the distribution of women's education (in particular, but also men's) on inequality between all household types. The analysis complements and qualifies the results presented in Part II since it includes all households regardless of whether there is a woman in working age or whether there are any earners (and who they are) in them.

APPENDIX 4. TRANSITION MODELS IN THE NETHERLANDS AND ITALY

Similarly to what was done for the UK in Chapter 3, in this appendix the results of the four multinomial logit models of transitions between states in the Netherlands and Italy are reported. Instead of showing coefficients, relative risk ratios are used.

Table A4.1. Transitions from initial state 1: Not working, not partnered, Netherlands

	Working, not partnered, no additional child
Age	1.312**
	(.111)
Age squared	.995***
	(.001)
Educ=medium	3.292***
	(.913)
Educ=high	2.722**
	(971)
Care	.630
	(.228)
Ill health	.339***
	(.097)
N children	.879
	(.165)
Ends meet	1.729
	(.483)
In education	1.354
	(.464)
Housing	.421
	(.254)
Hhd income	.997
	(.006)
N=790	
Pseudo R^2=0.32	

Reference category is not working, not partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A4.2. Transitions from initial state 2: Not working, partnered, Netherlands

	Not working, not partnered, no additional child	Not working, partnered, additional child	Working, partnered, no additional child
Age	.728*	2.335	1.160**
	(.091)	(1.076)	(.053)
Age squared	1.003*	.984*	.997***
	(.001)	(.006)	(.000)
Educ=medium	.738	3.139	1.391**
	(.301)	(1.285)	(.151)
Educ=high	.000***	5.332**	1.680**
	(.000)	(3.060)	(.299)
Care	3.548**	16.365*	1.177
	(1.626)	(18.748)	(.208)
Duration of couple	.961	.862**	1.003
	(.028)	(.041)	(.011)
Ill health	.926	1.069	.640***
	(.353)	(.419)	(.075)
N children	.437*	.469**	.981*
	(.137)	(.116)	(.053)
Ends meet	.593	1.260	.899
	(.186)	(.442)	(.091)
In education	.697	1.162	1.588**
	(.717)	(.563)	(.247)
Housing	.862		.792
	(.456)		(.182)
Spouse's education	.988	1.494	.959
	(.278)	(.342)	(.070)
N=4914			
Pseudo R^2=0.12			

Reference category is not working, partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A4.3. Transitions from initial state 3: Working, not partnered, Netherlands

	Not working, not partnered, no additional child	Working, partnered, no additional child
Age	.857	1.304
	(.115)	(.177)
Age squared	1.002	.995*
	(.001)	(.001)
Educ=medium	.788	. 785
	(.357)	(.237)
Educ=high	1.132	.944
	(.571)	(.307)
Care	1.218	1.540
	.579	(.581)
Ill health	1.758	.653
	(.683)	(.208)
N children	.704	.627
	(.250)	(.154)
Ends meet	.786	1.006
	(.254)	(.229)
In education	.853	.686
	(.419)	(.186)
Housing	1.264	1.402
	(1.121)	(.954)
Hhd income	1.014	1.036***
	(.012)	(.006)
Public sector	1.087	1.328
	(.431)	(.299)
Personal earnings	.951*	1.000
	(.021)	(.004)
N=1455		
Pseudo R^2=0.13		

Reference category is working, not partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A4.4. Transitions from initial state 4: Working, partnered, Netherlands

	Not working, partnered, no additional child	Working, not partnered, no additional child	Working, partnered, additional child
Age	.780**	.865	5.230***
	(.057)	(.169)	(1.437)
Age squared	1.003***	1.001	.972***
	(.000)	(.002)	(.004)
Educ=medium	.512***	.497	1.419
	(.097)	(.244)	(.440)
Educ=high	.853	.778	1.601
	(.238)	(.422)	(.555)
Care	.558*	.197	1.838*
	(.164)	(.164)	(.483)
Ill health	2.434***	.716	.874
	(443)	(.462)	(.277)
N children	1.313	2.075	.616**
	(.192)	(.925)	(.095)
Ends meet	.878	2.307	1.166
	(.188)	(1.183)	(.341)
In education	.817	.195	.257**
	(.213)	(.200)	(.111)
Housing	.466*		2.315
	(.173)		(2.297)
Hhd income	1.002	.819***	1.003
	(.001)	(.028)	(.002)
Public sector	.615*	.793*	.903
	(.115)	(.368)	(.164)
Personal earnings	.958	.986	1.001
	(.021)	(.012)	(.002)
Spouse's education	.8641	.766*	1.173
	(.114)	(.250)	(.146)
N=5455			
Pseudo R^2=0.18			

Reference category is working, partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A4.5. Transitions from initial state 1: Not working, not partnered, Italy

	Not working, partnered, no additional child	Working, not partnered, no additional child
Age	1.166*	1.233***
	(.007)	(.046)
Age squared	.997*	.996***
	(.000)	(.000)
Educ=medium	1.101	1.307*
	(.239)	(.152)
Educ=high	1.768	2.024*
	(920)	(.529)
Care	1.113	1.241
	(.313)	(.174)
Ill health	.620	.556*
	(.267)	(.149)
N children	.704	.809
	(.135)	(.102)
Ends meet	1.285	1.107
	(.309)	(.118)
In education	.269***	.746*
	(.079)	(.086)
Housing	1.017	1.082
	(.240)	(.125)
Hhd income	.985*	1.003
	(.006)	(.001)
N=4827		
Pseudo R^2=0.06		

Reference category is not working, not partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A4.6. Transitions from initial state 2: Not working, partnered, Italy

	Not working, partnered, additional child	Working, partnered, no additional child
Age	1.829***	1.208***
	(.262)	(..045)
Age squared	.989***	.997***
	(.002)	(.000)
Educ=medium	1.084	1.336*
	(.155)	(.144)
Educ=high	1.576	2.985***
	(.5830)	(.711)
Care	.825	.909
	(.219)	(..095)
Duration of couple	.951	.994
	(.057)	(.007)
Ill health	.982	.894
	(.359)	(.141)
N children	.550*	.823***
	(.150)	(.041)
Ends meet	.887	1.208*
	(.133)	(.109)
In education	.428	1.954**
	(.224)	(.399)
Housing	.964	1.095
	(.133)	(.099)
Spouse's education	.903	.913*
	(.115)	(.068)
N=12236		
Pseudo R^2=0.13		

Reference category is not working, partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A4.7. Transitions from initial state 3: Working, not partnered, Italy

	Not working, not partnered, no additional child	Working, partnered, additional child
Age	.861*	1.368***
	(.055)	(.117)
Age squared	1.002**	.994***
	(.004)	(.001)
Educ=medium	.887	. 845
	(.190)	(.161)
Educ=high	1.018	.669
	(.443)	(.245)
Care	.831	1.161
	.142	(.215)
Ill health	1.037	.929
	(.266)	(.266)
N children	.442	.772
	(.228)	(.341)
Ends meet	.717	1.289
	(.136)	(.235)
In education	1.370	1.088
	(.368)	(.248)
Housing	.864	1.018
	(.175)	(.189)
Hhd income	1.002	.992
	(.004)	(.003)
Public sector	.787	.814
	(.237)	(.173)
Personal earnings	.932***	1.002
	(.020)	(.010)
N=3209		
Pseudo R^2=0.06		

Reference category is working, not partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

Table A4.8. Transitions from initial state 4: Working, partnered, Italy

	Not working, partnered, no additional child	Working, not partnered, no additional child	Working, partnered, additional child
Age	.806***	1.288	2.107***
	(.043)	(.259)	(.390)
Age squared	1.002***	.997	.986***
	(.000)	(.002)	(.002)
Educ=medium	.970	.510	1.239
	(.152)	(.221)	(.210)
Educ=high	.796	.317	1.554
	(.242)	(.194)	(.459)
Care	1.100	.509	1.271*
	(.151)	(.204)	(.289)
Ill health	1.060	.659	1.546
	(229)	(.398)	(.525)
N children	.967	.983	.426***
	(.071)	(.219)	(.068)
Ends meet	1.083	.819	.805
	(.129)	(.268)	(.126)
In education	.827	1.732	.942
	(.210)	(.799)	(.213)
Housing	.938	.917	.971
	(.118)	(.301)	(143)
Hhd income	1.004	.870***	1.007*
	(.003)	(.018)	(.003)
Public sector	.351***	1.306	1.064
	(.067)	(.466)	(.178)
Personal earnings	.954***	1.023**	1.002
	(.012)	(.007)	(.006)
Spouse's education	.946	1.781	1.245
	(.100)	(.524)	(.150)
N=7415			
Pseudo R^2=0.16			

Reference category is working, partnered, no additional child. Robust standard errors in parentheses. *** significant at p<0.001; ** significant at p<0.005; * significant at p<0.05.

PART III

EFFECTS OF INCREASED WOMEN'S EDUCATION ON EARNINGS INEQUALITY OVER TIME

CHAPTER 5. INCREASED WOMEN'S EDUCATION AND EARNINGS INEQUALITY IN THE UNITED KINGDOM[1]

5.1. Introduction

In Chapters 3 and 4, evidence confirming the existence of a positive relationship between women's education and (household) earnings levels was presented. The aim of this and the following chapter is to explain changes in earnings inequality among households in the UK (in Chapter 5), and in the Netherlands and Italy (in Chapter 6) by considering the effects of women's increasing educational attainment. The effects of changes in women's educational levels on changes over time in the distribution of household earnings[2] are examined and quantified, and the relative weights of the different processes by which increased education is expected to affect changes in inequality are assessed. In the following paragraphs, the main expectations as to how processes deriving from increased women's education –that

[1] This chapter draws on the framework devised, for the decomposition of inequality between households in the UK, in a joint paper by Richard Breen and Leire Salazar. It is available from the Juan March Working Papers Series (WP 2005/216).

[2] Throughout this chapter and Chapter 6, except where otherwise noted, earnings inequality strictly refers to the dispersion of wages and salaries from employment for the head of the household head and partner (if any).

were discussed at length in Part I of the thesis– are related to changes in inequality, are briefly summarised.

Educational attainment does not only affect individual earnings via its impact on earnings as one part of human capital; it can also have effects on other processes that ultimately affect the earnings distribution. First, increasing educational attainment can be expected to lead to greater labour force participation among women, and thus women's earnings will become more important in explaining total inequality, regardless of whether they have an equalising or disequalising effect. Female labour force participation rates have increased –albeit to different degrees– in all industrialised countries in the last three decades –except in those countries, such as Finland or Sweden, in which women's participation levels had already reached the highest possible levels– (Callan *et al.* 1998). More specifically, for the UK a significant rise in female participation rates since the Second World War has been consistently shown (Joshi *et al.* 1985, Gomulka and Stern 1990). In addition, the share of households in which women contribute substantially to household income through their own earnings has rapidly increased everywhere (see, for the UK, Machin and Waldfogel 1994). But whether the effect is to increase or reduce inequality will depend on the distribution of women's participation across different kinds of households, and this may vary over time, so influencing the trend in inequality. If *ceteris paribus* women belonging to households towards the bottom of the earnings distribution tend to participate more than women at the top, then there could be an equalising effect on inter-household earnings distribution. Alternatively, if women belonging to better-off households participate in paid labour in

greater proportions, then it could be the case that an unequalising effect is at work.[3]

Secondly, if members of couples tend to have similar characteristics (for instance educational attainment) that allow them to get certain returns in the labour market (earnings), and if educational homogamy increases (particularly at higher levels of education), then a reinforcement of inequalities could take place (Drobnič and Blossfeld 2001: 380-3; Blossfeld and Timm 2003: 341-2). Increases in women's educational attainment, to the extent that this equalises the distribution of education between the sexes, can be expected to increase the proportion of educationally homogamous households. On the other hand, if the educational attainments of both sexes are increasing, the effect on the overall level of homogamy will be indeterminate, but it seems likely that a declining rate of homogamy among couples with low levels of education and an increasing rate among those with high levels will be observed.

Thirdly, increasing education and labour force participation may change the distribution of household types, which may, in itself, affect inequality. Burtless (1999), for example, has pointed out the relevance of changes in household composition through changing marriage patterns on earnings inequality in the US. The two main factors contributing to this change are the decline and delay in fertility and the increase in the proportion of persons who remain unpartnered. Women's educational expansion seems likely to cause change in both of these, as the feasibility of establishing a household without a male partner increases and the opportunity cost of children also increases.

To test the effects of women's educational expansion on changes in the distribution of earnings among households, data

[3] There is contrasting empirical evidence on this matter for the UK. Machin and Waldfogel (1994) found that increased female participation took place among women married to low earnings men during the eighties. Alternatively, Davies and Joshi's analysis (1998) suggests that wives' participation rose particularly at the upper part of the earnings distribution between 1968 and 1990.

from the UK are used. On the one hand, the UK has experienced a very notable expansion in upper secondary and higher educational levels and important increases in the proportion of women in each successive cohort entering them (Shavit and Blossfeld 1993; Green *et al.* 1999). On the other, Britain showed the highest European levels of income and earnings inequality together with the steepest increase during the eighties (Atkinson *et al.* 1995) and the early nineties. This particular combination of high (female) educational expansion and high (and increased/increasing) inequality makes this an interesting test case.

In the next section of the chapter, the data and the counterfactual estimations that are carried out to assess the effect of increasing female educational attainment on inequality among households in the distribution of earnings are described. Some descriptive statistics are then presented, followed by the results of the counterfactual exercises. An investigation of some of the other factors that have led to a growth in earnings inequality follows. The chapter concludes with an assessment of the relative importance of increasing women's educational attainment for inequality.

5.2. Data and Methods

The data used in this chapter come from the UK Family Expenditure Survey (FES). The FES is a continuous, nationally representative, cross-sectional study operating from 1957 onwards and collecting detailed information on individual and household income and expenditure. It has been the most commonly used UK national survey by the Luxembourg Income Study (LIS), and its data quality has been confirmed when compared with other earnings datasets for the UK (see Atkinson, Micklewright and Stern 1988 for a comparison with the New Earnings Survey). The surveys for 1979, 1991 and 2000 are used: these cover the range of years that witnessed the most marked increase in inequality in the UK.

Since the unit of analysis is the household, and because the link that is trying to be established is between women's education and household earnings, earnings and educational information for both the head and the partner of the head of the household (if there is one) are considered.[4] This means that the earnings and education of other earners in the household (i.e. children or other adult members) are ignored: thus, the analysis deals only with inequality in the earnings of heads of households and their partners. The FES does not provide information on educational levels as such, but rather, on the age at which full-time education ceased. Only for those individuals still in formal education at the moment of the survey (and only for the 1979 cross-section) is it possible to identify the level in which they are enrolled. A simple categorisation of education comprising three broad levels is therefore used, as follows:

Level 1 = left full-time education before age 16.
Level 2 = left full-time education between the ages of 16 and 18.
Level 3 = left full-time education after the age of 18.

Thus level 1 is made up of those who, for the most part, had no more than compulsory education, while level 2 contains those with O-level or equivalent qualifications, and those with A-level. Level 3 comprises individuals with a qualification higher than A-level and thus includes all those with a degree.[5] A fourth category is then added to the educational variable, which applies to household types without a person of that sex (i.e. these are households with an unpartnered head). As well as education,

[4] Effectively, the data refer to married couples in the 1979 and 1991 cross-sections and to married or cohabiting couples in 2000, where a few same sex couples have been excluded.

[5] Of course, these categories might include persons who actually did not complete such levels, but overall they should be able to capture most of the differences in the educational qualifications of the sample.

whether or not the household head and, when coupled, her/his partner is working is also distinguished.

Earnings refer to normal weekly wages and salaries from (main and subsidiary if applicable) employment (excluding income from self-employment) for the household head and partner (if any).[6] The earnings figures throughout the chapter are expressed in constant (1992) pounds sterling. In order to account for the varying presence of children and adults other than the members of the couple, household earnings have been adjusted by household size using the LIS equivalence scale, which is simply the squared root of the number of persons in the household.[7]

Because the focus is on earnings (and not more comprehensive definitions of income), households whose main members (heads and partners of the heads) are retired or still enrolled in education should be excluded, and so inclusion in the sample is limited to

[6] The main analyses have been replicated using an earnings concept that includes self-employment income (see Appendix 5.3, section B). Although there are some differences between the two sets of results, the main substantive conclusions remain unaltered.

[7] Equivalence scales have been devised to adjust resources to household composition (needs) so that different household types are assigned varying weights depending on their needs. These scales vary according to the relative weight that is wished to be given to an adult versus a child or, in other words, to the extent to which economies of scales operate within the household. Since the use of a particular equivalence scale to adjust earnings might affect the results, the robustness of the results obtained in this chapter has been tested by replicating the main analyses using a different equivalising factor, namely the modified OECD scale, which takes into account not only the size of the household, but also its composition (Appendix 5.3, section A). The results prove not to be sensitive to the choice of either scale.

households in which the head is at working age (20 to 64).[8] But a further set of analyses is then carried out in which attention is confined to young households (where the head is between 25 and 34 years old) in order to discover whether the effects of increasing women's education are more evident in this age group than in the whole working population.[9]

The data for the analyses comprise, for each of the cross sections (1979, 1991 and 2000), a 4-way table of woman's education (W_E) by man's education (M_E) by whether or not the woman works (W_W) by whether or not the man works (M_W), as shown in Table 5.1.

This is an incomplete cross-classification because 16 of the possible 64 combinations –those marked with a cross in the table– cannot be observed; furthermore, another 15 cells –those containing a zero in the table– have zero entries because neither the household head not the partner has any earnings. Each cell of this table then contains three pieces of information that are required to carry out the empirical analyses: the proportion of households of each type, p_{ijkl}, the mean earnings of those household types, $\bar{x}_{ijkl}$, and a measure of earnings inequality among households in each type T_{ijkl}, where i, j, k and l index W_E, M_E, W_W and M_W, respectively.

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[8] There was certainly a notable decline in participation rates and in the average age of transition to inactivity among older workers, particularly men, during the two decades that are examined here (Auer and Fortuny 2000). Since part of this decline is due to early retirement, the upper age limit that has been chosen might be questionable. However, the inclusion of those households in the sample is justified because earnings from the other member of the couple (if present) could still be observed.

[9] There are obvious reasons to think that this might be the case, given that changes in the distribution of education are likely to be most pronounced within this age group.

Table 5.1. Subgroup partition: Types of households

Female head - educational level		Male head - educational level							
		Man - working				Man - not working			
		Low	Medium	High	Not present	Low	Medium	High	Not present
Woman-working	Low				x				
	Medium				x				
	High				x				
	Not present	x	x	x	x	x	x	x	x
Woman-not working	Low				x	0	0	0	0
	Medium				x	0	0	0	0
	High				x	0	0	0	0
	Not present				x	0	0	0	x

Cells containing an x are structural zeroes (i.e. household types that cannot be observed); cells containing a zero refer to households with zero earnings.

The measure of inequality that is used throughout the analysis is the Theil index. If household earnings are x and households are indexed by i, then the Theil index is given by

$$(1)\quad T = \frac{1}{n}\sum_i \frac{x_i}{\bar{x}} \ln\left(\frac{x_i}{\bar{x}}\right)$$

where $\bar{x}$ is the overall mean earnings and n is the total number of observations (households). Among the wide range of available measures of inequality, two broad types can be identified. On the one hand, synthetic measures quantify total inequality in a particular distribution using one single figure that summarises differences across the whole distribution. The Gini index, the Atkinson index, and indices belonging to the Generalised Entropy (GE) class are the most common measures of this type used in the literature. On the other hand, measures trying to depict the whole

distribution, such as the Lorenz curve, or differences across various parts of it –like ratios of deciles– have been extensively used. Needless to say, *the* best inequality measure does not exist, and the use of either type depends on the type of research question that one is interested in answering, the requirements of the research methods that are implemented, and the nature of the data at disposal. Generally speaking, measures describing the whole distribution are most often used for descriptive purposes, while explanations of changes in inequality, since they mostly apply methods based on some type of decomposition exercise, tend to focus on synthetic indices. For the particular implementation carried out in this thesis, therefore, a summary measure of inequality is appropriate. Among the available range, the Theil index stands out as an index that satisfies the general criteria for measures of income inequality proposed by Bourguignon[10] (1979), while including a particularly relevant type of decomposability. Although other inequality measures such as the Gini index can actually be subject to decomposition, they are not additively decomposable –i.e. they involve multiplicative terms, and a residual term is required. In the case of Generalised Entropy (GE) class measures, decomposability is perfect –no residual term is required and the sum of the terms adds up to total inequality. Among this family, the Theil index reaches decomposabilty through the weighted sum of between-group and within-group inequality with group weights given by each group's share of total income. Decomposability means that if we can identify mutually exclusive sub-groups within the population, then the total index T (i.e. overall inequality) can be perfectly decomposed into a between- and a within-group component. Between-group

[10] There are five of such criteria: (1) all cases are treated equally (symmetry); (2) the measure remains unchanged when all incomes are multiplied by the same unit (homogeneity of degree zero in incomes); (3) a multiplication of the sample size keeps the measure unaltered (symmetry axiom for population); (4) any transfer from richer to poorer units that preserves rank order reduces the value of the measure (Pigou-Dalton criterion); (5) decomposability.

inequality is interpreted as the share of total inequality that arises through variation in the average earnings of different sub-groups; the within-group component is the part of overall inequality that is due to heterogeneity in earnings among observations within each of the sub-groups. Applications of decomposition approaches are numerous, including the classical decomposition by sectors (agriculture versus industry) carried out by Kuznets (1955), or the study of the contribution of different income sources to inequality (Shorrocks 1982). The index decomposes as follows:

$$(2)\ T = \sum_{ijkl} p_{ijkl} \frac{\bar{x}_{ijkl}}{\bar{x}} \ln\left(\frac{\bar{x}_{ijkl}}{\bar{x}}\right) + \sum_{ijkl} p_{ijkl} \frac{\bar{x}_{ijkl}}{\bar{x}} T_{ijkl}$$

where p_{ijkl} is the proportion of households of each type, $\bar{x}_{ijkl}$ are the average earnings in each type, T_{ijkl} is the Theil value in each of the types and $\bar{x}$ are total average earnings. The first term is the between-type inequality while the second term is a weighted average of the within-type inequalities. In the analyses in Chapters 5 and 6, the subgroups are household types defined as the Cartesian product of the four variables, woman's education, man's education, woman's employment, and man's employment, W_E, M_E, W_W and M_W shown in Table 5.1 above.

There is one specific technical aspect to be noted that the use of the Theil index implies. By definition, households in which neither the head of the household nor his/her partner is working will have zero earnings. In reality, the total earnings of these households may, in fact, be non-zero because of the presence of other earners (who, of course, may also be present in households where the head and/or his/her partner are working). Appendix 5.1 shows a set of statistics comparing household earnings using the restrictive definition of earners adopted in this chapter and the case in which the earnings of all earners in the household are included. One effect of adopting the latter is that some household

types where neither the head nor the head's partner is working have very large inequality (Theil) values, based on very small numbers. But in general, the differences between the two approaches are minor: the contribution of other earners seems to be fairly constant across different types of households, and the trend in inequality is much the same whether other earners are taken into account or not. In fact, the major results of the counterfactuals are robust to the choice of either definition (not shown).

Clearly, an advantage of the analysis using earnings from all earners in the household is that (as the tables in Appendix 5.1 show) there are no household types in which all households have zero earnings (as there are when the more restricted definition of earnings is used). A difficulty with the inequality measure that is used, the Theil index, as with many other inequality measures, is that zeroes lead to the index being undefined. So, a household with zero earnings contributes zero to the Theil index. In this case, however, all the households with zero earnings are found in cells comprising only households with zero earnings. In these cells, the within-group Theil is zero, and this is unproblematic because there really is no inequality within households of these types using this definition of earnings. But these household types will also contribute zero to the between-group Theil, and this is clearly problematic. However, this is avoided when earnings from all earners are used, and the similarity of the results in the two cases indicates that the findings are robust to the existence of household types in which there are no earnings. Because not all households in which the head and her/his partner (if any) have zero earnings contain other earners, the within-group Theil becomes sensitive to zeroes when the more inclusive definition of household earnings is used. But this is less of a problem since the main aim is to decompose between-household type inequality.

Two counterfactual analyses and one decomposition are carried out to explain change between 1979 and 1991 and between 1991 and 2000. In the first counterfactual analysis one or more of the three terms in equation (2) (that is, p, $\bar{x}$ and T) are simply

allowed to take their t+1 value while keeping the remaining terms at their t value. It is well known that the results of this method may be sensitive to the order in which the terms are allowed to take their counterfactual values, and so the analyses are carried out using all different possible orderings. The decomposition method presented by Mookherjee and Shorrocks (1982) is also used. This is an exact decomposition of the change in inequality as follows:

$$(3)\ \Delta T = \sum_{ijkl} \Delta\varphi_{ijkl}\bar{p}_{ijkl} + \sum_{ijkl} \Delta p_{ijkl}\bar{\varphi}_{ijkl} + \sum_{ijkl} \Delta p_{ijkl}\bar{\gamma}_{ijkl} + \sum_{ijkl} \Delta\gamma_{ijkl}\bar{p}_{ijkl}$$

Here Δ means the change between t and t+1, $\varphi_{ijkl} = \frac{\bar{x}_{ijkl}}{\bar{x}} \ln\left(\frac{\bar{x}_{ijkl}}{\bar{x}}\right)$, and $\gamma_{ijkl} = \frac{\bar{x}_{ijkl}}{\bar{x}} T_{ijkl}$ corresponding to the unweighted terms of between-group and within-group inequality in equation (2). The bars indicate mean values over t and t+1: e.g. $\bar{p}_{ijkl} = \frac{p_{ijkl}(t) + p_{ijkl}(t+1)}{2}$. The four terms in (3) can then be interpreted as (a) the effect, on the change in between-group inequality, of a change in the inequality in mean earnings between subgroups; (b) the effect on the change in the between group inequality of the changing distribution of subgroups within the population; (c) the effect on within group inequality of the changing distribution of subgroups; and (d) the effect, on within-group inequality, of the change in the weighted Theil value for each subgroup.[11]

Both the counterfactual and the decomposition tell the relative importance of changes in the overall distribution of household types for inequality; however, they do not address the importance

[11] It should be noted, however, that this method leads to an underestimate of the effect of change in p because the quantity $\bar{x}$ is itself dependent on p.

of changes in each of the four variables that define the household types. The focus therefore shifts to another set of counterfactuals through which the total effect of the changing distribution of household types (i.e. subgroups) is further decomposed into the effects of change in the variables $W_{E,}$ $M_{E,}$ W_W and M_W and in the associations between them. For this purpose the Deming-Stephan method (see Appendix 5.2) is used. This allows adjustment of the univariate, bivariate or trivariate distributions of the variables to conform to any desired configuration. Previous attempts to decompose inequality into between- and within-group components have involved a univariate distribution of groups (as in Mookerjee and Shorrocks 1982 where the groups are defined by age); or a multivariate distribution in which each variable is treated entirely separately (as in Jenkins 1995); or a multivariate distribution which is gradually built up, from an original univariate distribution, by the addition of successive variables (as in Cowell and Jenkins 1995). The use of the Deming-Stephan method is much more flexible than any of these, and reveals a more detailed picture of the effects of counterfactual changes in the variables defining the groups. The difficult question of trying to assess the counterfactual impact of changing the distribution of one variable in a multivariate definition of groups is how to deal with the effect of such a change on the other variables, and this depends on how the associations between the variables are treated (and there are several possible ways of doing this). If, for example, the relationship between women's W_E, and men's education, M_E (that is, assortative mating by education) is captured by using the conditional probability of men's education given women's education, then a change in the distribution of W_E will cause a change in the distribution of M_E. This is undesirable, since there is no reason to suppose that such a dependency exists. Alternatively, if M_E is kept constant then the conditional probability will have to change –but this assumes a change in patterns of assortative mating which is something that should be treated separately from the change in the distribution of W_E.

The approach developed here overcomes these difficulties. In these counterfactuals, it is possible, for example, to allow the univariate distribution of W_E to take its t+1 value, while preserving the distributions of the other variables, and all the associations between variables (including those involving W_E) at their t values. The strategy is (1) to allow the marginal distribution of women's education to take its t+1 value, holding all else constant at their t values; (2) to allow the association between women's and men's education to take their t+1 values; (3) to further allow the association between women's and men's education and whether women are working or not to take their t+1 values[12]; and, (4), to let all variables and their associations take their t+1 values. The logic of this is that, in step (1) by allowing only the marginal distribution of W_E to change, what 'would' have happened had there been only a change in women's education and not in any of the other variables, nor in the behavioural consequences of women's education for household formation or labour force participation is shown. In step (2), the possible effects of such behavioural change are addressed by letting the pattern of association between men's and women's education change as it is observed in t+1, so capturing changes in educational assortative household formation. In step (3) the effects of behavioural change (in whether women are working or not) within each household type are added. Together, steps (1) to (3) capture the main mechanisms by which, directly and indirectly, changes in women's education might influence the distribution of household types in the population. From (3) a counterfactual in which p_{ijkl} are allowed to take their observed t+1 values is presented. The major change that this induces is that whether or not men are working takes its t+1 value.

There are two further complications in this procedure. First, in the initial step, the focus is on the effect of a change in the

[12] This is a shorthand way of saying that all the two-way associations between pairs of these three variables and their three-way interaction are allowed to take their t+1 values.

distribution of women's education *per se* and not in any changes in the distribution of household types that do not follow directly from this. The marginal total for the fourth category of W_E ('not present') was therefore set to its value at t (rather than t+1), and the counterfactuals for the three other categories were adjusted accordingly. Secondly, in step (2) the question arises of whether, as well as allowing the association between women's and men's education to change, the distribution of the latter should also be allowed to change. Similarly, in step (3), when the associations between W_E, M_E and W_W are allowed to change, should the marginal distributions of the last two take their t+1 values? It would seem that, in (2), M_E should be kept at its t value, because change in men's education cannot be viewed as a consequence of change in women's education; on the other hand, whether or not women participate in paid work might be considered such a consequence. In fact, counterfactuals allowing for all possibilities were carried out, and the results did not prove sensitive to the choice (not shown). The results in which the univariate distribution of W_W is allowed to change in (3), and that of M_E is allowed to change in both (2) and (3) are therefore only reported.

5.3. Descriptive Results

The sample confirms the already well-established fact that the UK is no exception to the general expansion in women's education in most industrialised countries in recent decades. Table 5.2 shows a very significant increase in medium and high educational levels in the period that the data cover. Whereas in 1979 more than 3 out of 5 women had the lowest educational level (i.e. left full-time education at the age of 15 or younger), by 2000 only 1 out of 4 had these qualifications. The proportion of those with some university education almost tripled during these two decades. Amongst the youngest cohort (those in households where the head was aged 25 to 34 at the time of the survey), women's educational expansion is even more remarkable, with a very small

percentage of women holding the lowest level by the end of the period.

Table 5.2. Educational levels of women (in households in which there is a female head or partner) over time, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
Low	61.94	39.09	24.37	47.24	11.44	9.22
Medium	30.47	46.83	55.60	40.22	71.86	64.16
High	7.60	14.09	20.03	12.54	16.70	26.62
N	4516	4132	4468	1268	988	1052

It was argued above that women's increasing education might affect household earnings inequality through a number of possible mechanisms. Firstly, as regards household formation, (a) the proportion of households with an unpartnered head, and (b) the proportion of educationally homogamous couples are expected to have increased, particularly at the two highest levels. Secondly, some growth in women's labour force participation and employment was anticipated. In the tables that follow, these changes are illustrated.

Table 5.3 shows that the proportion of households with an uncoupled head has indeed increased since the late seventies, although there is hardly any change between 1991 and 2000. The growth in non-partnership is even more notable in the youngest cohort, although this could partly be due to increasing delays in couple formation.[13]

[13] These trends also reflect the growth in the rate at which partnerships dissolve to leave single-person headed households.

Table 5.3. Percentage of households headed by an uncoupled person over time, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
% Uncoupled	24.05	37.32	38.17	19.21	42.13	41.08
N	4964	5113	5243	1385	1334	1244

The percentage of couples in which both partners have the same educational level has evolved in the expected manner (Table 5.4). Homogamy at the intermediate and highest levels has steadily increased whereas in fewer couples both the man and the woman have the lowest qualifications. This pattern is even more pronounced amongst the youngest couples. Overall, however, the percentage of educationally homogamous marriages declined in the complete sample from 70 per cent in 1979 to 66 per cent in 2000, while for the youngest households it increased from 63 to 68 per cent. Within households in which both partners are employed, the correlation between their earnings has steadily increased from 0.11 in 1979 to 0.21 in 1991 and to 0.29 in 2000 among the complete sample, with the comparable figures for younger households being 0.08, 0.32 and 0.25.

Table 5.4. Percentage of educationally homogamous couples by educational levels over time, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
Low	50.85	28.27	15.18	35.12	2.98	2.05
Medium	15.12	29.80	38.59	20.73	59.72	49.52
High	4.06	8.61	12.25	7.15	9.07	16.51
N	3770	3205	3242	1119	772	733

Finally, Table 5.5 shows the change in women's employment. The proportion of households in which the female head or partner of the head is employed followed a u-shaped trend, declining then rising. In the complete sample, by 2000 it had returned to its 1979 level, in the youngest sample, the rise was slightly higher and there was a net increase in the two decades. This trend is explained by the high unemployment of the early 1990s and the subsequent growth in jobs for women during the 1990s.

Table 5.5. Percentage of households in which the female head or female spouse is employed over time, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
% Working	51.7	47.2	51.9	47.9	44.7	53.2
N	4964	5113	5243	1385	1334	1244

Table 5.6 sheds more light on this trend (which will later prove important in explaining changes in earnings inequality). There was an overall decline in the proportion of two-earner households, particularly between 1979 and 1991, and in the proportion of households with one male earner. On the other hand, households with one female earner and, most noticeably, no earners, have increased their proportion of the total. The increase in the share of no earner households was very pronounced between 1979 and 1991, but it remained almost constant afterwards. The proportion of one female earner households rose steadily throughout the two decades (more markedly among the younger households).

Table 5.6. Distribution of household types according to earners, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
Two earners	38.3	29.9	32.3	37.5	30.2	34.9
One earner – male	33	25.9	20.2	41.1	34.2	25.6
One earner – female	13.4	17.3	19.6	10.5	14.5	18.3
No earners	15.3	26.9	27.9	11	21.1	21.2
N	4964	5113	5243	1385	1334	1244

5.4. Decomposition by Household Types

It is well known that during both the 1980s and less markedly the 1990s, earnings inequality experienced a dramatic rise in the U.K. The Theil index increased from 0.306 in 1979 to 0.535 in 1991 and 0.567 nine years later.[14] Average household earnings increased steadily during the period, too, as shown in Table 5.7. A similar trend, although with consistently lower levels, is evident among the younger households (0.247, 0.417 and 0.470).

[14] These figures might not be fully comparable with those from other studies. In particular, the fact that households in which nobody works (thus with zero earnings) are included, together with the restrictive definition of earnings that is used (which makes a great number of households fall into no-earner types), should show higher levels of inequality than studies in which male workers only are considered and/or in which a broader definition of earnings/income is used. The choices made here are justified by the very nature of the research question of this thesis, even if one of the outcomes implied by them is the lack of fully comparable results.

Table 5.7. Average earnings and earnings inequality (Theil indexes) over time, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
Average earnings	135.7	168.7	231.6	146.9	190.8	266.1
Theil	0.306	0.535	0.567	0.247	0.417	0.470
Between group	0.218	0.392	0.399	0.171	0.302	0.316
Within group	0.088	0.143	0.168	0.076	0.115	0.154
N	4964	5113	5243	1385	1334	1244

Table 5.7 also shows that not only is the between-group inequality larger than the within-group, but the former has tended to increase more in absolute terms; in other words, inequalities between household types tended to grow faster than did inequalities within them. The counterfactuals and decompositions reported in Table 5.8 show that the increasing between-group inequality was mostly due to the changing distribution of household types (allowing only p_{ijk} to change in all cases brings the between-group inequality very close to its observed t+1 value), while the growth in within-group inequality was mainly caused by a growth in the household-type specific Theil values (changing the Theil values for each household type alone almost reproduces the within-group inequality at t+1). Table 5.8 shows the observed inequality indexes, then a set of counterfactuals in which each of p_{ijkl}, $\bar{x}_{ijkl}$ and T_{ijkl}, and all combinations of them, are allowed to take their t+1 values. The parallel decompositions using the Mookherjee-Shorrocks method are then shown in the final three rows, where changes in p_{ijkl} affect both the between- and within-group inequality. In the whole sample, both changes in the distribution of household types and in average earnings of those contributed to increase inequality in the first period. Note that if

$\bar{x}_{ijkl}$ alone had changed between 1979 and 1991, between-group inequality would have increased by 0.109 (as opposed to 0.169 if only a change in p_{ijkl} had occurred). In the second (1991 to 2000) period, the effect of the changing distribution of types remained disequalising, but average earnings became equality-enhancing (this is evident in the simple counterfactual and in the Mookherjee and Shorrocks decomposition). The same picture of increased inequality caused by changes in the distribution of types counteracted by a buffering effect driven by changes in average earnings of those is repeated in the young sample in both periods. Results in the second period (both for the complete and the young samples) should be however interpreted with caution since there is not much change in inequality to be explained in the first place.

The main mechanisms that were earlier listed as possible means by which increased female educational attainment might have affected inequality (namely, increased female labour force participation, increased educational homogamy and changes in the distribution of single and dual earner households) will all influence between-household type, rather than within-household type, inequality.[15]

[15] This is not wholly true for changes in women's participation. Certainly if more of those women who would not have worked had they had lower educational levels are now working, this will cause the share of two earner households to increase (and those of either or both of one or no earner households will decline). However, if increased education leads women who, counterfactually, would have worked, to increase their hours of work, this will influence within-household type inequality, rather than the distribution of household types. The assumption is that this effect of increased education is likely to be small enough to safely ignore it.

Table 5.8. Decomposing changes in earnings inequality (Theil index), UK

(a) Complete sample							
Period:		1979-1991			1991-2000		
		Theil	Between-group	Within-group	Theil	Between-group	Within-group
Obs.	t	0.306	0.218	0.088	0.535	0.392	0.143
	t+1	0.535	0.392	0.143	0.567	0.399	0.168
Change in:	p_{ijkl}	0.482	0.387	0.095	0.546	0.404	0.142
	$\bar{x}_{ijkl}$	0.423	0.327	0.096	0.468	0.331	0.137
	T_{ijkl}	0.345	0.218	0.127	0.556	0.392	0.164
	$p_{ijkl}\ \bar{x}_{ijkl}$	0.488	0.392	0.096	0.542	0.399	0.143
	$p_{ijkl}\ T_{ijkl}$	0.528	0.387	0.141	0.571	0.404	0.167
	$\bar{x}_{ijkl}\ T_{ijkl}$	0.466	0.327	0.139	0.489	0.331	0.158
	$p_{ijkl}\ \bar{x}_{ijkl}\ T_{ijkl}$	0.535	0.392	0.143	0.567	0.399	0.168
Mook. and Shorrocks effect of changing:	$\Delta(t,t+1)$	0.229	0.174	0.055	0.033	0.008	0.025
	p_{ijkl}	0.058	0.057	0.001	0.089	0.080	0.009
	φ_{ijkl}	0.117	0.117	-	-0.072	-0.072	-
	γ_{ijkl}	0.054	-	0.054	0.016	-	0.016

(b) Age of head: 25-34							
Obs.	t	0.247	0.171	0.076	0.417	0.302	0.115
	t+1	0.417	0.302	0.115	0.470	0.316	0.154
Change in:	p_{ijkl}	0.385	0.300	0.085	0.422	0.307	0.115
	$\bar{x}_{ijkl}$	0.214	0.141	0.073	0.339	0.233	0.106
	T_{ijkl}	0.271	0.171	0.100	0.455	0.302	0.153
	$p_{ijkl}\ \bar{x}_{ijkl}$	0.388	0.302	0.086	0.427	0.316	0.111
	$p_{ijkl}\ T_{ijkl}$	0.412	0.300	0.112	0.462	0.307	0.155
	$\bar{x}_{ijkl}\ T_{ijkl}$	0.238	0.141	0.097	0.375	0.233	0.142
	$p_{ijkl}\,\bar{x}_{ijkl}\ T_{ijkl}$	0.417	0.302	0.115	0.470	0.316	0.154
Mook. and Shorrocks effect of changing:	$\Delta(t,t+1)$	0.170	0.131	0.039	0.053	0.014	0.039
	p_{ijkl}	0.161	0.148	0.013	0.106	0.096	0.010
	φ_{ijkl}	-0.017	-0.017	-	-0.082	-0.082	-
	γ_{ijkl}	0.026	-	0.026	0.029	-	0.029

Thus, the main concern is primarily to explain this aspect of inequality. It was also shown that changes in p_{ijkl} tended to consistently be the single most important source of inequality. Therefore, when the Deming-Stephan counterfactuals are carried out, the distribution of p_{ijkl} only is allowed to change and mean earnings and the within-group Theils are kept fixed at their t values.[16]

Table 5.9 contains the results of the Deming-Stephan counterfactuals applied to the data, and they show very clearly that, for the complete sample, the changing distribution of women's education (counterfactual 1) has little effect on the trend towards increased earnings inequality, and that its impact has been in the direction of ameliorating the growth in inequality. When the changing distribution of men's education and the association between men's and women's education (counterfactual 2) are allowed to change, the result is almost identical: in other words, any trends in educational homogamy have not tended to increase inequality: indeed, they too seem to have had a slight tendency to counteract the growth in inequality. When the change in women's labour force participation (in counterfactual 3) is accounted for, the equalising effect on increasing inequality remains. In both periods, when men's labour force participation is allowed to change (in counterfactual 4), the disequalising effect of the changing distribution of types appears. This actually seems to have been the major factor underlying the change in between-household type earnings inequality in both the 1979-1991 and 1991- 2000 period. Even if the most generous definition of the impact of changing women's education on inequality (i.e. counterfactual 3, which allows for the effects of increasing education on the distribution of household types according to

[16] Thus the total effect of the Deming-Stephan decompositions will equal the effect of a change in p_{ijkl} as reported in Table 5.8.

partnership status and on women's employment) is taken, the effect was to reduce inequality.[17]

Table 5.9. Deming-Stephan decomposition of the changing household distribution's effects on earnings inequality (Theil index), UK

(a) Complete sample						
Period:	1979-91			1991-2000		
	Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Obs. vals. t	0.306	0.218	0.088	0.535	0.392	0.143
t+1	0.535	0.392	0.143	0.567	0.399	0.168
Change in:						
1. Women's education	0.271	0.184	0.087	0.507	0.363	0.144
2. 1+ men's education	0.270	0.180	0.090	0.505	0.358	0.147
3. 2 + women's labour force participation	0.286	0.196	0.090	0.480	0.337	0.143
4. 3 + men's labour force participation	0.482	0.387	0.095	0.546	0.404	0.142
(b) Age of head: 25-34						
Period:	1979-91			1991-2000		
	Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Obs. vals. t	0.247	0.171	0.076	0.417	0.302	0.115
t+1	0.417	0.302	0.115	0.470	0.316	0.154
Change in: 1. Women's education	0.275	0.202	0.073	0.484	0.373	0.111

[17] The results for the youngest sample, however, show that the effects of increased women's education was slightly disequalising, although most of the increase in inequality caused by changes in the distribution of household types were, again, due to changes in men's employment.

2. 1+ men's education	0.270	0.189	0.081	0.479	0.368	0.111
3. 2 + women's labour force participation	0.271	0.190	0.081	0.452	0.341	0.111
4. 3 + men's labour force participation	0.385	0.300	0.085	0.422	0.307	0.115

The reason why changes in the distribution of women's education lead to consequences that ameliorated earnings inequality in the complete sample is quite subtle. Between-household inequality is taken up again in order to explain this effect. The between-group component in the Theil index, as shown in equation (2) is

$$(4)\ T_B = \sum_{ijkl} p_{ijkl} \frac{\bar{x}_{ijkl}}{\bar{x}} \ln\left(\frac{\bar{x}_{ijkl}}{\bar{x}}\right),$$

where the B subscript indicates between-group inequality. The specific concern is with the effect of changes in the distribution of different types of household, p_{ijkl}, on T_B. But p_{ijkl} has both a direct effect and an indirect one, as can be seen in equation (5) below.

$$(5)\ T_B = \sum_{ijkl} p_{ijkl} \frac{\bar{x}_{ijkl}}{\sum_{ijkl} p_{ijkl}\bar{x}_{ijkl}} \ln\left(\frac{\bar{x}_{ijkl}}{\sum_{ijkl} p_{ijkl}\bar{x}_{ijkl}}\right)$$

The indirect effect of p_{ijkl} is its effect on the overall mean earnings in the sample. So, changing p_{ijkl} will change the share of different types of household in the population (direct effect) and this will cause a change in mean earnings in the population (indirect effect). In Mookherjee and Shorrocks's (1982) terminology, the between household type inequality can be rewritten as

$$(6)\ T_B = \sum_{ijkl} p_{ijkl}\varphi_{ijkl}(p),$$

where φ_{ijkl} is expressed as a function of p_{ijkl}. The direct effect is captured in the impact of the first term on the right hand side in equation (6), the indirect in the latter.

The effect of changes in the distribution of women's education is to increase levels of women's education, to increase the share of households where the partners have at least a medium level of education, to increase the share of single person households, and to increase female participation rates. Overall, these trends will tend to increase inequality because the household types which are increasing are predominantly those with earnings greater than the overall average and so they have large positive values of φ_{ijkl}. But the indirect effect offsets this. Because these changes lead to more households with higher earnings, the overall mean level of earnings increases, and so household types with high earnings now contribute less to overall inequality (their φ_{ijkl} declines). Of course this means that household types with low earnings are now further below mean earnings, but this effect is minor, partly because there are now fewer of them, but also because, in the Theil measure, household types with mean earnings lower than the overall mean make a small negative contribution to between-group inequality.

To illustrate this, Table 5.10 focuses on the second counterfactual, which allows the educational distributions of men and women and their association to change, and on the example of households where both partners work. The arrows show which of the types increased or decreased their share of the total between 1979 and 1991 (under this counterfactual): so, households in which both partners had at least a medium level of education increased, while those with one or more low educated partner either decreased or kept a roughly constant share. Panel B of the table shows the φ_{ijkl} values for these nine household types in 1979 and it is evident that it is in those types with high values that growth has largely been concentrated. This is a disequalising trend. However, panel C shows the φ_{ijkl} values under the counterfactual, taking into account the indirect effect of changes in p_{ijkl}. These are always lower than the values found in panel B, and, furthermore, the largest difference between panels B and C tend to be found in those cells which have upward pointing arrows in panel A: it is clear that this change enhances equality. Overall, the two trends approximately cancel each other out, so that changes in education and in educational assortative mating have no effect on inequality.

Table 5.10. Direct and indirect effects of changes in p_{ijkl}, 1979-91, UK

Panel A: Change, 1979-1991, in proportion of households where both partners work by educational level of each

	Women's education		
Men's education	Low	Medium	High
Low	↓↓	↓	-
Medium	↓	↑	↑
High	-	↑	↑

Panel B: φ_{ijkl} values for households where both partners work, 1979

	Women's education		
Men's education	Low	Medium	High
Low	.30	.54	1.16
Medium	.53	.83	1.17
High	.89	.91	1.56

Panel C: φ_{ijkl} values for households where both partners work, second counterfactual

	Women's education		
Men's education	Low	Medium	High
Low	.11	.30	.79
Medium	.29	.53	.80
High	.58	.59	1.12

Moving through the counterfactuals, the indirect effect causes mean earnings to increase and φ_{ijkl} values to decline. The exception is the final counterfactual which increases the share of households in which the man is not working. This has the opposite effect to the changes that follow from the counterfactuals that try to capture the consequences of the growth in women's education because it increases the share of low earning households[18] and so reduces the overall mean earnings to approximately the observed 1979 value, and, correspondingly, increases the φ_{ijkl}. In fact, it is the latter that seems to have the largest impact on between-group inequality.

[18] Machin and Waldfogel (1994) showed for the UK that having no educational qualifications had a very important effect on male non-participation, and that this effect was more pronounced in 1989-90 than in 1979-80.

5.5. Explaining Within-Group Inequality

The increasing correlation between the earnings of men and women in dual earner households was noted earlier: this might be considered an effect of increasing women's educational attainment if it were caused by a shift in the joint distribution of the educational level of each member of the couple. But this would be captured in the analysis as a change in inequality between household types, and, as was shown, changes in between-household type inequality are not caused by changes in the educational distribution of couples. In fact (see below), the correlation between partners' earnings has changed in almost all combination of man's and woman's education. This will affect inequality within each type of household, rather than inequality between them.

To investigate changes in inequality within household types, attention is turned to Table 5.11, panel A of which reports the Theil value for all single-earner households in each year. This shows that, in the complete sample, households with a female earner had greater inequality, in the three years, than their male earner counterparts, and although in absolute terms the largest growth was experienced by male-earner households, by 2000 female earner households were still more unequal than their male equivalents. The single exception related to households where the woman had the highest level of education, where inequality decreased between 1979 and 1991 and remained stable afterwards. In these years (1991 and 2000), those types were most equal amongst all female-earner households. Panel A also presents the same within-group inequalities for the youngest sub-sample of households. Inequality increased for all male earner households. The pattern for young female earners follows an inverted u-trend over time: at all educational levels, inequality increased during the eighties and decreased in the nineties. Female earners with high levels of education were significantly more equal than the rest (by 2000, they were even more equal than highly educated young male earners).

Table 5.11. Explaining changes in within-household type inequality, UK

Panel A: Theil values in single earner households

	Complete sample			Age of head: 25-34		
	Educational level of male earners					
Year	Low	Medium	High	Low	Medium	High
1979	0.086	0.108	0.104	0.063	0.103	0.095
1991	0.121	0.208	0.171	0.139	0.119	0.145
2000	0.171	0.237	0.216	0.176	0.199	0.250
	Complete sample			Age of head: 25-34		
	Educational level of female earners					
Year	Low	Medium	High	Low	Medium	High
1979	0.291	0.251	0.363	0.399	0.271	0.176
1991	0.331	0.339	0.222	0.488	0.349	0.180
2000	0.312	0.332	0.227	0.316	0.320	0.156

Panel B: Theil, standard deviations of men's and women's earnings, and correlation between them

Complete sample												
	Men's Education											
Women's Education	Low				Medium				High			
	T	s_m	s_w	r	T	s_m	s_w	r	T	s_m	s_w	r
Low												
1979	0.064	70.2	52	0.029	0.077	92.1	57.4	0.107	0.080	150.2	71.6	-0.387
1991	0.071	111.5	68	0.117	0.102	173.6	92.2	0.206	0.128	184.2	107.5	-0.237
2000	0.082	146.2	112.2	0.012	0.088	146.6	150.8	0.032	0.070	199.8	109	0.280
Medium												
1979	0.072	87.4	61.5	0.017	0.068	106	70.9	0.014	0.085	146.8	71.8	-0.006
1991	0.102	146.6	97.1	0.070	0.100	175.7	100.9	0.051	0.082	187.8	120.3	0.034
2000	0.096	196.2	128.8	0.074	0.127	225.9	157.4	0.229	0.097	256.2	130.4	0.169
High												
1979	0.050	70.8	66.4	0.029	0.067	126.2	87.7	0.291	0.060	89.2	80.4	0.119
1991	0.134	207.3	128.7	0.051	0.076	186.1	129.3	-0.047	0.114	273.2	161.1	0.198
2000	0.029	137.7	151.6	-0.210	0.175	520.3	201.2	0.076	0.125	380.4	258.2	0.380

Age of head: 25-34												
	Men's Education											
Women's Education	Low				Medium				High			
	T	s_m	s_w	r	T	s_m	s_w	r	T	s_m	s_w	r
Low												
1979	0.079	79.5	48.2	0.107	0.062	87.8	54.6	-0.019	*	*	*	*
1991	0.045	74.6	49.8	0.256	0.107	89.9	90	0.244	*	*	*	*
2000	**	**	**	**	0.066	112	92.3	0.111	*	*	*	*
Medium												
1979	0.082	66.1	65.8	0.246	0.068	88.9	67.9	0.029	0.059	138.8	59.3	-0.381
1991	0.086	113.6	66.1	-0.086	0.087	106.6	92.8	0.162	0.083	134	118.2	0.272
2000					0.102	147	124.5	0.271	0.096	298.2	117.5	0.142
High												
1979	**	**	**	**	0.036	98.2	68.7	-0.492	0.058	74.8	72.9	0.338
1991	*	*	*	*	0.067	125.6	103.9	0.504	0.084	201.8	119.8	0.301
2000	*	*	*	*	0.230	740.8	226.6	0.051	0.113	309.6	198.8	0.348

T = Theil value.
sm = standard deviation of men's earnings.
sw = standard deviation of women's earnings.
r = correlation, men's and women's earnings.
* 5 or fewer observations.
** 6-10 observations.
* The figures refer to dual-earner households.
** The standard deviation and correlations refer to unadjusted earnings.

Panel B of Table 5.11 shows the Theil values, standard deviations of men's and women's earnings, and the correlation between them in households where there is a partner and where both the head and the partner are working (i.e. dual-earner households).[19] Among the complete sample, educationally homogamous couples (at all levels) showed similar, and not particularly high, levels of inequality in 1979, but inequality increased among all of them. The correlation between the couple's earnings increased in homogamous households with medium and high levels of education (and in all households that contained a highly educated man), but the correlation declined in low-low households. The variation in earnings is generally larger the higher the level of education (as might have been expected given that the level of earnings varies with education in a similar way), and this is true of both sexes, but it is also the case that the standard deviation of one partner's earnings varies according to his or her partner's level of education.

But such increasing correlations do not automatically lead to more inequality. The correlation in earnings in households in which both partners had high education grew considerably between 1991 and 2000 (from 0.198 to 0.380) but their Theil value hardly changed. Furthermore, despite this strong positive correlation, the Theil was not particularly big. So while an increasing correlation will tend to cause more inequality, there have been offsetting factors that mean that, empirically, a positive association between the correlation and the Theil index is not always observed.

For the youngest households it is hard to establish a clear picture because of the small sample sizes. The standard deviations of earnings tend to be lower than those in the whole sample. As in the complete sample, the Theil index increased in educationally homogamous households at the medium and high levels and in all combinations of medium or highly educated men married to

[19] The standard deviations and correlations refer to unadjusted earnings.

medium or highly educated women. The correlation in earnings also increased in all educationally homogamous households.

Much attention has been focused on dual earners as a likely source of increasing earnings inequality, which might be due not only to greater educational or earnings homogamy, but also to the increased importance of women's earnings. Table 5.12 shows the results of a Shorrocks decomposition of within-group household earnings inequality in dual-earner households by factor component (Shorrocks 1982) where factors are the relative contributions of earnings coming from men and women.[20] Inequality in this type of household is largely a function of men's earnings; for the complete sample, women's earnings only account for about a third of total inequality and their contribution does not follow a single pattern over time (it decreases and then increases slightly again). In the youngest households, women's contribution to inequality tends to be higher: in 1979 and 1991 it accounted for around 40per cent of the total variance, although by 2000 their relative importance notably declined, becoming even lower than in the complete sample. This picture is consistent with two of the facts shown in panel B of Table 5.11: (a) that the distribution of men's earnings tended to become significantly more unequal over the two decades, and (b) that although women's earnings inequality also experienced an important increase, the actual level of inequality generally remained lower than men's.

[20] Shorrocks (1982) shows that, for a large class of inequality measures of which the Theil index is one, the relative contribution to inequality of each factor, say X, of which the measure on which inequality is computed, say Y, is the sum, can be expressed as the covariance between X and Y divided by the variance of Y.

Table 5.12. Men's and women's contributions to household earnings inequality (in percentages) in dual-earner households, UK

Complete sample		
	Men's contribution	Women's contribution
1979	65	35
1991	68.2	31.8
2000	66.1	33.9
Age of head: 25-34		
	Men's contribution	Women's contribution
1979	61.2	38.8
1991	55.5	44.5
2000	73.6	26.4

These calculations refer to unadjusted earnings.

5.6. Conclusions

Three mechanisms by which increasing levels of educational attainment of women might lead, *ceteris paribus*, to a growth in inequality between households in their earnings were suggested at the beginning of this chapter (and elaborated in detail in Chapters 1 and 2): these are changes in female labour force participation; increasing educational homogamy (and therefore an overall increase in the correlation of partners' earnings); and a change in household formation behaviour, with more single earner households and more households with fewer or no dependent children. These three mechanisms have been put forward by previous authors, though they have not been associated with what is argued in this thesis to be one of their main causes –namely the growth in women's educational attainment.

The results in this chapter show that increasing earnings inequality in Britain between 1979 and 1991 was mainly due to growing inequality between types of household defined according to the educational level and employment status of the head and his/her partner (if any), while, between 1991 and 2000, the very

modest increase was about equally due to between-group and within-group change.[21] The three mechanisms that were outlined would all affect between-group inequality, mainly by changing the distribution of household types in the population, and the initial counterfactuals showed that the single most important factor leading to the between-group change could indeed be attributed to change in the distribution of household types, while most of the within group change was due to change in the Theil values in each type of household. The decomposition using the Mookherjee and Shorrocks (1982) method, however, showed a more complex picture: in the 1979-1991 period, the contribution of changes in average earnings was larger than the part explained by changes in the distribution of types. In the 1991-2000 period (and, actually, in both analyses for the young sub-sample), this decomposition pointed towards a disequalising effect of changes in p_{ijkl} compensated by an equalising effect of changes in $\bar{x}_{ijkl}$. But, despite this unanimously unequalising impact of changes in the distribution of types, the second set of counterfactuals, using the Deming-Stephan algorithm, showed that changes in the distribution of women's education operated in the direction of enhancing equality, and that the final disequalising impact was due to the changing proportion of male household heads (or male partners of female household heads) who were not working.

Although it is true that the correlation between the earnings of heads of households and their partner has increased over the period, this is not totally due to increased educational homogamy; the growth in the correlation has occurred in a number of types of two-earner households, although, admittedly, it has been particularly pronounced among couples in which both members have high levels of education. This indicates that there is some process of assortative mixing, beyond educational homogamy, occurring. One possibility is that the measure of education that is

[21] The changes among the sample of young households were somewhat different, but here the focus is on the results from the complete sample.

available is neither reliable nor fine enough to capture the processes of educational homogamy. On the one hand, the categorisation of years of education is likely to be a poor proxy for the educational qualifications that are important in helping people to get jobs and in determining their earnings; on the other, broad qualifications themselves may not discriminate fully in this respect. So, for example, considerations of which subject someone has obtained a degree in, and where they got it from, will undoubtedly also play a role in shaping earnings, and it may be that marriage partners meet within specific educational settings (such as a particular university or a particular course) or that being in such a setting helps to increase their likelihood of subsequently meeting and establishing a household with someone who comes from the same or a similar setting. One way in which this might occur is if a certain employer (or a large share of the employers in a particular business) recruits alumni from the same, or the same kind, of educational establishment or course. Another possibility is that, as the age of forming a stable partnership increases, partners may increasingly be found from among those with similar earnings, or earnings potential (if, for instance, this leads them to share similar lifestyles), and this may operate irrespective of, or, more likely, in addition to, a commonality in educational attainment. In other words, this would provide for increasing homogamy within those with the same level of education. Yet, a third possibility is assortative mating on the basis of unmeasured characteristics, which might correlate with earnings. These explanations are not mutually exclusive, but which, if any, of them are operating could only be answered if information about how people meet the partners with whom they form households were available: this is a notably under-researched area. But the main result of this chapter is that given the (limited) data that are available, conjectures about the unequalising effects of increasing women's educational attainment and labour force participation are not born out in the UK over the period of rapidly growing inequality during the last twenty years of the 20th century.

APPENDIX 5.1. SENSITIVITY OF THE RESULTS TO THE INCLUSION OF EARNINGS OF OTHER MEMBERS

Table A5.1.1. Presence of other earners in the household, UK, complete sample

Complete Sample	1979	1991	2000
Percentage of households in which `others´ work:			
All	21	20	14
Households in which neither head nor partner work	19	15	10
Male earner households	15	26	13
Female earner households	28	18	16
Dual earner households	23	20	18
Mean earnings coming from `others´:			
All	72	184	212
Households in which neither head nor partner work	74	177	217
Male earner households	77	203	256
Female earner households	71	186	211
Dual earner households	70	165	191
Variance in earnings coming from `others´:			
All	2114.3	21551	30702.1
Households in which neither head nor partner work	2237.6	22129.5	40753.4

Complete Sample	1979	1991	2000
Male earner households	2271.7	26913.4	39456.2
Female earner households	1868.5	14335.1	29109.2
Dual earner households	2085.2	18394.7	21990.8

Table A5.1.2. Sensitivity of the results to the inclusion of earnings of other members of the household, UK, complete sample

Complete Sample	Definition of Household Earnings					
	1979		1991		2000	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Total average earnings	136	153	169	190	232	248
Total Theil	0.306	0.265	0.535	0.476	0.567	0.520
Households in which neither head nor partner work						
Mean households earnings	0	17	0	16	0	12
Variance	0	1775.1	0	2599.5	0	2351.2
Theil	0	1.843	0	2.204	0	2.584
Male earner households						
Mean households earnings	149	163	236	269	325	343
Variance	5390.4	6471.4	32154.7	36695.3	64509.7	65837
Theil	0.106	0.108	0.203	0.193	0.240	0.223
Female earner households						
Mean households earnings	88	115	126	146	192	212
Variance	5391.1	6974.3	12625.4	13845.6	27012.4	27969.7

Complete Sample	Definition of Household Earnings					
	1979		1991		2000	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Theil	0.315	0.265	0.360	0.313	0.334	0.296
Dual earner households						
Mean households earnings	195	213	288	304	398	415
Variance	6468.4	6956.4	22368.4	22658	63405.3	62957.1
Theil	0.079	0.073	0.119	0.110	0.144	0.133

Definition of household earnings:
Definition 1 = Earnings from head of the household and partner (if present).
Definition 2 = Earnings from head of the household, partner (if present) and others (if present).

Table A5.1.3. Sensitivity of the results to the inclusion of earnings of other members of the household, UK, young sample

Age of head: 25-34	1979	1991	2000
Percentage of households in which `others´ work:			
All	4	11	4
Households in which neither head nor partner work	5	11	1
Male earner households	5	23	7
Female earner households	6	4	4
Dual earner households	2	1	2
Mean earnings coming from `others´:			
All	74	229	298
Households in which neither head nor partner work	64	236	225
Male earner households	75	227	337
Female earner households	80	234	370
Dual earner households	74	217	167

Age of head: 25-34	1979	1991	2000
Variance in earnings coming from `others´:			
All	1055.7	30749	49685.3
Households in which neither head nor partner work	1901.4	28011.1	31564.3
Male earner households	961.2	34200.5	78997.4
Female earner households	966	17551.9	17188.2
Dual earner households	1077.3	4539.8	7475.7

Table A5.1.4. Sensitivity of the results to the inclusion of earnings of other members of the household, UK, young sample

Age of head: 25-34	Definition of Household Earnings					
	1979		1991		2000	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Total average earnings	147	151	191	208	266	272
Total Theil	0.247	0.241	0.417	0.392	0.470	0.462
Households in which neither head nor partner work						
Mean households earnings	0	4	0	18	0	2
Variance	0	500	0	4278.1	0	371.4
Theil	0	3.370	0	2.426	0	4.778
Male earner households						
Mean households earnings	145	150	233	268	310	323
Variance	4838.8	5493.4	19132	25483.8	59127.7	60312.1
Theil	0.096	0.067	0.151	0.161	0.239	0.229

Age of head: 25-34	Definition of Household Earnings					
	1979		1991		2000	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Female earner households						
Mean households earnings	97	104	156	162	230	241
Variance	6013.4	6474.6	17258.6	18294.7	30335.2	33634.8
Theil	0.325	0.310	0.352	0.353	0.291	0.298
Dual earner households						
Mean households earnings	206	207	294	295	415	417
Variance	7296	7289.3	21265	21139.5	81895.4	82177.3
Theil	0.082	0.08111	0.113	0.112	0.163	0.162

Definition of household earnings:
Definition 1 = Earnings from head of the household and partner (if present).
Definition 2 = Earnings from head of the household, partner (if present) and others (if present).

APPENDIX 5.2. THE DEMING-STEPHAN COUNTERFACTUALS

The data for the counterfactuals comprise a 4-way table of women's education (W_E) by men's education (M_E) by whether or not the woman works (W_W) by whether or not the man works (M_W). The last two of these are dichotomies, but the education variables each have four categories: low, medium and high education plus, because the units of observation are households, a category of 'not present' for those households where the head of the household does not have a partner. For the same reason, the 4-way table is incomplete because 16 out of the possible 64 combinations of the variables can never be observed: these are known as 'structural zeroes'.

To compute the counterfactuals, the Deming-Stephan algorithm (sometimes called Iterative Proportional Fitting) is used. It provides a means of adjusting the marginal distributions of a contingency table while preserving the pattern of associations, as captured by odds ratios, among those variables (Deming and Stephan 1940a, 1940b).[1]

Let f_{ij} be the frequencies of a contingency table with rows i=1,…,I and columns j=1,..,J and define $f_{i+\equiv}\sum_{j} f_{ij}$ and

[1] Odds ratios express the relative chances of an observation being found in category j rather than in j' of one variable, conditional on being located in category i rather than i' of another variable.

$f_{+j} \equiv \sum_i f_{ij}$ to represent the row and column totals of the table. Given target row and column distributions, f^*_{i+} and f^*_{+j}, the Deming-Stephan algorithm adjusts the observed frequencies by a series of iterations, each of which has two steps, as follows:

$$(1)\quad f_{ij}^{11} = f_{ij}\frac{f^*_{i+}}{f_{i+}}, \quad f_{ij}^{12} = f_{ij}^{11}\frac{f^*_{+j}}{f_{+j}^{11}}$$

$$(2)\quad f_{ij}^{21} = f_{ij}^{12}\frac{f^*_{i+}}{f_{i+}^{12}}, \quad f_{ij}^{22} = f_{ij}^{21}\frac{f^*_{+j}}{f_{+j}^{21}},$$

and so on until convergence to the adjusted frequencies.

The Deming-Stephan algorithm is very easily implemented on a 2-dimensional table and so the estimations were carried out by reshaping the 4-way contingency table as the appropriate 2-way table. In *counterfactual 1* the marginal distribution of women's education is allowed to change. So the 4-way W_E by M_E by W_W by M_W (4 by 4 by 2 by 2) table was reshaped into a 2-way W_E by X1 table, where X1 is the 16 category variable capturing all the M_E by W_W by M_W combinations. This 4 by 16 table thus includes the 16 structural zeroes, but this is not a problem because the Deming-Stephan procedure, of necessity, preserves any zero cell values. Counterfactual estimates of the change between t and t+1 are thus made by taking the W_E by X1 table observed at t and applying the algorithm using the observed X1 (column) marginal totals and the counterfactual W_E (row) margin, which is given by the W_E distribution at t+1. Because the sample sizes vary between t and t+1, the t sample size is used and thus the counterfactual row totals are given by the t+1 row proportions applied to the t row total. But in this particular counterfactual the interest is in the effect of a

change in the distribution of women's education per se and not in any changes in the distribution of households types that does not follow directly from this. The marginal total for the fourth category of W_E ('not present') was therefore set to its value at t, and the counterfactuals for the three other categories were adjusted accordingly.

Counterfactual 2 involved reshaping the 4-way table into a 2-way X2 by X3 table, where X2 captures all the combinations of W_E and M_E while X3 captures W_W by M_W: thus the table has 16 rows and 4 columns. The row variable measures both the educational distributions of men and women and the association between them (including the share of households without a man or without a woman). As before, the t+1 row distribution is used to form the counterfactual row distribution while the column distribution is left at its observed value. In *counterfactual 3* the row variable is then expanded to 32 categories with the addition of the distinction between households in which the woman is working and those in which she is not.

The reshaping of the table and the Deming-Stephan algorithm itself are easily carried out on any computer program that allows the user to write macros.

APPENDIX 5.3. SENSITIVITY OF THE RESULTS TO THE EQUIVALENCE SCALE AND TO THE INCLUSION OF SELF-EMPLOYMENT INCOME

5.3.A. Equivalence Scale Sensitivity: Replication of The Main Analysis Using The Modified OECD Equivalence Scale

Throughout Chapter 5 and 6 the LIS equivalence factor has been used in order to account for the varying sizes and compositions of the units (households). The choice of this scale is not arbitrary. The analysis for Italy and the Netherlands (in Chapter 6) is carried out using LIS data and, unfortunately, in the Dutch case information about the ages of all members of the household (which would allow the use of a more refined equivalence factor) is not available in all the cross-sections used. For the sake of consistency across the three countries and the three cross-sections, the (less data-demanding) LIS factor was used instead.

In this section, the main analysis (i.e. counterfactuals and decompositions) is replicated using the modified OECD scale, which assigns a weight of 1 to the first adult in the household, 0.5 to each additional adult (15 or older) and 0.3 to each child (under 15). Average earnings are slightly lower when the modified OECD scale is used. The Theil values are only marginally different and the trend in inequality is replicated (Table A5.3.1). Both the simple counterfactuals and the Shorrocks decompositions

point to the same substantive results as the main analysis (Table A5.3.2), and the Deming-Stephan decompositions very closely replicate the findings reported in the chapter (Table A5.3.3). All these tests unequivocally confirm that the choice of the equivalence factor does not change any of the effects found in this chapter and does not challenge any of its conclusions.

Table A5.3.1. Average earnings and earnings inequality (Theil indexes) over time, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
Average earnings	126.2	158	218.2	140.2	183	256
Theil	0.312	0.539	0.571	0.249	0.419	0.469
Between group	0.218	0.392	0.398	0.171	0.302	0.314
Within group	0.094	0.147	0.173	0.078	0.117	0.155
N	4964	5113	5243	1385	1334	1244

Table A5.3.2. Decomposing changes in earnings inequality (Theil index), UK

Complete sample							
Period:		1979-1991			1991-2000		
Observed	t	0.312	0.218	0.094	0.539	0.392	0.147
	t+1	0.539	0.392	0.147	0.571	0.398	0.173
Change in :	p_{ijkl}	0.487	0.387	0.100	0.549	0.403	0.146
	$\bar{x}_{ijkl}$	0.408	0.307	0.101	0.473	0.331	0.142
	T_{ijkl}	0.350	0.218	0.132	0.561	0.392	0.169
	$p_{ijkl}\ \bar{x}_{ijkl}$	0.493	0.392	0.101	0.545	0.398	0.147
	$p_{ijkl}\ T_{ijkl}$	0.472	0.326	0.146	0.575	0.403	0.172
	$\bar{x}_{ijkl}\ T_{ijkl}$	0.450	0.307	0.143	0.493	0.331	0.162
	$p_{ijkl}\ \bar{x}_{ijkl}\ T_{ijkl}$	0.539	0.392	0.147	0.571	0.398	0.173
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	0.227	0.174	0.053	0.032	0.006	0.026
	p_{ijkl}	0.074	0.073	0.001	0.090	0.081	0.009
	φ_{ijkl}	0.101	0.101	-	-0.075	-0.075	-
	γ_{ijkl}	0.052	-	0.052	0.017	-	0.017

Age of head: 25-34							
Period:		1979-1991			1991-2000		
Observed	t	0.249	0.171	0.078	0.419	0.302	0.117
	t+1	0.419	0.302	0.117	0.469	0.314	0.155
Change in :	p_{ijkl}	0.386	0.299	0.087	0.423	0.306	0.117
	$\bar{x}_{ijkl}$	0.205	0.132	0.073	0.346	0.237	0.109
	T_{ijkl}	0.275	0.171	0.104	0.457	0.302	0.155
	$p_{ijkl}\ \bar{x}_{ijkl}$	0.389	0.302	0.087	0.428	0.314	0.114
	$p_{ijkl}\ T_{ijkl}$	0.414	0.299	0.115	0.463	0.306	0.157
	$\bar{x}_{ijkl}\ T_{ijkl}$	0.232	0.132	0.100	0.381	0.237	0.144
	$p_{ijkl}\ \bar{x}_{ijkl}\ T_{ijkl}$	0.419	0.302	0.117	0.469	0.314	0.155
Mookherjee and Shorrocks	$\Delta(t,t+1)$	0.170	0.131	0.039	0.050	0.012	0.038
effect of changing	p_{ijkl}	0.172	0.158	0.014	0.101	0.091	0.010
	φ_{ijkl}	-0.028	-0.028	-	-0.079	-0.079	-
	γ_{ijkl}	0.026	-	0.026	0.028	-	0.028

Table A5.3.3. Deming-Stephan decomposition of the changing household distribution's effects on earnings inequality (Theil index), UK

Complete sample							
Period:		1979-1991			1991-2000		
		Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Obs. vals.	t	0.312	0.218	0.094	0.539	0.392	0.147
	t+1	0.539	0.392	0.147	0.571	0.398	0.173
Counertactuals							
Cf 1		0.275	0.183	0.092	0.511	0.363	0.148
Cf 2		0.276	0.180	0.096	0.508	0.358	0.150
Cf 3		0.291	0.196	0.095	0.483	0.336	0.147
Cf 4		0.487	0.387	0.100	0.549	0.403	0.146
Age of head: 25-34							
Period:		1979-1991			1991-2000		
		Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Obs. vals.	t	0.249	0.171	0.078	0.419	0.302	0.117
	t+1	0.419	0.302	0.117	0.469	0.314	0.155
Counterfactuals							
Cf 1		0.275	0.201	0.074	0.485	0.372	0.113
Cf 2		0.271	0.188	0.083	0.481	0.367	0.114
Cf 3		0.273	0.190	0.083	0.452	0.339	0.113
Cf 4		0.386	0.299	0.087	0.423	0.306	0.117

5.3.B. Sensitivity to The Inclusion of Self-employment Earnings: Replication of The Main Analysis Including Self-employment of The Head of The Household and of The Partner of The Head in The Earnings Definition

Income from self-employment was left outside the definition of earnings used in this chapter. Even though the data for the UK would allow its inclusion, unfortunately in the Italian and Dutch data provided by LIS it is not always possible to separate out which share of household income from self-employment is to be attributed to each member of the household. However, in this

section, the main analyses (counterfactuals and decompositions) shown in this chapter are replicated using a less restrictive definition of earnings (including self-employment) to check to what extent the results are consistent to the choice of a definition of earnings. This more comprehensive definition of earnings should necessarily decrease the proportion of zero-earnings households and some effect is expected on the substantive findings of Chapter 5. A detailed analysis of earnings including self-employment income in the UK can be found in Breen and Salazar (2005).

Average earnings are slightly higher in this case (not surprisingly, since the definition of earnings is more comprehensive), and the Theil values tend to be consistently lower (Table A5.3.4), which would point to some equalising effect of self-employment earnings. The replication confirms the results only to a limited extent. As regards the simple set of counterfactuals (Table A5.3.5), the effects of p_{ijkl} and $\bar{x}_{ijkl}$ that were described in the main analysis are confirmed in the first period (1979-1991). In the 1991-2000 period, however, some of the effects that were previously found disappear. Specifically, p_{ijkl} has no effects in that period for the complete sample, and $\bar{x}_{ijkl}$ loses its equalising impact in the youngest sample when self-employment earnings are included.

The results of the Mookherjee and Shorrocks decompositions (Table A5.3.5) differ even more notably, not only because the increases in inequality to be explained vary in their magnitude but, most importantly, because the relative contributions of each of the factors to that increase that were found when income from employment alone was analysed, are not fully reproduced when self-employment income is also included. Most notably, whereas in the main analysis for the 1979-1991 period changes in mean earnings were found to account for a large part of the increase in inequality, when self-employment earnings are included they become almost negligible to explain that change.

Despite these differences, when the effects of changes in the distribution of women's education and their associated processes are tested through the Deming-Stephan decomposition of household types (Table A5.3.6) the broadening of the earnings definition does not seem to make any fundamental difference. In line with the main results of the chapter, in the complete sample (and in both periods), all three changes associated with increased education of women had an ameliorating impact on the distribution of earnings across households, and the actual increase in inequality caused by the change in household types (p_{ijkl}) was due to changes in men's employment. Alternatively, in the young sample (and, again, in the two periods), women's educational expansion had a disequalising impact.

Table A5.3.4. Average earnings and earnings inequality (Theil indexes) over time, UK

	Complete sample			Age of head: 25-34		
	1979	1991	2000	1979	1991	2000
Average earnings	144.6	191.7	265	155.7	211.6	281.9
Theil	0.250	0.448	0.540	0.197	0.312	0.421
Between group	0.151	0.275	0.317	0.110	0.184	0.269
Within group	0.099	0.173	0.223	0.087	0.128	0.152
N	4964	5113	5243	1385	1334	1244

Table A5.3.5. Decomposing changes in earnings inequality (Theil index), UK

Complete sample							
Period:		1979-91			1991-2000		
Obs.	t	0.250	0.151	0.099	0.448	0.275	0.173
	t+1	0.448	0.275	0.173	0.540	0.317	0.223
Change in :	p_{ijkl}	0.367	0.264	0.103	0.484	0.315	0.169
	$\bar{x}_{ijkl}$	0.278	0.177	0.101	0.426	0.258	0.168
	T_{ijkl}	0.314	0.151	0.163	0.498	0.275	0.223
	p_{ijkl} $\bar{x}_{ijkl}$	0.378	0.275	0.103	0.486	0.317	0.169
	p_{ijkl} T_{ijkl}	0.402	0.235	0.167	0.531	0.315	0.216
	$\bar{x}_{ijkl}$ T_{ijkl}	0.346	0.177	0.169	0.485	0.258	0.227
	p_{ijkl} $\bar{x}_{ijkl}$ T_{ijkl}	0.448	0.275	0.173	0.540	0.317	0.223
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	0.198	0.124	0.074	0.092	0.042	0.050
	p_{ijkl}	0.094	0.091	0.003	0.066	0.068	-0.002
	φ_{ijkl}	0.033	0.033	-	-0.026	-0.026	-
	γ_{ijkl}	0.071	-	0.071	0.052	-	0.052

Age of head: 25-34							
Period:		1979-91			1991-2000		
Observed	t	0.197	0.110	0.087	0.312	0.184	0.128
	t+1	0.312	0.184	0.128	0.421	0.269	0.152
Change in :	p_{ijkl}	0.278	0.185	0.093	0.384	0.256	0.128
	$\bar{x}_{ijkl}$	0.121	0.041	0.080	0.319	0.193	0.126
	T_{ijkl}	0.222	0.110	0.112	0.336	0.184	0.152
	p_{ijkl} $\bar{x}_{ijkl}$	0.277	0.184	0.093	0.395	0.269	0.126
	p_{ijkl} T_{ijkl}	0.311	0.185	0.126	0.409	0.256	0.153

	$\bar{x}_{ijkl}$ T_{ijkl}	0.146	0.041	0.105	0.343	0.193	0.150
	$p_{ijkl}\,\bar{x}_{ijkl}$ T_{ijkl}	0.312	0.184	0.128	0.421	0.269	0.152
Mookherje and Shorrocks effect of changing	$\Delta(t,t+1)$	0.115	0.074	0.041	0.109	0.085	0.024
	p_{ijkl}	0.156	0.139	0.017	0.079	0.077	0.002
	φ_{ijkl}	-0.065	-0.065	-	0.008	0.008	-
	γ_{ijkl}	0.024	-	0.024	0.022	-	0.022

Table A5.3.6. Deming-Stephan decomposition of the changing household distribution's effects on earnings inequality (Theil index), UK

Complete sample							
Period:		1979-91			1991-2000		
		Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Obs. vals.	t	0.250	0.151	0.099	0.448	0.275	0.173
	t+1	0.448	0.275	0.173	0.540	0.317	0.223
Counterfactuals							
Cf 1		0.216	0.119	0.097	0.415	0.248	0.167
Cf 2		0.217	0.117	0.100	0.420	0.246	0.174
Cf 3		0.227	0.127	0.100	0.398	0.227	0.171
Cf 4		0.367	0.264	0.103	0.484	0.315	0.169
Age of head: 25-34							
Period:		1979-91			1991-2000		
		Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Obs. vals.	t	0.197	0.110	0.087	0.312	0.184	0.128
	t+1	0.312	0.184	0.128	0.421	0.269	0.152
Counterfactuals							
Cf 1		0.223	0.139	0.084	0.380	0.254	0.126
Cf 2		0.239	0.147	0.092	0.398	0.270	0.128
Cf 3		0.231	0.139	0.092	0.373	0.247	0.126
Cf 4		0.278	0.185	0.093	0.384	0.256	0.128

CHAPTER 6. INCREASED WOMEN'S EDUCATION AND EARNINGS INEQUALITY IN THE NETHERLANDS AND ITALY

6.1. Introduction

In Chapter 5 the question of whether increased women's educational attainment has entailed higher inequality in household earnings was addressed, and the mechanisms by which this might have been the case were discussed and put to the test using data for the United Kingdom. In this chapter, the analysis is extended to two additional countries, the Netherlands and Italy. The research design aimed at contrasting contexts with varying combinations of women's educational expansion and trends in earnings inequality. Whereas the UK and Italy were regarded as countries that experienced important increases in upper secondary and higher educational levels during the period at stake, in the Netherlands expansion was supposed to be somewhat more moderate and a large gender gap was reported. As for earnings inequalities and changes in them, the UK has traditionally been considered to be the European country with both the highest levels and a remarkable increase during the eighties and, less markedly, the nineties. The Netherlands tended to stand out amongst the countries with the lowest levels of inequality together with countries such as Sweden or Norway, while Italy ranked in this period at some intermediate level (Gottschalk and Smeeding 1997, Gottschalk and Joyce 1998). Both the Netherlands and Italy have,

according to existing evidence, been considered to experience spells of increased inequality, although without a pattern of continuous rise. Note, however, as was discussed in Chapter 1, that this particular ordering of countries as regards levels and changes is partly affected by the choice of a specific sample, usually men only and most often working men. The ranking of countries in terms of earnings inequality and, particularly, their levels, are necessarily different in this thesis since a fundamental aspect of it is that it provides a more comprehensive account of women's labour status (including them in the first place and, more specifically, allowing for zero-earners (both male and female) to enter the analysis).

An extensive account of the processes by which increased education of women could have affected earnings inequality was provided in Chapters 1 and 2. In this chapter, therefore, this discussion is not repeated and the focus is rather on the empirical analysis complementing Chapter 5. In the next section a number of specificities of the Dutch and Italian data are explained, and a very brief account of the methods (which were discussed at length in Chapter 5) is provided. Some descriptive statistics illustrating changes in women's education, household formation and participation are then shown. The results of the counterfactual analyses and decompositions, and an exploration of other aspects of the change in earnings inequality follow. The chapter then concludes with a summary of the main findings for the two countries compared to the UK –particularly with regard to the effect of women's education on changes in inequality– and with a brief discussion of some aspects that should be subject to further investigation in the future.

6.2. Data and Methods

The data for this chapter have been obtained from the Luxembourg Income Study (LIS) harmonised datasets. For the Netherlands, 1983, 1991 and 1999 surveys are used; those derive

from the Additional Enquiry on the Use of (Public) Services and from the Dutch Socio-Economic Panel. For Italy, data coming originally from The Bank of Italy Income Survey for 1986, 1993 and 2000 have been used. The choice of those years aims at covering approximately the same period –the eighties and nineties– in the three countries. Unfortunately, 1986 is the first year for which LIS data are available for Italy.

Following on from the framework used in the previous chapter relating to the UK, the focus when addressing the Netherlands and Italy is on the relationship between women's education and household earnings. Education, working status and earnings information for the head and for the partner of the head (if present) exclusively are considered, and thus earnings inequality throughout the chapter refers strictly speaking to inequality in the earnings of the head and the partner of the head. It was shown for the British case (see Appendix 5.1 in Chapter 5) that the exclusion of other members of the household from the analysis was rather unproblematic. Similarly, the exclusion of earnings from members of the household other than the head and the partner of the head (see Appendix 6.1 in this chapter) does not generally change the trend in inequality.[1]

The Luxembourg Income Study data were relatively recently refined to standardise the (rather idiosyncratic) educational variables across countries and years. By the time the analyses for this chapter were carried out, the routine was only available for one out of the three cross-sections in the Netherlands (1999) and Italy (2000). In an attempt to allow the comparison of the three

[1] Only in Italy for the complete sample total inequality as measured by the total Theil index significantly differs depending on the definition of household earnings that is used. However, the Theil values for specific household types are quite similar regardless of the definition, obviously except in the case of households in which neither the head nor the partner works –those types show very high Theil values based on very few cases. This difference occurs because of the very high (over 30 per cent) percentage of households in which neither the head nor the partner work in Italy.

cases and still guarantee some degree of internal consistency in the definition of education in each of the three countries over time, this variable was then subject to some modifications to obtain a simple categorisation of education into three broad levels as described below. Admittedly, the result is not as fine-tuned as would be ideal, but it is believed to be able to capture the main changes in the distribution of educational levels over time. The categorisation for the Netherlands in 1983 could appear as particularly problematic since it includes information about years of education for non-university qualifications and about the actual level in the case of university degrees. However, LIS extended and updated their routine as of October 2005. The new LIS recoding for the Netherlands in 1983, 1991 and 1999 (the three years that are used in this chapter) is identical to the one used throughout this analysis. This agreement helps to confirm the validity of the categorisation.

Table 6.1. Categorisation of educational variables in the Netherlands and Italy

	Netherlands		
	1983	1991	1999
Level 1	Less than 10 yrs of education (Secondary lower or less)	Secondary lower or less	Secondary lower or less
Level 2	10-12 yrs of education (Secondary high)	Secondary high	Secondary high
Level 3	Tertiary	Tertiary	Tertiary
	Italy		
	1986	1993	2000
Level 1	Less than high school	Less than high school	Less than high school
Level 2	High school	High school	High school
Level 3	University	University	University

An additional category (4) is included to account for household types in which there is an unpartnered head[2] (and so, for instance, in the case of a woman who was the head of the household and was not partnered, the variable referring to the educational level of the male partner would have value 4). Labour participation (specifically, whether the head of the household and his/her partner are employed) is additionally distinguished, and households where neither the head nor the partner is working are considered to have zero earnings.

All LIS income variables are recorded as yearly amounts even if not provided as annualised in the original surveys. Household earnings therefore refer to yearly wages and salaries from employment for the head and partner of the head of the household (when present) only.[3] Only net income data for Italy are available. All the earnings figures have been adjusted using the LIS equivalence factor, which is simply the squared root of the number of persons in the household. Moreover, whenever possible, all the analyses have been replicated using the modified OECD equivalence scale to test the robustness of the results to the choice of alternative adjusting factors. Unfortunately, not for all three cross-sections for the Netherlands information about the ages of the children in the household –which are required to construct the modified OECD scale– is available, and therefore the replications are only shown for Italy in Appendix 6.2 (and were shown for the

[2] Specifically, the data for the Netherlands comprise married couples in 1983 and 1991 and married or cohabiting couples in 1999. In Italy, the data include married couples in 1986 and married or cohabiting couples in 1993 and 2000. Same-sex couples have been excluded from the analysis.

[3] In the analysis for the UK in Chapter 5, the robustness of the results to the choice of an earnings definition was tested by running all the analyses including and excluding income from self-employment. It was shown that some differences actually exist. Such tests with the inclusion of self-employment income are not conducted for the Netherlands and Italy since it is not always possible to attribute a share of total income from self-employment to each of the household members.

UK in Chapter 5). All the earnings figures are expressed in constant (2000) units of the corresponding national currencies (expressed in thousands in the case of Italy).

In the main part of the empirical analysis, households whose head is outside prime-working age (20 to 65) have been excluded from the sample. This helps to avoid the inclusion of those still in formal education or retired who would have income sources other than earnings. However, all the analyses are replicated using an even more restricted sample of young households (those in which the head is 25 to 34 years old) in which, presumably, the effects of women's increased education should be more visible.

The data consists, for each of 1983, 1991 and 1999 in the Netherlands and 1986, 1993 and 2000 for Italy, of a 4-way table of woman's education (W_E) by man's education (M_E) by whether or not the woman works (W_W) by whether or not the man works (M_W). In each cell of this table, three pieces of information which are needed for the analysis are included, namely the proportion of households, p_{ijkl}, the mean earnings of those household types, $\bar{x}_{ijkl}$, and a measure of earnings inequality in each of them –the Theil index, T_{ijkl}– where i, j, k and l refer to W_E, M_E, W_W and M_W, respectively.

The methods used in the analyses will only be outlined in this chapter since they were extensively discussed in Chapter 5 (see the Data and Methods section and Appendix 5.2). All the analyses refer to differences in household earnings inequality (and the effect of changes in women's education) between 1983 and 1991 and between 1991 and 1999 for the Netherlands, and between 1986 and 1993 and 1993 and 2000 for Italy. A simple set of counterfactuals is firstly carried out using the decomposable (between- and within-group) Theil index. This is done by allowing one or more components of the index (p_{ijkl}, $\bar{x}_{ijkl}$ and T_{ijkl}) to take their actual t+1 value and keeping the rest of the terms at their earlier t value. Secondly, a decomposition of the change in earnings inequality between each t and each t+1 is presented using the method suggested by Mookherjee and Shorrocks (1982). This

method, on the one hand, permits the assessment of how much of the between-group component of the change in inequality is due 1) to changes in mean earnings in each subgroup (household type), and 2) to changes in the distribution of subgroups. On the other hand, the effect of 3) changes in the distribution of subgroups, and 4) changes in inequality within each of the groups, on the within component of the change in earnings inequality is measured. A final set of counterfactual analyses is then conducted by decomposing the effects of changes in the distribution of subgroups into the effects of changing the variables which configure the household types (namely, women's education, men's education, women's work and men's work) and their patterns of associations. The Deming-Stephan method (Deming and Stephan 1940a, 1940b) as described in detail in Chapter 5 is used for this purpose.

6.3. Descriptive Results

Table 6.2 illustrates the very significant educational expansion that took place in both countries. In Italy, four out of five women in the mid-eighties sample reported the lowest level of education (less than high school), but by 2000 this ratio had fallen to three out of five. The proportion of women with a high school degree and university qualifications increased steadily during that period. The expansion amongst the youngest sample was even more remarkable, particularly in upper secondary education. In the Netherlands, education began from a much higher general starting point –with more than 40 per cent of women having the equivalent of an upper secondary education at the beginning of the eighties. However, the expansion is also evident inasmuch as there was a marked decrease in the proportion of women with the lowest level

and a rise in the numbers of women with some tertiary education.[4] As expected, the youngest cohort shows the same pattern but even more markedly.

Table 6.2. Educational levels of women (in households in which there is a female head or partner) over time, Netherlands and Italy

Netherlands	Complete sample			Age of head: 25-34		
	1983	1991	1999	1983	1991	1999
Low	56	47.4	27.4	42.7	36	15.9
Medium	42.4	38	47	54.5	45.7	49.1
High	1.6	14.6	25.9	2.8	18.3	35
N	3391	2883	3121	987	781	686
Italy	Complete sample			Age of head: 25-34		
	1986	1993	2000	1986	1993	2000
Low	80.8	69.4	57.3	80.9	52.9	40.9
Medium	11.4	23.8	33.1	11.7	40.1	48.1
High	7.8	6.8	9.6	7.4	7	11
N	5876	5400	5042	915	762	511

It was argued in detail earlier in this thesis that women's increased education is expected to have influenced several possible processes regarding family formation and participation in the labour force and, moreover, that particular combinations of those could have inequality-enlarging effects. The following tables in this section briefly describe changes in those processes.

[4] This increase might be partly overestimated because of the changing definition of the three educational levels over time. In addition, as regards the highest level, individuals with a high level of education include those with any tertiary education in the Netherlands while in Italy this level only includes those with university education. This might be overestimating the proportion having this level of qualification in the Netherlands.

Table 6.3 shows that the percentage of households in which the head does not have a partner has tended to increase, significantly more markedly in Italy (and particularly for the youngest households) than in the Netherlands, where in the early eighties almost one out of four households were headed by an unmarried person. Unpartnered households accounted for at least a third of the youngest sample by the end of the period in both countries.[5]

Table 6.3. Percentage of households headed by an uncoupled person over time, Netherlands and Italy

Netherlands	Complete sample			Age of head: 25-34		
	1983	1991	1999	1983	1991	1999
% Uncoupled	23.6	28.4	27.2	25	28.2	30.5
N	3893	3511	3589	1158	991	804
Italy	Complete sample			Age of head: 25-34		
	1986	1993	2000	1986	1993	2000
% Uncoupled	15.6	20.3	22.7	15.2	20.6	32.2
N	6242	5827	5562	1009	860	615

Educational homogamy experienced changes in the expected direction. As reported in Table 6.4, the proportion of couples in which both members had the lowest educational level was very high in the eighties in both the Netherlands and Italy (44 and 56 per cent respectively in the complete samples), and by the end of the nineties it had significantly fallen, particularly in the

[5] It was already noted in Chapter 5 that this figure is affected both by increasing delays in couple (and particularly marriage) formation and by increased rates of union dissolution.

Netherlands.[6] Alternatively, homogamy at the medium and highest levels had strengthened by the end of the period, most notably amongst the youngest couples. Despite this general picture of increased homogamy at the highest levels, the total percentage of couples in which both members had the same level of education did not systematically rise.

Table 6.4. Percentage of educationally homogamous couples by educational levels over time, Netherlands and Italy

Netherlands	Complete sample			Age of head: 25-34		
	1983	1991	1999	1983	1991	1999
Low	44.1	24	9.4	31.9	18	4.3
Medium	23.1	18.8	27.8	27.6	25.4	30.8
High	1	9.6	16	1.3	7.7	21.8
N	2757	2105	2392	821	572	513
Italy	Complete sample			Age of head: 25-34		
	1986	1993	2000	1986	1993	2000
Low	56.2	57.9	45	47.8	44.2	34.5
Medium	2.4	13.1	18.1	2.7	20.2	25.4
High	0.5	4.1	4.7	0.7	3.2	4.1
N	5233	4644	4298	855	683	417

Women's employment shows very distinctive patterns in both countries (Table 6.5). Interestingly, both countries showed very similar percentages –26 per cent in the Netherlands and 29 per cent in Italy– of households where the female head or partner of the head was employed in the mid-eighties. In the Netherlands, this share increased steadily during the nineties and by the end of the decade almost 60 per cent of the households had a female head

[6] For a detailed analysis of absolute rates of homogamy and relative chances of homogamy in Italy across cohorts, see Bernardi (2003). For an analysis of the factors influencing the educational level of the partner in the first marriage in the Netherlands, see (De Graaf *et al.* 2003).

or partner of the head who was employed. Alternatively, in Italy the share of households in which the female head or partner of the head is employed remained stable and at a remarkably low level – around 30 per cent. Even more interestingly, this pattern of similar initial levels and dramatically different patterns of change afterwards is observed for the youngest sub-sample of households too. In the mid-eighties, the proportion of employed women was again almost identical and notably higher than in the whole sample in both countries –37 per cent. During the nineties, a very marked increase took place in the Netherlands while there was no change in Italy.

Table 6.5. Percentage of households in which the female head or female spouse is employed over time, Netherlands and Italy

Netherlands	Complete sample			Age of head: 25-34		
	1983	1991	1999	1983	1991	1999
% Working	26.3	41.7	58.2	36.7	55.7	70
N	3893	3511	3602	1158	991	810
Italy	Complete sample			Age of head: 25-34		
	1986	1993	2000	1986	1993	2000
% Working	29.3	29.7	33.9	37.2	38.5	37.2
N	6242	5827	5563	1009	860	615

These opposing trends in the two countries can be further illustrated by showing changes in the distribution of male and female earners across households over time (Table 6.6). The distribution of household types in terms of male and female earners was strikingly similar in the two countries in the mid-eighties, with approximately one third of all households without any earners (as defined in this analysis), and a very notable predominance of the male-breadwinner model (42 per cent in the Netherlands and 38 per cent in Italy). In the Netherlands, women

clearly became more present in the distribution of household types –with female-single-earner and, particularly, dual-earner households increasing their share at the expense of male-earner and no-earner units. In Italy, alternatively, the proportion of dual-earner households remained stable (amongst the youngest women it even declined slightly) and the male-breadwinner model still seemed to be dominant even in the young households. The Netherlands experienced a very high unemployment rate in that period (17.3 per cent in 1984). In spite of this rising rate, a notable increase in the participation of women (particularly married women) took place, strongly affected by the increasing availability of part-time work. In the late eighties, there was a marked recovery, with a notable growth in employment (Hartog *et al.* 1993). These trends are reflected both by the growth in households with the female head or partner of the head employed (Table 6.5) and by a significant reduction in the proportion of households without any earners (Table 6.6). In contrast with the Netherlands, where the proportion of households without earners halved, in Italy households in which neither the head of the household nor their partner was employed increased their share in both the total sample and the subset of households whose head was aged 25 to 34. Total unemployment experienced two clear peaks in this country, in 1988 and 1998, but was notably concentrated in the Southern regions, amongst young workers (particularly female), and, more generally, among women (Bertola and Garibaldi 2003). The stability at a low level in women's employment and the slight increase in households without earners could also be partly overestimated by the presence of women with lower qualifications (and possibly of other members of the household) in the informal economy, which accounts for an important share of GDP in Italy and showed an upward trend in recent decades (see Bertola and Garibaldi 2003), and by the rise in time spent in education that tends to delay the entry into the labour market (which would mostly affect the subset of young households).

Table 6.6. Distribution of household types according to earners, Netherlands and Italy

Netherlands	Complete sample			Age of head: 25-34		
	1983	1991	1999	1983	1991	1999
Two earners	18.1	27	43.7	26.5	38.6	54.5
One earner – male	41.7	36.2	26.1	43.7	36.9	23.2
One earner – female	8.8	12.3	15.7	10.7	14.3	16.5
No earners	31.4	24.5	14.5	19.1	10.2	5.8
N	3656	3010	3346	1107	811	754
Italy	Complete sample			Age of head: 25-34		
	1986	1993	2000	1986	1993	2000
Two earners	19.5	18.6	20.2	26.5	24.7	22.8
One earner – male	38	32.7	28.9	46.6	38.1	37.7
One earner – female	9.9	11.1	13.7	10.7	13.8	14.5
No earners	32.6	37.6	37.2	16.2	23.4	25
N	6201	5827	5562	1004	860	615

Once the main trends in women's education and their associated processes have been briefly described, in the following section an account of overall changes in inequality is provided. In addition, a number of simple counterfactuals, a decomposition of the change in inequality across periods, and a Deming-Stephan decomposition of changes in the distribution of household types are conducted.

6.4. Decomposition by Household Types

It was shown in Chapter 5 that in the UK earnings inequality experienced a very remarkable increase during the eighties followed by some stabilisation by the end of the nineties. The picture in Italy is very similar as regards the trend, but with even higher levels of inequality (inequality increased from 0.524 in 1986 to 0.628 in 1993 and remained almost constant in 2000). In the Netherlands, alternatively, the Theil index moderately decreased from 0.499 in the early eighties to 0.459 in 1991 and then more markedly to 0.309 in 1999.[7] In both countries young households seemed to be more equal than the complete sample, but in terms of changes over time they followed very closely the general pattern (Table 6.7).

The between-group component of inequality as measured by the Theil index was systematically larger than the within-group component (i.e. inequality was mostly due to differences in the average earnings of the 48 household types rather than to those types being very heterogeneous in their household earnings). In addition, the change in the share of total inequality accounted for by the between-group component tended to replicate the time-trend in total inequality, thus decreasing when inequality fell (such as in the Netherlands for the complete and the younger samples) and remaining constant when total inequality did not change significantly (in Italy in both the complete and the young samples between 1993 and 2000).

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[7] It has been argued throughout this thesis (and it has been one of the most consistent findings in the literature on income and earnings differences) that inequality in the UK was the greatest among European countries during the eighties and nineties. It could thus appear surprising that the Netherlands and Italy show in this analysis even higher levels of earnings inequality than the UK. The fact that there is a remarkably higher proportion of households without an earner in these two countries (particularly in Italy) together with the computation of the Theil index when zero values are considered, seem to be responsible for this seeming inconsistency with previous evidence.

Table 6.7. Average earnings and earnings inequality (Theil indexes) over time, Netherlands and Italy

Netherlands	Complete sample			Age of head: 25-34		
	1983	1991	1999	1983	1991	1999
Average earnings	29411	35305	45182	36019	43171	51669
Theil	0.499	0.459	0.309	0.307	0.223	0.180
Between group	0.429	0.329	0.194	0.265	0.142	0.091
Within group	0.070	0.130	0.115	0.042	0.081	0.089
N	3656	3010	3346	1107	811	754
Italy	Complete sample			Age of head: 25-34		
	1986	1993	2000	1986	1993	2000
Average earnings	12531	13076	13372	15490	15295	15465
Theil	0.524	0.628	0.627	0.300	0.422	0.424
Between group	0.453	0.549	0.541	0.236	0.348	0.354
Within group	0.071	0.079	0.086	0.064	0.074	0.070
N	6201	5827	5562	1004	860	615

Table 6.8 shows the observed inequality in t and t+1, and seven counterfactuals in which each of the components of the Theil index (the proportion of households, average household earnings and the Theil index of each type) and all their possible combinations adopt their actual t+1 value while keeping everything else constant at its t value. In the Dutch case, in which total earnings inequality decreased during the eighties and particularly the nineties, change in the distribution of household types (i.e. a change in p_{ijkl}) alone would have lowered between-

group inequality,[8] but it is the change in average earnings which acted as the most important equalising force taking the between-group component to its actual decrease. This result is partially explained by the increase in the proportion of dual-earner couples (which, as will be shown later in the chapter, tend to be fairly equal) and the dramatic decrease in households without any earners, together with higher relative earnings gains in households with lower levels of education. This would be consistent with the well-established finding that the Netherlands experienced falling returns to education over time (Gottschalk 1997, Gottschalk and Smeeding 1997, Gottschalk and Joyce 1998, Hartog *et al.* 1993). In line with what was reported in the analysis for the UK, changes in the Theil values accounted for most of the difference in the within-group term –note that letting T_{ijkl} adopt their t+1 value almost reproduces the actual t+1 within-types inequality (entirely in the 1991-1999 analysis). In the final four rows of the table, results from the Mookherjee and Shorrocks decomposition of the change in inequality are reported. According to it, the reduction in total inequality in the Netherlands (which was mostly due to decreasing between-types inequality), was the result of changes in the distribution of households increasing inequality and changes in average earnings across types buffering it. Note, however, that this decomposition does not take into account the indirect effect of changes in p_{ijkl}. This exclusion explains the discrepancy between the direction of the effects of p in the simple and the Mookherjee and Shorrocks decompositions.

The results of both the counterfactuals and the decomposition for Italy show that the increase in total inequality between 1986 and 1993, which were due primarily to rising between-group inequality, cannot be attributed exclusively to either changes in the distribution of household types or to changes in average earnings across these households: both components worked in the direction of increasing inequality. The high and increasing proportion of

[8] The effects of changes in the distribution of household types are explored in detail at the end of this section and shown in Table 6.8.

households without any earnings together with low (although positive) and stable returns to education in that country during the eighties (see Nickell and Bell 1996) can help to explain this finding. The subsequent stabilisation of total inequality between 1993 and 2000 took place as a consequence of changes in p_{ijkl} and in average earnings in each of the household types slightly decreasing inequality on the one hand and changes in group specific Theil values increasing in approximately similar proportions. Although the final result in this second period is that there is hardly any change in earnings inequality as defined in the analysis, it is interesting to note that this stability is due to counteracting forces operating rather than to lack of changes in any of the components of inequality.[9]

Young households display similar patterns –in the results of the simple counterfactuals– to the complete samples in both countries. In the Netherlands, particularly in the first period, changes in the distribution of household types would have decreased the between-group component in 1991 and they were accompanied by the very powerful equalising effect of changes in average earnings across types. In Italy, the increase in between-group inequality in both periods was due fundamentally to changes in both the distribution of types and average earnings across household types. In both countries, changes in the group-specific Theils tend to account for the largest share of the change in the within-group component.

[9] For alternative decompositions (of income rather than earnings) using different household typologies in Italy over approximately the same period, see Brandolini and D'Alessio (2001), and Albertini (2003).

Table 6.8. Decomposing changes in earnings inequality (Theil index), Netherlands and Italy

Netherlands – Complete sample							
		1983-1991			1991-1999		
		Theil	Between-group	Within-group	Theil	Between-group	Within-group
Observed	t	0.499	0.429	0.070	0.459	0.329	0.130
	t+1	0.459	0.329	0.130	0.309	0.194	0.115
Change in :	p_{ijkl}	0.416	0.351	0.065	0.324	0.204	0.120
	$\bar{x}_{ijkl}$	0.184	0.130	0.054	0.179	0.074	0.105
	T_{ijkl}	0.557	0.429	0.128	0.444	0.329	0.115
	$p_{ijkl}\ \bar{x}_{ijkl}$	0.392	0.329	0.063	0.316	0.194	0.122
	$p_{ijkl}\ T_{ijkl}$	0.483	0.351	0.132	0.317	0.204	0.113
	$\bar{x}_{ijkl}\ T_{ijkl}$	0.227	0.130	0.097	0.167	0.074	0.093
	$p_{ijkl}\ \bar{x}_{ijkl}\ T_{ijkl}$	0.459	0.329	0.130	0.309	0.194	0.115
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	-0.040	-0.100	0.060	-0.150	-0.135	-0.015
	p_{ijkl}	0.320	0.296	0.024	0.194	0.172	0.022
	φ_{ijkl}	-0.396	-0.396	-	-0.307	-0.307	-
	γ_{ijkl}	0.035	-	0.035	-0.037	-	-0.037

Italy – Complete sample							
		1986-1993			1993-2000		
		Theil	Between-group	Within-group	Theil	Between-group	Within-group
Observed	t	0.524	0.453	0.071	0.628	0.549	0.079
	t+1	0.628	0.549	0.079	0.627	0.541	0.086
Change in :	p_{ijkl}	0.611	0.538	0.073	0.620	0.540	0.080
	$\bar{x}_{ijkl}$	0.620	0.546	0.074	0.536	0.461	0.075
	T_{ijkl}	0.535	0.453	0.082	0.633	0.549	0.084
	$p_{ijkl}\ \bar{x}_{ijkl}$	0.622	0.549	0.073	0.621	0.541	0.080
	$p_{ijkl}\ T_{ijkl}$	0.618	0.538	0.080	0.626	0.540	0.086
	$\bar{x}_{ijkl}\ T_{ijkl}$	0.630	0.546	0.084	0.540	0.461	0.079
	$p_{ijkl}\ \bar{x}_{ijkl}\ T_{ijkl}$	0.628	0.549	0.079	0.627	0.541	0.086
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	0.104	0.096	0.008	-0.001	-0.008	0.007
	p_{ijkl}	0.014	0.016	-0.002	0.095	0.088	0.007
	φ_{ijkl}	0.080	0.080	-	-0.096	-0.096	-
	γ_{ijkl}	0.010	-	0.010	0	-	0

Netherlands – Age of head: 25-34							
		1983-1991			1991-1999		
		Theil	Between-group	Within-group	Theil	Between-group	Within-group
Observed	t	0.307	0.265	0.042	0.223	0.142	0.081
	t+1	0.223	0.142	0.081	0.180	0.091	0.089
Change in :	p_{ijkl}	0.210	0.168	0.042	0.158	0.090	0.068
	$\bar{x}_{ijkl}$	0.044	0.011	0.033	0.030	-0.036	0.066
	T_{ijkl}	0.359	0.265	0.094	0.224	0.142	0.082
	p_{ijkl} $\bar{x}_{ijkl}$	0.184	0.142	0.042	0.162	0.091	0.071
	p_{ijkl} T_{ijkl}	0.249	0.168	0.081	0.177	0.090	0.087
	$\bar{x}_{ijkl}$ T_{ijkl}	0.090	0.011	0.079	0.033	-0.036	0.069
	p_{ijkl} $\bar{x}_{ijkl}$ T_{ijkl}	0.223	0.142	0.081	0.180	0.091	0.089
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	-0.084	-0.123	0.039	-0.043	-0.051	0.008
	p_{ijkl}	0.223	0.215	0.008	0.158	0.148	0.010
	φ_{ijkl}	-0.338	-0.338	-	-0.199	-0.199	-
	γ_{ijkl}	0.031	-	0.031	-0.002	-	-0.002

Italy – Age of head: 25-34							
		1986-1993			1993-2000		
		Theil	Between-group	Within-group	Theil	Between-group	Within-group
Observed	t	0.300	0.236	0.064	0.422	0.348	0.074
	t+1	0.422	0.348	0.074	0.424	0.354	0.070
Change in :	p_{ijkl}	0.372	0.315	0.057	0.443	0.366	0.077
	$\bar{x}_{ijkl}$	0.352	0.286	0.066	0.396	0.320	0.076
	T_{ijkl}	0.311	0.236	0.075	0.417	0.348	0.069
	p_{ijkl} $\bar{x}_{ijkl}$	0.409	0.348	0.057	0.432	0.354	0.078
	p_{ijkl} T_{ijkl}	0.394	0.315	0.079	0.439	0.366	0.073
	$\bar{x}_{ijkl}$ T_{ijkl}	0.359	0.286	0.073	0.386	0.320	0.066
	p_{ijkl} $\bar{x}_{ijkl}$ T_{ijkl}	0.422	0.348	0.074	0.424	0.354	0.070
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	0.122	0.112	0.010	0.002	0.006	-0.004
	p_{ijkl}	0.008	0.013	-0.005	0.043	0.039	0.004
	φ_{ijkl}	0.099	0.099	-	-0.033	-0.033	-
	γ_{ijkl}	0.015	-	0.015	-0.008	-	-0.008

So far, the effects of changes in the different terms into which the total Theil index is decomposable have been assessed. However, the effects that truly need to be addressed refer to changes in the distribution of women's education over time and in those household formation and labour participation processes that, it has been argued, derive at least in part from it. The combination of changes in women's educational levels and their effects on participation, homogamy, and the distribution of single- and dual-earner households is precisely what shapes the 48 household types that are used throughout the analysis. In Table 6.9, the results of the Deming-Stephan counterfactuals, in which only the distribution of the household types is allowed to change, are reported. In the Netherlands, where total (and between-group) inequality decreased only slightly throughout the eighties and quite markedly in the nineties, the changing distribution of women's education (counterfactual 1) and of its alleged influences (men's education and homogamy in counterfactual 2, and women's participation in the labour force in counterfactual 3, all have clear-cut unequalising effects in the first period (1983-1991). Counterfactual 4, in which men's employment is allowed to take its t+1 value, shows some equalising effect. Alternatively, in the second period (1991-1999), when actual changes in total inequality were observed, changes in women's participation had a notable equalising effect that was however offset to some extent by changes in men's participation. Among the youngest households, women's educational expansion and all the effects associated with it contributed to increase inequality, and only when men's employment was allowed to adopt its real t+1 value, between- and total inequality decreased.

In Italy, where total (and between-group) inequality increased in the first period, the results of the Deming-Stephan decompositions point to a disequalising effect of changing women's education on its own –counterfactual 1– and in its broader sense –including partnership and educational homogamy, as in counterfactual 2, and additionally considering women's participation, as in counterfactual 3. Men's employment

(counterfactual 4) also shows a disequalising (and stronger) effect. In the second period there is not much change in inequality to explain, but the effects of changes in women's education tend to be disequalising too.

Table 6.9. Deming-Stephan decomposition of the changing household distribution's effects on earnings inequality (Theil index), Netherlands and Italy

(a) Netherlands - Complete sample						
Period:	1983-91			1991-1999		
	Theil	Between-group	Within-group	Theil	Between-group	Within-group
Obs. values t	0.499	0.429	0.070	0.459	0.329	0.130
t+1	0.459	0.329	0.130	0.309	0.194	0.115
Change in:						
1. Women's education	0.701	0.637	0.064	0.339	0.220	0.119
2. 1+ men's education	0.701	0.635	0.066	0.348	0.223	0.125
3. 2 + women's labour force participation	0.633	0.566	0.067	0.273	0.154	0.119
4. 3 + men's labour force participation	0.416	0.351	0.065	0.324	0.204	0.120
(b) Italy - Complete sample						
Period:	1986-93			1993-2000		
	Theil	Between-group	Within-group	Theil	Between-group	Within-group
Obs. t	0.524	0.453	0.071	0.628	0.549	0.079
values t+1	0.628	0.549	0.079	0.627	0.541	0.086
Change in:						
1. Women's education	0.586	0.515	0.071	0.668	0.592	0.076
2. 1+ men's education	0.592	0.518	0.074	0.669	0.590	0.079
3. 2 + women's labour force participation	0.596	0.522	0.074	0.637	0.557	0.080
4. 3 + men's labour force participation	0.611	0.538	0.073	0.620	0.540	0.080

(a) Netherlands - Age of head: 25-34						
Period:	1983-91			1991-1999		
	Theil	Between-group	Within-group	Theil	Between-group	Within-group
Obs. t	0.307	0.265	0.042	0.223	0.142	0.081
values t+1	0.223	0.142	0.081	0.180	0.091	0.089
Change in:						
1. Women's education	0.627	0.587	0.040	0.291	0.221	0.070
2. 1+ men's education	0.621	0.581	0.040	0.292	0.221	0.071
3. 2 + women's labour force participation	0.546	0.503	0.043	0.249	0.181	0.068
4. 3 + men's labour force participation	0.210	0.168	0.042	0.158	0.090	0.068
(b) Italy - Age of head: 25-34						
Period:	1986-93			1993-2000		
	Theil	Between-group	Within-group	Theil	Between-group	Within-group
Obs. t	0.300	0.236	0.064	0.422	0.348	0.074
values t+1	0.422	0.348	0.074	0.424	0.354	0.070
Change in:						
1. Women's education	0.451	0.386	0.065	0.757	0.681	0.076
2. 1+ men's education	0.444	0.383	0.061	0.757	0.674	0.083
3. 2 + women's labour force participation	0.437	0.376	0.061	0.750	0.665	0.085
4. 3 + men's labour force participation	0.372	0.315	0.057	0.443	0.366	0.077

Focusing on the complete sample and exclusively on the periods for which clear changes in total inequality are observed, the reasons for the contrasting effects of changing women's education in the two countries (equalising in the Netherlands between 1991 and 1999 and disequalising in Italy between 1986 and 1993) are now addressed. Taking up the argument again about the direct and indirect effects of changes in p_{ijkl} on between-group inequality that was discussed in the previous chapter, Table 6.10 shows a similar illustration of the direct and indirect effects of changes in p_{ijkl} under the second counterfactual in the Deming-Stephan decompositions (allowing men's and women's educational distributions and their association to take their t+1 value), relating to dual-earner couples in the period at stake for each country. The notable equalising impact in the Netherlands is explained by the systematically lower φ_{ijkl} values under the counterfactual (panel C) than the actual 1991 values (panel B) in precisely those types (combinations of men's and women's educational levels in dual-earner couples, in this particular illustration) which experienced significant increases in their share of the total (expressed as upward pointing arrows in panel A). The mechanism up to this point works similarly to the UK (although the differences are much more marked in the Dutch case). The difference between both cases is found when the fourth counterfactual is addressed. In the UK, it was shown that once men's employment was allowed to change, its strong disequalising impact blurred the equality-promoting impact of women's education, and that this explained the total disequalising role played by changes in p_{ijkl}. In the Dutch case, however, even when changes in men's labour force participation are allowed (in counterfactual 4), between-group and total inequality decrease. In this case, consequently, the total effect of changes in p_{ijkl} must necessarily promote equality as shown in Table 6.8. Interestingly, the same example can help to explain the reasons underlying the disequalising impact of changes associated with women's education in Italy between 1986 and 1993. From the comparison

of panels C and B in Table 6.10 it becomes evident that the φ_{ijkl} values when men's and women's education and their association are accounted for are systematically higher than the actual 1986 ones and, moreover, that those inequality-enlarging differences tended to be higher in those household types that became more prevalent over time. In addition, the change in men's employment also contributed to more inequality, with the unequivocal result of changes in p_{ijkl} accounting for a great share of total growth in between-group inequality.

Table 6.10. Direct and indirect effects of changes in p_{ijkl}, Netherlands 1991-1999 and Italy 1986-1993

Panel A: Change, Netherlands 1991-1999 and Italy 1986-1993, in proportion of households where both partners work by educational level of each

Netherlands	Women's education		
Men's education	Low	Medium	High
Low	↓	-	-
Medium	-	↑	↑
High	-	↑	↑

Italy	Women's education		
Men's education	Low	Medium	High
Low	↓	↑	↓
Medium	↓	↑	-
High	↓	-	↑

Panel B: φ_{ijkl} values for households where both partners work, Netherlands 1991 and Italy 1986

Netherlands	Women's education		
Men's education	Low	Medium	High
Low	.31	.50	2.12
Medium	.60	.64	1.42
High	1.68	1.30	1.63

Italy	Women's education		
Men's education	Low	Medium	High
Low	1.10	1.36	1.18
Medium	2.03	2.22	1.76
High	2.46	2.16	3.83

Panel C: φ_{ijkl} values for households where both partners work, second counterfactual

Netherlands	Women's education		
Men's education	Low	Medium	High
Low	.07	.21	1.43
Medium	.29	.32	.90
High	1.09	.81	1.06

Italy	Women's education		
Men's education	Low	Medium	High
Low	1.19	1.46	1.27
Medium	2.17	2.36	1.89
High	2.62	2.30	4.05

6.5. Explaining Within-Group Inequality

In this section, the reasons for changes in within- rather than between-household types inequality are examined. Overall,

within-group inequality (and changes in it) had a limited impact on changes in earnings inequalities across households in both countries. However, it is worth exploring whether any trend follows from women's increased educational attainment. In particular, changes in those household types supposedly favoured by female educational expansion (i.e. female single-earner and dual-earner households) need to be addressed.[10] Firstly, changes in inequality in male and female single-earner households across educational levels are explored. Secondly, dual-earner households are examined with regard to several aspects of inequality in each combination of men's and women's education. Lastly, women's contribution to inequality in dual-earner types is assessed.

Panel A in Table 6.11 shows the Theil values of single-earner households for each year and for each educational level. Both in the Netherlands and in Italy, and for the complete sample, households with only a female earner had, in general, higher levels of inequality than the equivalent male earner households. However, the two countries differ to some extent as regards the relationship between education of the earner and inequality. In the Netherlands, households with only a male earner tended to be more unequal the higher his level of education, whereas households with only a female earner display the reverse pattern, inequality being systematically higher at the lowest educational level. In Italy this relationship is more erratic and only for male earners can it be asserted that they are more unequal when they have university education –although the differences are actually very slight.

With regard to changes over time, inequality moderately increased since the early eighties in the Netherlands in male-earner households (with the exception of highly-educated ones, for which inequality declined slightly from 1991 to 1999). In female-earner households the increase was notable between 1983 and 1991 at all

[10] It is pertinent to recall that whereas in the Netherlands there was a substantial increase in female single-earner and dual-earner households, in Italy hardly any change occurred in this regard during the period examined in this chapter.

educational levels, but during the nineties the levels of within-group inequality tended to remain virtually unchanged. The Italian case presents again less clear a pattern. Inequality over time in male earner households only experienced a very slight increase, and in female earner households it decreased amongst highly-educated women.

With a few exceptions in the case of Italy, young households tend to be more equal than their older counterparts. In the two countries, the fact that female earner households are more unequal is repeated, although the differences are markedly smoother, and the educational gradient is blurred in this young subset of the sample. There was some time trend in the Netherlands towards growing inequality in both male and female single earner households, although the levels tended to remain relatively low – particularly amongst male earners. Inequality in Italian male earner younger households increased between 1986 and 1993 and consistently declined in the later period. Amongst female earners, inequality, which was rather low in 1986 for those with low and intermediate levels of education, had notably increased by 2000; alternatively, households of highly educated female single earners, which were the most unequal in the mid eighties, became more homogeneous and by 2000 their level of inequality was roughly the same as those of their less educated counterparts.

Table 6.11. Explaining changes in within-household type inequality, Netherlands and Italy

Panel A: Theil values in single earner households

Netherlands	Complete sample			Age of head: 25-34		
	Educational level of male earners					
Year	Low	Medium	High	Low	Medium	High
1983	0.060	0.079	0.087	0.045	0.058	0.070
1991	0.132	0.123	0.204	0.214	0.083	0.099
1999	0.136	0.132	0.186	0.113	0.113	0.170
	Educational level of female earners					
Year	Low	Medium	High	Low	Medium	High
1983	0.263	0.182	0.148	0.158	0.100	*
1991	0.446	0.315	0.187	0.132	0.143	0.101
1999	0.405	0.304	0.207	0.280	0.341	0.119

Italy	Complete sample			Age of head: 25-34		
	Educational level of male earners					
Year	Low	Medium	High	Low	Medium	High
1986	0.089	0.077	0.105	0.091	0.065	0.073
1993	0.088	0.107	0.121	0.097	0.101	0.124
2000	0.096	0.124	0.134	0.084	0.089	0.119
	Educational level of female earners					
Year	Low	Medium	High	Low	Medium	High
1986	0.125	0.100	0.185	0.097	0.044	*
1993	0.185	0.117	0.144	0.160	0.137	0.209
2000	0.159	0.133	0.141	0.152	0.159	0.164

* 5 or fewer observations.

Panel B: Theil, standard deviations of men's and women's earnings, and correlations between them

Netherlands – Complete sample												
Men's Education												
Women's Education	Low				Medium				High			
	T	sm	sw	r	T	sm	sw	r	T	Sm	sw	r
Low												
1983	0.067	15378.8	15722.2	-0.08	0.037	24126.8	12286.6	-0.286	0.072	33581.8	11691.2	0.15
1991	0.074	19783.5	14459.9	0.07	0.088	20861.4	20110.4	0.180	0.047	35810.5	19984.1	-0.30
1999	0.049	17200.6	13203.4	-0.11	0.077	22820.3	15885.2	-0.119	0.047	20401.9	20495.5	-0.06
Medium												
1983	0.054	21312.6	161648	-0.05	0.057	25888	16847.2	-0.015	0.042	48330.5	16801.8	-0.10
1991	0.070	17130.4	17270.6	0.024	0.081	23023.8	17415.5	-0.014	0.074	41714.7	16908.6	-0.07
1999	0.081	15092	21658.6	0.103	0.065	22829.6	18091.4	-0.052	0.079	41284.3	21454.9	-0.11
High												
1983	*	*	*	*	*	*	*	*	0.061	29130.1	49612.3	0.36
1991	0.090	41229.1	19740.9	0.373	0.039	23689.2	23767.3	-0.180	0.093	39508.7	23517.9	0.07
1999	0.038	15593.2	21059.2	-0.26	0.066	28342.1	24824.1	-0.090	0.085	39385.5	27057.1	0.09

Italy – Complete sample												
Men's Education												
Women's Education	Low				Medium				High			
	T	sm	sw	r	T	sm	sw	r	T	Sm	sw	r
Low												
1986	0.059	7260.2	8106	0.297	0.040	10020.2	8309.7	0.337	0.041	13218.5	7562.6	0.255
1993	0.076	9607.6	8773.1	0.322	0.072	13563.1	9166.8	0.367	*	*	*	*
2000	0.063	8146.6	8115.6	0.307	0.053	8115.9	8168.2	0.203	*	*	*	*
Medium												
1986	0.066	9635.3	90963	0.426	0.046	10435.6	7715	0.408	0.071	16833.2	10058.6	0.541
1993	0.037	7151.3	8384.2	0.221	0.047	13288.7	8384	0.194	0.059	24331.8	9309.3	0.158
2000	0.038	82865	8252.5	0.129	0.056	12677.4	8824.7	0.309	0.070	20486	8273.8	0.263
High												
1986	0.083	7275	9767.1	0.445	0.024	6894.9	7217.6	-0.010	0.100	35959.2	5415.4	0.077
1993	0.030	11634	2920.8	0.121	0.035	13158.6	9007.7	0.207	0.043	20204.1	9264.5	0.172
2000	0.055	11000	10552.8	0.734	0.041	13305.4	9458.3	0.512	0.087	26975.1	14311.3	0.395

Netherlands – Age of head: 25-34												
Men's Education												
Women's Education	Low				Medium				High			
	T	sm	sw	r	T	sm	sw	r	T	Sm	sw	r
Low												
1983	0.046	8978.7	14679.2	0.267	0.021	12794.9	12095.8	-0.399	*	*	*	*
1991	0.104	14934.3	15732	0.384	0.075	15756.9	23431.2	0.118	*	*	*	*
1999	0.036	8102.7	10100.9	0.503	0.057	14086.7	17815.7	-0.457	*	*	*	*
Medium												
1983	0.042	22348.7	15211.5	-0.13	0.029	14739.2	13754.9	-0.176	0.023	17911.9	15315	0.021
1991	0.056	11596.6	15419.1	0.009	0.051	17785.1	16399.6	-0.191	0.029	17595.1	15001.9	-0.14
1999	0.073	13716.9	19641.9	0.252	0.060	16828.2	17679.4	0.014	0.042	25852.7	20512.5	-0.18
High												
1983	*	*	*	*	*	*	*	*	*	*	*	*
1991	*	*	*	*	0.019	15135.7	16665.6	-0.409	0.064	19720.6	20986.1	0.455
1999	0.040	9948.7	19055.3	-0.44	0.049	23412	19613.4	-0.001	0.084	27288.5	23170	0.254

Italy – Age of head: 25-34												
Men's Education												
Women's	Low				Medium				High			
Education	T	sm	sw	r	T	sm	sw	r	T	Sm	sw	r
Low												
1986	0.064	6160.5	8470	0.242	0.041	7888.6	8409.9	0.161	0.097	14647.7	12707.5	0.814
1993	0.056	7894.1	8898.8	0.085	0.058	8389.1	7234.2	0.447	*	*	*	*
2000	0.040	5362.1	6313	0.335	0.042	5681.3	6598.3	0.268	*	*	*	*
Medium												
1986	0.076	9514	9042.4	0.501	0.037	7316.6	6767.7	0.528	*	*	*	*
1993	0.046	6077	8786.2	0.263	0.048	9861.8	7975.3	0.396	0.034	20386.6	8298	0.194
2000	0.029	5524.8	7709.1	0.047	0.057	9086.9	10432.7	0.375	*	*	*	*
High												
1986	0.160	10053.2	13853	0.703	0.030	7518.4	7229.2	-0.323	*	*	*	*
1993	*	*	*	*	0.080	11019.1	12054.5	-0.235	0.047	9817.1	8108.5	0.509
2000	*	*	*	*	0.023	5155.9	4291.5	0.661	0.072	12569.8	12481.5	0.761

T = Theil value.
sm = standard deviation of men's earnings.
sw = standard deviation of women's earnings.
r = correlation, men's and women's earnings.
* 5 or fewer observations.
* The figures refer to dual-earner households.
** The standard deviations and correlations refer to unadjusted earnings.

The focus now turns to dual-earner households (i.e. those in which there is a partner present in the household and in which both the head and partner are employed). Panel B in Table 6.11 reports the Theil values, standard deviations of men's and women's earnings, and their correlations for all combinations of educational levels of both members of the couple and over time. In both countries inequality in these dual-earner types remained remarkably low (almost always below 0.1) in all possible combinations of educational levels and in all years. Moreover, homogamous couples (at all levels) were not particularly more unequal than the rest, nor did they become systematically more heterogeneous in their household earnings over time. Although in a slightly inconsistent manner across educational combinations, men's earnings tended to show more variation (i.e. higher standard deviations) than women's in the Netherlands –less clearly in Italy, particularly when men's education is the lowest. Amongst Dutch dual-earner couples, higher levels of education of both men and women were generally associated with higher variation in their earnings. In Italy, however, this is only true in the case of men. Clearly, where the two countries differ to a greater extent is in the pattern of correlations in the couple's earnings. In the Netherlands, negatively correlated earnings are the norm rather than the exception. In Italy, although correlations tend to be positive and rather high, homogamous households with medium and high levels of education do not stand out particularly when compared to heterogamous couples. Moreover, even in those combinations of educational levels in which there have been notable increasing correlations (such as in high-high households, in which the correlation changed from 0.08 to 0.39), an increase in inequality does not necessarily follow, nor a level of inequality significantly higher than in other combinations.

The youngest dual-earner households resemble those in the complete sample in their very low levels of inequality. Earnings inequality increased in homogamous couples at the intermediate and high levels –although, again, the levels were never particularly high when compared to other combinations of partners'

educational levels. Furthermore, increasing correlations in those homogamous households in Italy did not find a clear correspondence with higher inequality.

Throughout the thesis it has been argued that dual-earners have the potential to constitute an unequalising force of the household earnings distribution through two main mechanisms: on the one hand, greater educational (and therefore earnings) homogamy would tend to broaden the gap between households at the bottom and at the top of the distribution; on the other hand, women's contribution would become more salient (regardless of its disequalising or equalising impact) to explain total earnings inequality if women's employment rates increased. Women's employment, and particularly dual-earner types of households, actually increased substantially in the Netherlands,[11] but they changed very little in Italy over almost two decades, and unemployment was particularly high among women. Table 6.12 reports the results of a decomposition of inequality in dual-earner households by factor components (Shorrocks 1982) in which the relative contribution of men's and women's earnings can be straightforwardly assessed. Although not as markedly as in the UK, inequality in this household type in the two countries was still mostly driven by men's share, and in the complete sample there was no clear increase in women's contribution over time (actually, there was no change in the Netherlands and even some decrease between 1986 and 1993 in Italy). In the youngest households, however, there is some basis to point towards women as a growing source of inequality: by 2000, women's share accounted for exactly half of total inequality in this household type in Italy, and in the Netherlands their contribution ranged from 42 to 54 per cent over the two decades.

[11] It has been shown that labour force participation increased notably amongst married women in the Netherlands (Hartog *et al.* 1993).

Table 6.12. Men's and women's contributions to household earnings inequality (in percentages) in dual-earner households, Netherlands and Italy

Netherlands – Complete sample		
	Men's contribution	Women's contribution
1983	65.5	34.5
1991	67	33
1999	65.3	34.7
Italy – Complete sample		
	Men's contribution	Women's contribution
1986	57.6	42.4
1993	65.6	34.4
2000	63.8	36.2

Netherlands – Age of head: 25-34		
	Men's contribution	Women's contribution
1983	58.2	41.8
1991	45.8	54.2
1999	52.5	47.5
Italy – Age of head: 25-34		
	Men's contribution	Women's contribution
1986	52.4	47.6
1993	52.2	47.8
2000	50	50

These calculations refer to unadjusted earnings.

The evidence presented in this section, therefore, does not point towards increased women's education (and its accompanying processes) as an inequality-enlarging factor through the within-group component.

6.6. Conclusions

The results from the previous chapter on the UK provided clear evidence of the equalising role of increased women's education in explaining changes in earnings inequality. Most of the unprecedented increase in inequality in that country was fundamentally due to the combination of the changing proportions of men who were working (affecting between-group change) and changes in type-specific inequality (affecting within-group change).

The results for the Netherlands and Italy show interesting differences when compared to the UK, not only because total earnings inequality evolved differently over the period under investigation but, most importantly, because the effects of changes in women's education operated in opposite directions. In the Netherlands –where total inequality decreased significantly between 1991 and 1999–, the fall in between-group inequality seemed to be due to the impact of both changes in the distribution of household types and in average earnings across subgroups. Changes in within-group inequality were wholly explained by changes in group-specific inequality. In Italy, where the total level of earnings inequality increased in the first period, changes in the distribution of household types were to some extent responsible for increased between-group inequality, and changes in within-group inequality were mainly due to changes in type-specific inequality.

However, where the two countries differ to a greater extent is in the role played by (a) changes in women's education and the effects that were associated with them, and (b) changes in men's employment. On the one hand, in the Netherlands, in the period in which inequality experienced a significant decline (1991-1999), the change in women's education (on its own and when considering its effects on educational homogamy and on women's participation) had an equalising role. Alternatively, in the period of increased inequality in Italy (1986-1993), changes in women's education accounted for an important share of the increase in

between-group inequality. The explanation is the same in the two cases (and was already put forward as the main reason for the ameliorating effect of changes in women's education in the UK). Changes in women's education tend to increase the share of households with more educated people (which tend to have above average earnings). This would in principle lead to increased inequality; however, the indirect effect of changes in the distribution of education tends to cancel this out. This takes place by increasing total average earnings throughout the counterfactuals and by subsequently reducing the contribution of households with higher earnings to the total level of inequality.[12] This mechanism works not only in the British and the Dutch cases (where the effect is equality-enhancing), but also in Italy, where the effect is disequalising. The changing contributions of households with above- and below-average earnings to inequality between households were such that a decline in inequality was forced not to happen. The very limited increase in total mean earnings, together with increasing relative gains in households with more educated people, help to explain this pattern.

On the other hand, the effects of changes in men's employment also showed important variation across the three countries. In the UK, changes in men's employment accounted for a great share of the increase in inequality during the eighties. This was also the case in Italy in the period of increased inequality. In the Netherlands, however, changes in men's labour force participation contributed to the decline in total inequality throughout the nineties. The increase in the share of no-earner households in the first two cases and the significant decline in the latter are responsible for these contrasting effects. The following table summarises some of the main coincidences and differences across countries in the effects that have been described.

[12] It could be the case that, in addition, in the Netherlands this effect is accompanied by decreasing returns to education as was suggested above.

Table 6.13. Summary of the main results in Part III

	United Kingdom			Netherlands			Italy		
	1979	1991	2000	1983	1991	1999	1986	1993	2000
% households with an employed woman	52	47	52	26	42	58	29	30	34
% dual-earner households	38	30	32	18	27	44	19.5	19	20
% male-earner households	33	26	20	42	36	26	38	33	29
% female-earner households	13	17	20	9	12	16	10	11	14
% no-earner households	15	27	28	31	24.5	14.5	33	38	37
Average earnings	136	169	232	29411	35305	45182	12531	13076	13372
Total Theil	0.306	0.535	0.567	0.499	0.459	0.309	0.524	0.628	0.627
	Effects on changes in inequality								
	1979-1991		1991-2000	1983-1991		1991-2000	1986-1993		1993-2000
Effect of p	+		+	–		–	+		–
Effect of m	+		–	– –		– –	+		–
Effects of women's education (Counterfactuals 1, 2 and 3)	– – –		– – –	+ + +		– – –	+ + +		+ + +
Effect of men's employment (Counterfactual 4)	+		+	–		–	+		–

The signs + and – refer to disequalising and equalising effects respectively; shadowed areas indicate periods of marked changes in total inequality.

Turning to the within-group component of earnings inequality, the growth in female-only earner households, with levels of inequality generally higher than male-breadwinner households (whose share of the total clearly decreased in the two decades examined), constitute an important source of inequality in the three countries. The effect of dual-earner households on earnings inequality is much more limited: inequality in those household types remained significantly low in the Netherlands and Italy and there was not a clear trend suggesting that homogamous couples at the intermediate and highest levels were more unequal than the rest, nor that they were becoming less equal over time. In the UK, although increasing correlations between the earnings of homogamous couples at the top two levels could suggest increased inequality, the relationship between homogamy, earnings correlations and inequality in dual-earner types of households proved much more complex.

Findings in Chapters 5 and 6 generally reject the suggestion often formulated in the literature that women's growing participation in the labour force together with an increasing tendency for people to match homogamously (particularly at higher educational levels) would lead to higher earnings inequality across households. The growth in women's education, which is considered in this thesis to be their main common cause, does not seem to be unequivocally related to the direction of changes in total inequality. In fact, if a single most important factor of changes in earnings inequality had to be pinpointed, the findings would suggest that men's employment is to blame: in the absence of more spells of significant changes in total inequality to test the consistency of these results, it seems that inequality tends to increase when changes in men's employment (for the abovementioned reasons) have disequalising effects (such as in the UK between 1979 and 1991, and in Italy in the 1986-1993 period); when changes in men's employment, alternatively, are equalising, total inequality tends to behave in a similar manner (in the Netherlands between 1991 and 1999).

A number of possible limitations of the analyses presented in Chapters 5 and 6 are due to the lack of fully comparable data. Despite the LIS efforts to ensure both data quality and comparability across national data sets, there are several aspects which are difficult to adjust ex post, such as the choice of a particular definition of income or other relevant variables, the extent to which information for all or only certain household members is available, etc. Specifically, the use of different educational variables not only across countries but even over time within one country (such as in the Dutch case), forced the use of, admittedly, less refined an indicator of education than ideal. However, broad changes in the distribution of education are believed to have been captured, not only because they roughly match patterns of educational attainment reported in other studies, but also because the LIS itself recently suggested a recoding of the Dutch educational categories which is identical to the one that is used throughout this chapter. The fact that the analyses presented in this and the preceding chapter do not follow the general practice in the literature dealing with earnings inequality (i.e. to exclude zero-earners from the analysis) might appear at first somewhat problematic. From a substantive point of view it is conversely contended that the inclusion of households without earnings provides a more accurate picture of changes in earnings inequality. Any answer to the research question posed in this thesis needs to account for changes in the distribution of household types in terms of who their earners are (if any) in a comprehensive manner. From a technical point of view, however, it must be admitted that the inclusion of a significant proportion of households with zero-earnings might lead to some overestimation of inequality compared to analyses using the conventional procedure. The use of measures of inequality which are aggregative and decomposable but which are not sensitive to calculations with zeroes could test the robustness of the results of Chapters 5 and 6 in further analyses.

APPENDIX 6.1. SENSITIVITY OF THE RESULTS TO THE INCLUSION OF EARNINGS OF OTHER MEMBERS

Table A6.1.1. Presence of other earners in the household, Netherlands, complete sample

Complete Sample	1983	1991	1999
Percentage of households in which `others´ work:			
All	15	8	19
Households in which neither head nor partner work	14	11	10
Male earner households	13	20	18
Female earner households	14	12	15
Dual earner households	21	25	24
Mean earnings coming from `others´:			
All	13257	8769	6137
Households in which neither head nor partner work	21358	17032	16660
Male earner households	10666	8595	6627
Female earner households	13430	11049	5816
Dual earner households	5525	4710	4375
Variance in earnings coming from `others´:			
All	1.71*10^8	1.51*10^8	9.90*10^7
Households in which neither head nor partner work	1.20*10^8	2.55*10^8	2.05*10^8
Male earner households	1.50*10^8	1.35*10^8	1.16*10^8

Female earner households	2.34* 10^8	1.55* 10^8	9.27* 10^7
Dual earner households	9.68* 10^8	7.54* 10^7	5.73* 10^7

Table A6.1.2. Presence of other earners in the household, Italy, complete sample

Complete Sample	1986	1993	2000
Percentage of households in which `others´ work:			
All	21	21	19
Households in which neither head nor partner work	20	24	24
Male earner households	24	22	18
Female earner households	25	22	22
Dual earner households	17	15	12
Mean earnings coming from `others´:			
All	8362	10018	11845
Households in which neither head nor partner work	11661	12922	12754
Male earner households	7097	8019	10483
Female earner households	8232	9594	12904
Dual earner households	5260	5773	10107
Variance in earnings coming from `others´:			
All	6.01*10^7	6.14*10^7	5.25*10^7
Households in which neither head nor partner work	5.30*10^7	5.45*10^7	4.79*10^7
Male earner households	5.64*10^7	5.34*10^7	5.61*10^7
Female earner households	7.15*10^7	7.66*10^7	5.44*10^7
Dual earner households	4.09*10^7	3.52*10^7	4.92*10^7

Table A6.1.3. Presence of other earners in the household, Netherlands, young sample

Age of head: 25-34	1983	1991	1999
Percentage of households in which `others´ work:			
All	8	9	7
Households in which neither head nor partner work	1	0	0
Male earner households	7	6	4
Female earner households	6	5	3
Dual earner households	19	16	10
Mean earnings coming from `others´:			
All	3963	2743	36
Households in which neither head nor partner work	32501	-	-
Male earner households	4465	4074	279
Female earner households	10000	15053	0.1
Dual earner households	560	598	0.1
Variance in earnings coming from `others´:			
All	1.31*10^8	7.75*10^7	59684
Households in which neither head nor partner work	2.78*10^8	-	-
Male earner households	1.56*10^8	1.34*10^8	467528
Female earner households	3.08*10^8	2.86*10^8	9.14*10^6
Dual earner households	1.30*10^7	1.08*10^7	3.85*10^6

Table A6.1.4. Sensitivity of the results to the inclusion of earnings of other members of the household, Italy, young sample

Age of head: 25-34	1986	1993	2000
Percentage of households in which `others´ work:			
All	11	9	4
Households in which neither head nor partner work	5	5	6
Male earner households	12	10	4
Female earner households	16	10	9
Dual earner households	11	10	0
Mean earnings coming from `others´:			
All	2698	5161	16249
Households in which neither head nor partner work	10251	13716	16070
Male earner households	2477	5011	17193
Female earner households	4262	6061	15270
Dual earner households	0.1	784	-
Variance in earnings coming from `others´:			
All	3.45*10^7	6.45*10^7	7.99*10^7
Households in which neither head nor partner work	3.17*10^7	5.28*10^7	1.01*10^8
Male earner households	2.65*10^7	6.75*10^7	1.05*10^8
Female earner households	8.18*10^7	7.51*10^7	4.35*10^7
Dual earner households	1.87*10^6	1.17*10^7	-

Table A6.1.5. Sensitivity of the results to the inclusion of earnings of other members of the household, Netherlands, complete sample

Complete Sample	Definition of Household Earnings					
	1983		1991		1999	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Total average earnings	29411	31225	35305	36808	45182	46273
Total Theil	0.499	0.442	0.459	0.428	0.309	0.294
Households in which neither head nor partner work						
Mean households earnings	0	3017	0	1895	0	1687
Variance	0	7.22*10^7	0	5.68*10^7	0	4.57*10^7
Theil	0	2.091	0	2.634	0	2.672
Male earner households						
Mean households earnings	37951	39275	42798	44447	48186	49316
Variance	3.19*10^8	3.77*10^8	1.10*10^9	1.13*10^9	8.70*10^8	8.80*10^8
Theil	0.097	0.096	0.176	0.172	0.166	0.161
Female earner households						
Mean households earnings	35409	37161	32567	33851	36520	37370
Variance	5.34*10^8	5.45*10^8	6.64*10^8	6.53*10^8	8.49*10^8	8.42*10^8
Theil	0.218	0.203	0.332	0.306	0.279	0.264
Dual earner households						
Mean households earnings	57806	58699	58491	59543	61477	62435
Variance	5.39*10^8	5.34*10^8	7.07*10^8	6.98*10^8	7.40*10^8	7.35*10^8
Theil	0.076	0.073	0.094	0.090	0.090	0.087

Definition of household earnings:
Definition 1 = Earnings from head of the household and partner (if present).
Definition 2 = Earnings from head of the household, partner (if present) and others (if present).

Table A6.1.6. Sensitivity of the results to the inclusion of earnings of other members of the household, Italy complete sample

Complete Sample	Definition of Household Earnings					
	1986		1993		2000	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Total average earnings	12531	14245	13076	15169	13372	15653
Total Theil	0.524	0.441	0.628	0.498	0.627	0.497
Households in which neither head nor partner work						
Mean households earnings	0	2281	0	3068	0	3002
Variance	0	3.18*10^7	0	4.32*10^7	0	4.05*10^7
Theil	0	1.819	0	1.598	0	1.594
Male earner households						
Mean households earnings	15605	17195	17168	18882	17482	19352
Variance	5.68*10^7	7.34*10^7	8.66*10^7	1.07*10^8	1.06*10^8	1.28*10^8
Theil	0.106	0.112	0.128	0.131	0.141	0.142
Female earner households						
Mean households earnings	13797	15795	15132	17205	15361	18168
Variance	6.11*10^7	8.60*10^7	8.30*10^7	1.04*10^8	8.62*10^7	1.12*10^8
Theil	0.153	0.164	0.178	0.174	0.172	0.159
Dual earner households						
Mean households earnings	26836	27698	31061	31859	30800	31981
Variance	8.94*10^7	9.35*10^7	1.44*10^8	1.43*10^8	1.60*10^8	1.67*10^8
Theil	0.061	0.060	0.073	0.070	0.078	0.076

Definition of household earnings:
Definition 1 = Earnings from head of the household and partner (if present).
Definition 2 = Earnings from head of the household, partner (if present) and others (if present).

Table A6.1.7. Sensitivity of the results to the inclusion of earnings of other members of the household, Netherlands, young sample

Age of head: 25-34	Definition of Household Earnings					
	1983		1991		1999	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Total average earnings	36019	36312	43171	43401	51669	51671
Total Theil	0.307	0.305	0.223	0.223	0.180	0.180
Households in which neither head nor partner work						
Mean households earnings	0	462	0	-	0	-
Variance	0	1.75*10^7	0	-	0	-
Theil	0	4.336	0	-	0	-
Male earner households						
Mean households earnings	35570	35847	39601	39832	44435	44445
Variance	1.88*10^8	1.97*10^8	5.37*10^8	5.49*10^8	6.09*10^8	6.08*10^8
Theil	0.068	0.070	0.131	0.133	0.143	0.142
Female earner households						
Mean households earnings	38908	39496	39811	40590	45524	45524
Variance	3.48*10^8	3.72*10^8	3.27*10^8	3.27*10^8	1.23*10^9	1.23*10^9
Theil	0.123	0.127	0.124	0.120	0.222	0.222
Dual earner households						
Mean households earnings	61525	61604	59274	59360	62134	62134
Variance	3.02*10^8	3.03*10^8	4.42*10^8	4.42*10^8	5.36*10^8	5.36*10^8
Theil	0.040	0.040	0.065	0.065	0.072	0.072

Definition of household earnings:
Definition 1 = Earnings from head of the household and partner (if present).
Definition 2 = Earnings from head of the household, partner (if present) and others (if present).

Table A6.1.8. Sensitivity of the results to the inclusion of earnings of other members of the household, Italy, young sample

Age of head: 25-34	Definition of Household Earnings					
	1986		1993		2000	
	Def. 1	Def. 2	Def. 1	Def. 2	Def. 1	Def. 2
Total average earnings	15490	15772	15295	15721	15465	16178
Total Theil	0.300	0.291	0.423	0.408	0.424	0.407
Households in which neither head nor partner work						
Mean households earnings	0	503	0	614	0	939
Variance	0	6306023	0	1.02*10^7	0	1.96*10^7
Theil	0	3.162	0	3.268	0	2.994
Male earner households						
Mean households earnings	15234	15509	15199	15672	16467	17208
Variance	4.22*10^7	4.46*10^7	5.61*10^7	6.32*10^7	5.34*10^7	7.73*10^7
Theil	0.094	0.095	0.121	0.123	0.097	0.115
Female earner households						
Mean households earnings	13619	14296	14738	15349	16522	17895
Variance	4.17*10^7	5.48*10^7	7.53*10^7	8.89*10^7	9.25*10^7	1.19*10^8
Theil	0.118	0.134	0.169	0.182	0.181	0.185
Dual earner households						
Mean households earnings	26184	26184	30260	30330	30143	30143
Variance	9.84*10^7	9.84*10^7	1.05*10^8	1.05*10^8	1.05*10^8	1.05*10^8
Theil	0.069	0.069	0.059	0.059	0.057	0.057

Definition of household earnings:
Definition 1 = Earnings from head of the household and partner (if present).
Definition 2 = Earnings from head of the household, partner (if present) and others (if present).

APPENDIX 6.2. EQUIVALENCE SCALE SENSITIVITY: REPLICATION OF THE MAIN ANALYSIS USING OECD EQUIVALENCE SCALE

Similarly to the exercise undertaken for the UK in Chapter 5, in this section, the main analysis for Italy is replicated using the modified OECD scale to adjust household earnings. This factor assigns a weight of 1 to the first adult in the household, 0.5 to each additional adult and 0.3 to each child (under 15). Average earnings are slightly lower when this equivalence factor is used, total inequality as measured by the Theil index is only marginally higher, and it follows the same trend over time (Table A6.2.1). Both the simple counterfactuals and the Shorrocks decompositions (Table A6.2.2) show very similar results, and the Deming-Stephan decompositions are virtually identical (Table A6.2.3). It can now be safely argued that the choice of either equivalising factor does not challenge any of the substantive results.

Table A6.2.1. Average earnings and earnings inequality (Theil indexes) over time, Italy

Italy	Complete sample			Age of head: 25-34		
	1986	1993	2000	1986	1993	2000
Average earnings	11329.5	11786.1	12153.8	14763.2	14568	14792.8
Theil	0.536	0.640	0.637	0.303	0.427	0.428
Bet-gr	0.457	0.554	0.545	0.236	0.349	0.354
Wit-gr	0.079	0.086	0.092	0.067	0.078	0.074
N	6201	5827	5562	1004	860	615

Table A6.2.2. Decomposing changes in earnings inequality (Theil index), Italy

Italy – Complete sample							
Period:		1986-1993			1993-2000		
Observed	t	0.536	0.457	0.079	0.640	0.554	0.086
	t+1	0.640	0.554	0.086	0.637	0.545	0.092
Change in :	p_{ijkl}	0.623	0.543	0.080	0.630	0.544	0.086
	$\overline{x}_{ijkl}$	0.626	0.544	0.082	0.538	0.457	0.081
	T_{ijkl}	0.545	0.457	0.088	0.645	0.554	0.091
	p_{ijkl} $\overline{x}_{ijkl}$	0.633	0.554	0.079	0.632	0.545	0.087
	p_{ijkl} T_{ijkl}	0.630	0.543	0.087	0.636	0.544	0.092
	$\overline{x}_{ijkl}$ T_{ijkl}	0.634	0.544	0.090	0.542	0.457	0.085
	p_{ijkl} $\overline{x}_{ijkl}$ T_{ijkl}	0.640	0.554	0.086	0.637	0.545	0.092
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	0.104	0.097	0.007	-0.003	-0.009	0.006
	p_{ijkl}	0.020	0.023	-0.003	0.104	0.097	0.007
	φ_{ijkl}	0.074	0.074	-	-0.106	-0.106	-
	γ_{ijkl}	0.010	-	0.010	-0.001	-	-0.001

Italy – Age of head: 25-34							
Period:		1986-1993			1993-2000		
Observed	t	0.303	0.236	0.067	0.427	0.349	0.078
	t+1	0.427	0.349	0.078	0.428	0.354	0.074
Change in :	p_{ijkl}	0.377	0.317	0.060	0.448	0.367	0.081
	$\bar{x}_{ijkl}$	0.351	0.281	0.070	0.398	0.318	0.080
	T_{ijkl}	0.315	0.236	0.079	0.421	0.349	0.072
	$p_{ijkl}\ \bar{x}_{ijkl}$	0.408	0.349	0.059	0.437	0.354	0.083
	$p_{ijkl}\ T_{ijkl}$	0.401	0.317	0.084	0.444	0.367	0.077
	$\bar{x}_{ijkl}\ T_{ijkl}$	0.357	0.281	0.076	0.387	0.318	0.069
	$p_{ijkl}\ \bar{x}_{ijkl}\ T_{ijkl}$	0.427	0.349	0.078	0.428	0.354	0.074
Mookherjee and Shorrocks effect of changing	$\Delta(t,t+1)$	0.124	0.113	0.011	0.001	0.005	-0.004
	p_{ijkl}	0.012	0.017	-0.005	0.047	0.042	0.005
	φ_{ijkl}	0.096	0.096	-	-0.037	-0.037	-
	γ_{ijkl}	0.016	-	0.016	-0.009	-	-0.009

Table A6.2.3. Deming-Stephan decomposition of the changing household distribution's effects on earnings inequality (Theil index), Italy

(b) Italy - Complete sample						
Period:	1986-1993			1993-2000		
	Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Observed t	0.536	0.457	0.079	0.640	0.554	0.086
values t+1	0.640	0.554	0.086	0.637	0.545	0.092
Counterfactuals						
Cf 1	0.598	0.519	0.079	0.678	0.596	0.082
Cf 2	0.604	0.523	0.081	0.679	0.594	0.085
Cf 3	0.607	0.526	0.081	0.647	0.561	0.086
Cf 4	0.623	0.543	0.080	0.630	0.544	0.086
(b) Italy – Age of head: 25-34						
Period:	1986-1993			1993-2000		
	Theil	Bet-gr	Wit-gr	Theil	Bet-gr	Wit-gr
Observed t	0.303	0.236	0.067	0.427	0.349	0.078
values t+1	0.427	0.349	0.078	0.428	0.354	0.074
Counterfactuals						
Cf 1	0.451	0.386	0.065	0.757	0.681	0.076
Cf 2	0.444	0.383	0.061	0.757	0.674	0.083
Cf 3	0.437	0.376	0.061	0.750	0.665	0.085
Cf 4	0.377	0.317	0.060	0.448	0.367	0.081

PART IV

CONCLUSIONS

CHAPTER 7. CONCLUSIONS

Sociology of stratification has developed extensive theoretical and empirical work on the distribution of resources attained in the labour market, yet, in comparison, the explanation of strictly monetary resources has been surprisingly under-researched until recently. This study has taken advantage of the upsurge in interest in this field that has occurred coinciding with periods of marked increases in income inequality in several advanced societies (Morris and Western 1999), and has explored the effects of one of the factors that are expected to have contributed to change the distribution of resources between households, namely the educational expansion of women. Specifically, the objective of this thesis has been to explore the processes by which increased educational attainment of women in recent decades might have affected changes in the distribution of earnings among households –how this effect has operated–, and to quantify their relative contributions –the extent to which they help to explain changes in inequality.

The argument of the thesis could be put in a nutshell as follows. Women's education, at the micro level, is empirically observed to be associated with a strong attachment to the labour force, lower propensities to establish a couple and, when so doing, a high probability of finding a partner with similar educational levels. To the extent that these relationships generally hold, increased women's educational attainment in recent decades might be expected, on the one hand, to have intensified the presence of highly-educated women –showing high earnings potential– in paid

work; on the other hand, changes in the nature of households are thought to have taken place, with an increase in the proportion of single-adult households and in the degree of educational homogamy –and hence in the correlation of partners' earnings. It has been argued that these changes are all likely to have implications for the level of inequality between households, an outcome at the macro level, and changes in it. In this thesis, a comprehensive account of the different aspects of the so-called 'revolution' in women's behaviour (Goldin 2005, 2006), specifically increased labour supply and greater variation in the types of families that are formed, has been provided. In addition, the extent to which they are led by what is conceived to be one of its driving forces, namely educational expansion, is assessed. Part I of the thesis presented the research question, discussed the hypotheses, data, methods, and selection of cases, and reviewed the main theoretical and empirical debates relevant to this contribution. In Part II the extent to which women's education correlates with higher earnings levels and with more 'profitable' household structures was explored. Part III quantified the effect of increased women's educational attainment on changes in the distribution of household earnings.

In these closing pages, the main contributions of the thesis, its limitations and implications are summarised in two different sections. In the first one, the need to simultaneously model the generation of earnings levels of members of the household and the formation of households is justified, and the main results of these analyses are interpreted as having implications for changes in the distribution of household earnings over time. The second and final section of this chapter puts the emphasis on the explanation of the advantages of the methods applied in the decomposition of changes in inequality, in two senses: relative to previous –often incomplete– assessments of the effects of women's earnings on inequality, on the one hand, and, more generally, to the implementation of counterfactual analyses, on the other. The findings in this part are summarised, and their implications discussed.

7.1. The Generation of Household Earnings and Implications for Earnings Inequality

Part II of the thesis explored the effect of women's education on some of the processes underlying the generation of household earnings. These processes included not only the extent to which positive returns to education exist, but also whether higher educational attainment tends to be associated with more 'advantageous' household structures, which correlate positively with household earnings. Throughout the thesis, it has been argued that these two factors constitute a good basis on which the distribution of earnings between households can be examined since the position that a particular family occupies in the distribution can be considered to depend on the amount of economic resources that members in the household bring in to the unit –i.e. individual earnings– and on the nature of that unit –its composition. There is a long tradition within the human capital approach of analysing the effects of schooling and experience on individual earnings (starting with the influential work of Mincer 1974 or Becker 1975), most often focused on men's earnings at prime working age. Studies addressing the generation of household (rather than individual) earnings are much more infrequent. This is the case because this explanation would require not only modelling the processes generating household earnings, but also those generating households, as Gottschalk (1997) and Gottschalk and Smeeding (1997) have pointed out. One of the contributions of this thesis is, therefore, the adoption of the household as the unit of analysis and thus the inclusion of demographic aspects in the study of a topic that has traditionally been focused exclusively on the explanation of the generation of economic resources.

Rather than estimating returns to education as a function of a set of individual and household characteristics, in this study earnings levels and the tendency for women to create types of households which are likely to generate those earnings levels, have been estimated simultaneously. The justification for the

adoption of this approach was twofold. The main factors involved in the generation of women's earnings (women's work, partnership and fertility) are all choice variables, and it is unlikely that they are uncorrelated with some of the unobserved factors that might affect their earnings –i.e. the effect of both types of events is not exogenous to individual and household earnings. Similarly, a selection problem as regards women's earnings arises. Not only are women with earnings a selected –non-random– sample of all women (Heckman 1979), but, to the extent that women's participation in the labour market is not independent of their family formation behaviour, women might more generally self-select into certain types of households as regards whether they work, their marital status, and whether they have any children. This multiple selection is taken into account by applying a two-stage estimation method. In the first step, selection terms were estimated as combined outcomes in the family formation and labour participation processes, applying Lee's procedure (1983) for selection variables with more than two unordered categories. These terms were then included, in the second step, as additional covariates in the earnings equations.

The findings generally supported the expectations that there are positive returns to education for women and their partners in the three countries that were analysed. Net of the effect of self-selecting into particular household types, education was generally associated with higher earnings levels, and some evidence of the existence of a positive correlation between the earnings of members of the couple was found. This result would be suggesting, *ceteris paribus*, that the more endowed households are in terms of human capital, the more likely they are to be located high up in the distribution of household earnings. In addition, education was found to have a positive effect on belonging to household structures associated with higher earnings potential. On the one hand, women with high levels of education show a more stable commitment to paid labour than those with a lower level, as they clearly tend to remain longer in employment. They also seem to benefit from higher earnings from their current or potential

partners since some degree of assortative mating exists. These results could be summarised by saying that education is positively associated with household structures that are income-generating. On the other hand, households with a highly-educated woman tend to be more capable of buffering income losses due to an exit from the labour market –they tend to be more likely to re-enter the labour force after a break– and to couple dissolution. These results could be taken to imply that, as the share of women with higher levels of education increased in the population, the differences in terms of earnings between households with high- and low-educated individuals could have increased. These results can, however, only prove that the beneficial effect of education was at work during the nineties –the period that the data cover. It must therefore be noted that these distributional consequences should only be observed had the sign and strength of the relationship between education, on the one hand, and returns and belonging to advantageous households, on the other, remained constant or increased over time. Despite the caution with which these results need to be interpreted, this approach is believed to constitute a useful attempt to explore some of the micro mechanisms –or generative processes in the rational action theory framework (Goldthorpe 1998, 2000)– underlying earnings inequality between households and changes in inequality over time.

7.2. Increased Education and Earnings Inequality between Households

Part III of the thesis presented an analysis of the links between changes in the marginal distribution of women's –in particular, but also men's– education and changes in earnings inequality in settings with varying combinations as regards the extent of educational expansion and trends in earnings differences between households. This relationship, it was argued, takes place through three main channels that are all –at least in part– attributed to changes in the distribution of women's education: the increase in

single-earner households, in educational homogamy, particularly at the highest level, and in women's participation in paid work.

Most explanations of increased earnings and income inequality from the supply side were traditionally restricted to the study of changes in men's earnings. The contribution of increased women's labour supply to inequality has often been limited to wives. The potential 'perverse' result that greater proportions of women with high earnings potential, together with rising assortative mating, make the distribution of household income more unequal, inspired new lines of research trying to assess the effects of the varying involvement in paid work of women at different parts of the distribution. According to the available empirical evidence so far, the alleged polarising influence of assortative mating has not received much support; most often wives' earnings have actually been found to have a positive, i.e. equalising, effect on the distribution of earnings between couples (Treas 1987, Cancian and Schoeni 1998) and between all households (Cancian and Reed 1999, Reed and Cancian 2001). In this thesis, it has been argued that this exclusive focus on wives is insufficient, and a framework that allows an assessment of the impact of the earnings of all women and men –regardless of their marital status and whether or not they have earnings–, on the distribution of earnings between all households, has been defended. On the one hand, the inclusion of unmarried women is justified not only in terms of their constituting greater shares of the population, but also because they might show very distinctive labour behaviour when compared with wives or might be selected in certain characteristics that correlate with earnings. On the other hand, incorporating non-earners in the picture could be seen as bringing about either higher inequality levels than conventional approaches or a different description of trends. This would challenge the strict comparability of this study with other pieces of research in the field, but it has been argued that neglecting non-earners would prevent an accurate assessment of the effects that have been described and would conceal the actual extent to which inequality exists.

The methods used in this thesis improve the empirical tests that have been employed up until this time, and allow a more accurate assessment of the effects of women's earnings on the distribution of total household earnings by including all women – rather than only wives– in the picture, broadening the scope of the analysis to all households –not only earners– and carrying out a set of counterfactual analyses that do not need to sacrifice theoretical soundness. Firstly, a subgroup partition that incorporates couples, as well as uncoupled men and women, and allows to identify, for each member of the household, their educational level and whether or not they have any earnings, is devised. This categorisation of households shows a sufficient degree of detail to capture the main effects of women's education that were hypothesised, and is comprehensive enough to draw conclusions for the whole distribution. Secondly, the choice of a synthetic population-weighted additive decomposable inequality measure such as the Theil index permits an accurate identification of the effects of changing education –and the three abovementioned mechanisms associated with it– on different components of inequality. In addition, the use of the Deming-Stephan algorithm in the counterfactual exercises enables a more appropriate handling of changes in the marginal distribution of the variables of interest and in their patterns of associations than conventional approaches. In particular, the contribution of changes in women's levels of education to changes in inequality net of changes in other variables and when accounting for their effects on women's increased labour supply and on assortative mating could be assessed. This clearly overcomes some of the difficulties in earlier counterfactual analyses in which the number of variables involved had to remain fairly limited (Mookherjee and Shorrocks 1982, Jenkins 1995) or changes in the distribution of one variable were assumed not to have any effect on the rest (Cowell and Jenkins 1995, Reed and Cancian 2001). This would certainly be implausible in the case of education.

The decomposition and counterfactual exercises have shown that the increase in women's education has helped to equalise the

distribution of earnings between households in settings in which educational expansion and the narrowing of the gender gap in education were different in nature and size, and in which total inequality developed in opposing directions. In both the UK and the Netherlands, changes in the marginal distribution of women's education, in assortative mating and in women's involvement in paid work, all had an equalising effect on the distribution of household earnings. Even if the proportions of households with educated people, who happen to have earnings above the average, increased (and this should, in principle, enhance inequality), as these changes induced a rise in total mean earnings and, consequently, a decline in the contribution of these households to total inequality, this effect tended to vanish. In Italy, where women's employment hardly experienced any change, the proportion of households without earners was remarkably high, and average earnings were surprisingly constant throughout the period, changes in women's education accounted for an important share of the increase in between-group inequality –which drove most of the total change. In this case, the indirect effect of changes in the proportions of households that takes place by increasing total average earnings was not enough to cancel out the direct effect that increased proportions of highly-educated women had. Further analyses could systematically assess the strength of the direct and indirect effects on all household types, but the fact that in Italy increased education has not entailed an overwhelming presence of women in the labour force –hence not being able to contribute to a rise in total earnings– could constitute a tentative explanation for this result.

In the three cases, changes in the between-group component of inequality were found to be mainly caused by the changing proportion of households without any earner –which is, in the counterfactuals, not attributable to changes in women's education, but rather to changes in men's employment. In the UK and Italy, changes in men's employment and, in particular, the dramatic growth of households without earnings, accounted for a large share of increased between-types inequality. In the Netherlands,

where the share of these household types almost halved, changes in men's employment contributed to the very notable decline in this component of inequality that was observed in the nineties. This finding is in line, for instance, with the disequalising impact of the rise in the number of non-working families reported, for the UK, by Atkinson (1993). This result does not imply that the conventional approach to the explanation of total inequality, that focuses on male earnings only, is enough. Women's participation and marriage patterns were actually found to have an effect, often counteracting the effects of men's employment on inequality.

The analysis of the within-group component of inequality has shown that the growth of female single-earner households, which tend to be more unequally distributed, in the three countries, than their male counterparts, has contributed to some extent to the increase in inequality. However, since most of the change in total inequality was predominantly due to changes between types, the relative contribution of this aspect to total inequality was very limited. This unequalising effect does not hold amongst dual-earner households. Earnings differences within these types were remarkably low in Italy and the Netherlands and, not only households whose members had high levels of education were not more unequal than the rest, but they were not becoming more unequal over time either. In the UK, although the correlations between the earnings of homogamous couples at the medium and high levels strengthened, these did not mechanically translate into greater earnings dispersion. This suggests that the relationship between educational homogamy, the correlations between the earnings of members of the couple, and inequality in dual-earner households is far from being simple. Aspects of education –and educational homogamy– correlated with earnings that might not be fully captured by levels are likely to be mediating these links, but the absence of detailed information in the data about the precise mechanisms by which individuals form couples impedes further analyses.

The reasons for differences in the results across the three countries considered in the thesis could be examined in more

detail. The aim of extending the analyses to more than a single country was to test the robustness of the results under settings with varying degrees of women's educational expansion and with different patterns in household earnings inequality over time, but not to disentangle the full set of country-specific conditions under which inequality differed across the three countries.

*** *** ***

Overall, the results shown in this thesis therefore suggest that there are neither consistent grounds for pointing to a clear disequalising role of increased education –on its own, and when considering its effects on rising participation in the labour market, increases in single-adult households and marital sorting–, nor for claiming that women's earnings have become more salient to explain changes in earnings inequalities between households. The sometimes claimed trade-off between women's participation in paid work and equality across families (Blossfeld and Drobnič 2001) has not been supported by the results. On the contrary, settings in which the male-breadwinner model is still predominant seem to be associated with greater potential for income inequality. Rising educational homogamy has been increasingly regarded with concern as an additional potential source of inequality across households, but the results shown in this thesis suggest that it does not seem to be associated with more closure in terms of the life-chances and opportunities that it gives access to, and they do not seem to clearly involve the distributional consequences that were suspected. Some accumulation of advantages and disadvantages across households does take place, but there are counteracting forces that prevent them from translating into changes in the distribution of valuable resources such as household earnings.

The evidence provided in these pages does not of course totally rule out the possibility that effects of increased homogamy do come about when a more comprehensive definition of income or additional income sources are considered. However, it has been shown that including income from self-employment does not

generally challenge the substantive results, nor does the inclusion of earnings from other adults in the household. The analysis carried out in this thesis could be extended by considering additional income components for each member of the household but, apart from adding a degree of technical complexity into the analyses, this would require a significantly more demanding modelling of the processes generating household income, as Gottschalk (1997) has argued.

It could also be the case that increased homogamy does not show any distinctive effect on the distribution of financial assets, but it could nonetheless have some consequences on differences in non-economic aspects (Kalmijn 1994). However, education is (still) the best predictor of earnings, and the association between couples' education and other variables such as class position or educational opportunities of their offspring is expected to be significantly weaker. It is therefore not straightforward to think of alternative reasons as to why the relationship between increased educational homogamy and the distribution of non-financial resources should then hold.

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