The Material Returns to Partnership: The Effects of Educational Matching on Labour Market Outcomes and Gender Equality

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ABSTRACT

Partnerships continue to be determined by mutual considerations of the economic value of prospective partners. Whereas in the past this worked through property or income, the basis for assessment is now given by several facets of an individual's human capital, some of which are observed only by marriage candidates but not by social researchers. This gives an indication not only of the suitability of a prospective partner but also of that person's employment prospects and future labour market success. Using the first nine waves of the British Household Panel Survey (1991-1999), we employ a two-stage estimation procedure to identify these uncertificated components of human capital first, and then test whether or not they affect labour market outcomes. We find that wages and occupational prestige scores are significantly affected by such unobservables, and that their effects have increasingly become more symmetrical by gender over time. They are also systematically correlated to partners' labour market outcomes in a way that may favour women more than men.

Polly: *"I did not marry him (as 'tis the fashion) coolly and deliberately for honour and money. But, I love him."*
Mrs Peachum: *"Love him! Worse and worse! I thought the girl had been better bred."*
John Gay: The Beggar's Opera

Nuddu ti pigghia si non t'arrassumigghia (None will marry you if you do not look alike)
Old Sicilian proverb

INTRODUCTION

The interplay between the family and the labour market has long been examined by social analysts. Prominent have been studies of the impact of family circumstances on (especially female) labour supply (England and Farkas, 1986; Spain and Bianchi, 1996; Goldin, 1997; Hakim, 2000; Blossfeld and Drobnič, 2001), and, in return, of employment on the distribution of family welfare (Eckenrode and Gore, 1990; Becker, 1991; Blumberg, 1991; Erikson and Goldthorpe, 1992; Dex; 1999). With the decline in the perception of the family as a unit with a single decision-maker, these lines of study are increasingly seen as two sides of the same coin. What each spouse or partner puts into and obtains from the labour market affects not only the family as a whole but also both partners as individuals. The concern of this paper is with these material effects of partnership decisions and their implications for labour market success.

People come together in partnerships,[1] whether in marriage or otherwise, for a range of psychic, sexual, familial and material benefits. The last of these has been the basis of a substantial literature within economics (Becker, 1991; Bergstrom, 1996; Pencavel, 1998). Reviewing contributions in this area, Weiss (1997) identifies a number of economic reasons for marriage, such as the flexibility it gives to the timing of labour-market participation or the

[1] Throughout the paper, this term is used to cover both marriage and cohabitation, though specific terms such as "marriage market" and "marriage premium" are used where appropriate. Similarly, the terms "husband/wife" and "partner" are synonymous.

sharing of costs such as housing. The sociological contribution has tended to focus on specific factors like social mobility through marriage (Goldthorpe, Llewellyn, and Payne, 1987), the domestic division of labour (Blumberg, 1991; Greenstein, 1996), control over financial resources (Pahl, 1989; Blumberg, 1991), or family responsibilities and labour-market participation (Spain and Bianchi, 1996; Blossfeld and Drobnič, 2001).

Despite this research effort, the attempt to pin down the value of partnership is highly problematic. Four specific issues inform the research reported below. First, because factors that directly influence the partnership decision are not readily measurable, it is often assumed that actual observable outcomes (such as joint income) reflect considerations made during the time of partnership formation (Benham, 1974). Yet, we cannot say that partnership decisions actually derive from such considerations. Second, most existing studies assume that the unobserved traits individuals bring to the marriage market are uncorrelated with observed characteristics that influence labour market success, such as schooling attainment (Taylor and Glenn, 1976; Keeley, 1977). This is arguably not the case. Third, if the attributes of a prospective partner feed into both the partnership decision and into labour market outcomes, it is difficult to explain the linking mechanism. Such problems can be seen in respect of concerns to identify the cause of the marriage premium (Gray, 1997). Fourth, despite growing interest in the relative human capital of partners, the emphasis has been excessively on male outcomes (e.g., Lam and Schoeni, 1994). Yet, when we consider the family, the main interest lies precisely in the relationship between male and female outcomes.

Our argument is that joint human capital of partners is critical to an understanding of the partnership. We assume that people seek partners with a relatively high level of education, as this will maximise joint lifetime income, even in cases where there is no income sharing (Burdett and

Coles, 1997). We test the potential effect of anticipation of such rewards by looking at the impact of the educational matching process on the labour market outcomes of each partner. If any observed or unobserved element of the matching is related to higher labour market payoffs for either partner then we can infer that the prospective return was a factor in the partnership decision. Although the outcome is used to tell us about the decision, it is the relative human capital position that enables us to do this.

Further, the human capital of each partner might contribute to the labour market productivity of the other, and this in turn might reinforce the total financial value of the partnership. We can measure this simply through inclusion of partner's education on own labour market outcomes (Benham, 1974). However, our concern is with human capital in general, not education specifically. The overall impact is of the ability of a highly educated partner to make the household organisation more efficient and the other partner more ambitious and productive, to provide effective career guidance, and perhaps even to act as a role model. These effects of cultural and social capital (Bourdieu, 1976; Coleman, 1989) derive from human capital broadly defined, not just from education.[2] Several studies have now identified such intra-couple effects (e.g., Bernasco, de Graaf, and Ultee, 1998; Brynin and Schupp, 2000; Juhn and Murphy, 1997), but they rely on the directly measured educational or wage component. We in addition focus on the broader, generally unobservable aspects of human capital.

Our analysis, therefore, treats returns to partnership in the same terms as the returns to labour. This works through human capital, which is both the glue that binds people of similar

[2] Human capital here refers to general knowledge and productive capacities embodied in people, with a potential value as a source of current and future flows of output, income and wellbeing (Becker, 1975). This encompasses the notion of cultural capital, which includes a range of specific values and behaviours—such as cultural literacy, political attitudes, child-rearing values and styles of speech (Kalmijn (1994)—that are also likely to determine current and future levels of income and wellbeing.

background and the basis of improved lifetime earnings of both partners. In a two-step approach, we use "residual" measures obtained from first-stage equations testing the closeness of partners' education to explain the labour market outcomes of each partner in the second step. In doing so we aim to achieve two main objectives. The "residual" information from the first-step equations provides us with a measure of the reciprocal value added through the relationship. This is achieved by examining each partner's labour market outcomes. The same information can also be used to assess the reciprocal effects of each partner's human capital (and not just education) on own labour market outcomes more fully than has previously been possible.

THEORETICAL FRAMEWORK

The Material Basis to Partnership: Educational Homogamy and Human Capital

While either wealth or current income might still be an important basis for partnership decisions[3], given that partnerships tend to occur before careers are well established, prospective income is what counts in most cases. The latter is likely to be embedded in education, plus other, less visible aspects of human capital (Becker, 1975). The joint welfare of couples, therefore, depends on the educational achievement of *both* partners. As a corollary, mutual assessment of the educational value of prospective partners is likely to influence the partnership decision. A number of commentators have focussed attention on an increasingly individualistic basis to partnership decisions through which "people make rational calculations about the costs and benefits of marrying the individuals they love" (Cherlin, 2000: 126). Yet it is difficult for the

[3] Wealth, of course, has been vital to marriage decisions for much of history, the more so the higher up the social scale (Goode, 1964). While Stone (1977) argues that, especially in England from the seventeenth century, there was a cultural shift to "affective individualism" as the basis for marriage decisions, this does not mean that wealth became unimportant. Perhaps individual calculation of gain replaced family calculation (Macfarlane, 1978).

analyst to assess the prospective material value of a partner (Udry, 1974; South, 1992). Where these economic values have been the subject of study, the focus has been on the desirability of partnership in general rather than on the specific characteristics of a partner (e.g., Oppenheimer, 1988 and 2000; Lichter, LeClere, and McLaughlin, 1991; Blossfeld, 1995).

Our argument is that the evaluation process works by means of educational matching. Individuals assess the value of prospective partners through knowledge of their educational achievement and evaluation of related aspects of human capital, such as motivation and commitment. This matching process implies educational homogamy.[4] We take this to signify the need of prospective partners to guarantee for themselves a level of future welfare consonant with what they already know. People therefore make an "educated guess" as to the future material worth of a prospective partner. While some attempt has been made to distinguish educational from material aspects of homogamy (Kalmijn, 1994), these to a great extent overlap because education indicates both cultural and material value, and because it cannot possibly capture all the salient aspects of human capital.

While homogamy is not essential to our argument, since the intra-couple transfer of the benefits of human capital could also occur in cases of educational imbalance, it may be relevant in our framework for at least three reasons. First, if individuals are able to assess the future earning capacity of a prospective partner, their success in doing so is probably the greater the

[4] The possible existence of a material basis to marriage and partnerships does not imply a process of "trading up". Resistance to and even prohibition against intermarriage has been the historical norm, whether across religion, ethnicity, caste or class (Westermarck, 1903). "Parity of age, status, wealth, reputation and religion, together with personal attraction, made the perfect match", according to the moral tracts of Stone's reference period (Wrightson, 1982: 80). The system of the dowry ensured "a very high degree of social and economic endogamy" (Stone, 1977: 60). This might have been reinforced through intermarriage amongst the propertied between pairs of siblings or between cousins (Davidoff and Hall, 1987). Historically an unequal marriage was not always of advantage to the person moving up. From the point of view of a man marrying up, in the face of a strong family of destination, the family of origin might lose the long-term struggle for reproduction of family power (Bourdieu, 1976).

closer their educational backgrounds. Second, this similarity is likely to draw people together in the first place. Apart from the possibility of meeting partners at a college or university, there is also an economic rationale. Mare argues that: “Increasing competition for spouses with good economic prospects may increase the educational homogamy of marriages” (1991: 17-18), and this concurs with the evidence emerging in recent economic literature (Pencavel, 1998). Third, if one partner makes the other more effective in their career, through their own education but also through aspects of human capital correlated with this, then this is simply more likely to occur the closer the educational match. Mutual needs, experience, and understanding maximise the reciprocity of this human capital effect. The higher the joint educational level of a couple the greater the mutual support for each partner’s own employment prospects. People with high education, it has been argued, generally rely on a partner for emotional support more than those with less education (Komarovsky, 1964; Liao, 1994). Where both have a high level of education then this benefit is mutual. The mutual benefits of support and guidance that education might provide, especially if both partners have careers, are likely to provide the motivation to enter a relationship in the first place (Scanzoni, 1972).

People benefit in a variety of ways through a relationship with someone with as high a level of human capital as possible. This is likely to influence the partnership decision. Once in a partnership, individual human capital has both direct and indirect effects on the labour market experience of both partners. At the most general level this process can perhaps be equated with the often observed “marriage premium”, whereby a married (male) worker earns more than an unmarried worker. While it is uncertain (see for example, Gray, 1997) whether this results from selection effects (men with higher human capital are selected into both marriage and higher paying jobs), both explanations fit in with our model of the human capital benefits of partnership.

People who are relatively highly educated are more likely to marry partly because their higher education has appeal in the marriage market. Where men and women are equally educated they are likely to seek each other out for precisely this reason. But their human capital then begins to operate to their mutual advantage. This direct effect of a partner's human capital has also been the subject of study in its own right (Benham, 1974; Lam and Schoeni, 1994). Kalmijn argues:

> The wife's human capital may facilitate the husband's access to networks that are helpful in his career, her earnings may subsidize his human capital resources, and the economic security she offers may lessen the need to settle for short-term career benefits, thereby increasing his opportunity to choose more attractive, long-term career objectives. (1994: 426)

Juhn and Murphy (1997), Bernasco, de Graaf and Ultee (1998), Brynin and Schupp (2000), and Robert and Bukodi (2002) have all found intra-couple labour market effects of human capital.[5] However, one problem with this line of research is that, no matter how many controls are included in the analysis, it is unlikely that we will ever be able to account for all the relevant aspects of family background, preferences and endowments that are correlated with labour market success. This is one of the contributions of our study. Such "cross-over" effects complement the more general effects discussed above of the impact of each partner's labour market value on the partnership decision itself.

A New Gender Balance

A woman was until recent decades much less likely to work or to expect to work, and also on average had less education.[6] It is not surprising therefore that earlier commentators (e.g.,

[5] Importantly, in a number of these studies, such effects have been calculated in both directions rather than those only of the woman's education on the man's productivity.

[6] As a corollary, a woman had an incentive to examine the human capital of a prospective partner, while the reverse did not necessarily apply. An early feminist critic argued that women's position would not improve unless they worked, while others would be forced to treat "marriage as a trade" (Hamilton, 1912).

Westermarck, 1903), equated equality in marriage with altruism, where this was a male prerogative.[7] The material rewards of marriage to men, once the transfer of rights to property and the dowry had disappeared, were to some extent more nebulous.[8] In Britain, for example, well into the twentieth century, marital mobility for women was as great as their occupational mobility (Goldthorpe, Llewellyn, and Payne, 1987).

The gender balance of advantage has changed during the second half of the twentieth century. Women's education has in many countries been equivalent to that of men and their labour-market participation, if not hours, job status or wages, is close to that of men (Spain and Bianchi, 1996; Dex, 1999; Rubery, Smith, and Fagan, 1999). Women have therefore increasingly turned to the labour market for support rather than rely entirely on within-family transfers, which has major implications both for the family and for women's role in the family (Brines, 1994; Beeghley, 1996). This leads to greater female independence but surely also affects the male view of the benefits of partnership. Far from men having a disincentive to marry if the woman works,[9] her earning power is an attraction, and human capital is an indicator of this earning power in future times.[10] Men are now able to draw on the fruits of female human capital which were unavailable in the past.[11]

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[7] For an historical underpinning of this point in Britain, see Stone (1977) and Seidman (1991). Modern patriarchy is in part a reflection of this (Mitchell, 1971).

[8] Davidoff and Hall (1987), however, argue that women's contribution to the rise of the British middle class derived from the skills they brought to household management and social networking. Women with such skills, therefore, were an important asset for men seeking to build up their businesses and careers.

[9] Although Blossfeld (1995) finds that increasing female education is not associated with delayed marriage, it is possible that higher *income* encourages women to remain independent. Indeed, the result that women with high parental income seem to be less likely to marry suggests to Goldscheider and Waite "that they are using their resources to buy out of marriage" (1991: 76).

[10] Finch (1989) emphasises the importance of achieving balance in mutual aid over time. This is especially important within couples where female dependence and independence fluctuates. Means are found to negotiate reciprocity dynamically rather than through specialisation.

[11] In the United States, Goldin (1997) calculates that, for women born between 1924 and 43, the gains of a college education in the marriage market (through access to a larger pool of college men) are around 40 percent. However,

As women's employment has grown so has their bargaining power. Oppenheimer (1988) explains the trend to rising age at marriage in part by a decline in the job prospects of young men, but also by the effect of women's rising independent means, itself reinforced through birth control (Cherlin, 2000; Goldin and Katz, 2002). Economists have increasingly abandoned the standard "common preference" models for cooperative and noncooperative bargaining models of intra-household resource allocations (Weiss, 1997; Bergstrom, 1997). In these there is more individual accounting. These have a parallel in the sociological view of the "postmodern" family (Giddens, 1992). Scanzoni et al. (1989) see the growth of individualism in love as intertwined with that of employment, particularly in the "equal-partner" relationship where work and gender roles are negotiated. The new equality applies not only to career and income but to the domestic division of labour. Women of liberal views might be more likely than other women to split from their partner if he fails to do his share of household work (Greenstein, 1995).[12] In couples where the woman is in paid work she is likely to have increasing control over household finances or more general household control, especially where she is the major earner (Pahl, 1989), even if this is often veiled (Macrae, 1986; Tichenor, 1999). Finally, the state, slowly limiting the male bias in tax and benefit systems, and legislating to ease divorce, has also tended to equalise the bargaining potential within partnerships (Lundberg and Pollak, 1996).

Our concern here is with some paradoxical results of this development. Women's earnings capacity makes for a more equal relationship based on reciprocal contributions to family welfare, as identified for instance through earnings homogamy (Henz and Sundström, 2001). The

there are also returns to the husband as a college wife is more likely to work, to have a longer career, and to be paid more than women with a lesser education.

[12] In terms of socio-political and family attitudes, women who work full-time have shown an increasing tendency to liberal views compared to home-carers (Glass, 1992).

greater the contribution, the greater the financial attractions of that partner, and yet at the same time the greater that person's independence. Women's self-determination makes them increasingly attractive as partners. Moreover, the higher her human capital the greater her "career-caring" role, in regard both to herself *and* to her partner, while the man's human capital enables him to nurture his partner's career and thereby her independence. The new type of individualised relationship need not, therefore, be equated with any notion of the family in decline, as proposed for instance by Popenoe (1993). The modern (or post-modern) relationship is not so much selfish as involving a more complex entanglement. Both partners equally value the benefits—material, emotional and sexual—that they might obtain from the other, thus producing a far more interdependent relationship than in the past (Cancian, 1987; Jamieson, 1998).

Hypotheses

Following on from the above discussion, we will empirically test the following six hypotheses:

Hypothesis 1. *If individuals' own human capital is enhanced through the human capital of their partners with the effect that each partnership choice has an impact not only within the home but also at work, we would expect to find a systematic relationship between own labour market outcomes and partner's human capital and family background characteristics. More specifically, we would expect to find partner's education and partner's background factors positively associated with own success in the labour market.*

Hypothesis 2. *There will be a positive correlation between own education and partner's education and family background, even after controlling for a large set of observable characteristics of partners. It is this correlation that we label "human capital homogamy".*

Hypothesis 3. *The unobservable components of the educational matching equation— which we label "homogamy residuals" and which comprise a mixture of motivation, commitment and abilities that are relevant in the marriage market—are expected to influence that individual's labour-market outcomes. More specifically, we would expect labour market outcomes (e.g., wages and occupation prestige) to be positively affected by the homogamy residuals. Such residuals therefore provide us with the link between the labour and marriage markets.*

Hypothesis 4. *Although the expansion of education might lead to increased human capital homogamy, we would expect to observe an offsetting effect on it, if intrafamily spillovers generated by material resources are decreasing over time (because nonmaterial aspects have become more consequential to partnership formation).*

Hypothesis 5. *If the gender balance of advantage through partnership has changed as women have moved towards equal participation in education and the labour market, and this in turn has influenced partnership formation, we would expect to observe an equalisation of the effects of the homogamy residuals by gender over time.*

Hypothesis 6. *If there are intrafamily spillovers of uncertificated human capital, then we expect not only the education of each partner to affect the labour market outcomes of the other (as stated in hypothesis 1), but also the "cross-homogamy residuals" (i.e., the partner's homogamy residuals) to have an independent and positive effect.*

The next section will specify how these six hypotheses will be tested in our analysis.

METHODS AND DATA

Analytical Issues

To test Hypothesis 1 we estimate Benham-type equations for each labour market outcome and for men and women separately. In particular, let $\boldsymbol{Y}_i$ be a vector of labour market outcomes (i.e., labour force participation, wages and occupational prestige) of partner i, let S_i represent the highest educational attainment of i, let $\boldsymbol{F}_i$ denote a vector containing individual's i family background variables, and $\boldsymbol{Z}_i$ be a vector of observable characteristics for individual i. We estimate the following set of equations separately for each labour market outcome:

$$(1) \qquad \boldsymbol{Y}_i = \gamma_{0i} + \gamma_{1i}S_i + \gamma_{2i}\boldsymbol{F}_i + \gamma_{3i}\boldsymbol{Z}_i + \gamma_{4i}S_j + \gamma_{5i}\boldsymbol{F}_j + \xi_i,$$

where i,j=wife (w), husband (h) and $i \neq j$, and ξ_i is a vector of i.i.d. residuals. A formal assessment of Hypothesis 1 is then given by the test that both γ_4 and γ_5 are positive and significantly different from zero.

Our empirical analysis proceeds by following the two-step methodology proposed in Behrman, Birdsall and Deolalikar (1995).[13] In the first step, we assume that education of individual i, S_i, is "determined" in the marriage market solely by the education of his/her partner, S_j, the partner's family background, $\boldsymbol{F}_j$, other socio-demographic characteristics of the partner (including age and ethnicity) denoted by $\boldsymbol{X}_j$, and the partner's unobserved human capital, μ_j. That is:

$$(2) \qquad S_i = \alpha_{0i} + \alpha_{1i}S_j + \alpha_{2i}\boldsymbol{F}_j + \alpha_{3i}\boldsymbol{X}_j + \mu_j + \varepsilon_i,$$

where ε_i is an i.i.d. stochastic disturbance term with zero mean and finite variance, and α are parameters that are estimated. In the "homogamy equation" (2), an individual's (say, the wife's) characteristics are included in the determination of the husband's education because they are presumed to be crucial from the point of view of potential grooms and their families. Men have a higher level of education if the woman has more desirable characteristics (i.e. has more education herself, is more attractive, has more work motivation). Some of these characteristics of the wife are observed and included in the vector $\boldsymbol{X}$, but others are not.[14] Therefore, μ_w is meant to capture the unmeasured components of the wife's human capital that are relevant for the determination of the husband's observed education.

We call this the "homogamy" equation because, despite the apparent intention to find a partner with as high a level of education as possible, the equation itself works through the concept of educational matching. A higher level of partner's education is associated with a higher level of own education. The residuals therefore describe the unobserved human capital that is associated with the educational matching process. In terms of equation (2), a formal test of

[13] An early application of a similar method is in Welch (1974).
[14] A discussion of the variables included in $\boldsymbol{F}$ and $\boldsymbol{X}$ is presented below.

Hypothesis 2 is that the estimates of the α_1 and α_2 parameters are positive and significant for both husbands and wives.

In the second stage we are concerned with the determination of labour market outcomes for both partners, in which the residuals from the first stage are used as an explanatory variable. In particular:

(3) $$\boldsymbol{Y}_j = \beta_{0j} + \beta_{1j}S_j + \beta_{2j}F_j + \beta_{3j}\boldsymbol{Z}_j + \beta_{4j}\mu_j + \boldsymbol{u}_j,$$

where all the regressors are defined as in equation (1), $\boldsymbol{u}_j$ is a vector of i.i.d. disturbance terms such that cov(ε,$\boldsymbol{u}$)=0, and β is a conformable vector of parameters to be estimated. The important point of equation (3) is that the unobserved characteristics of, say, the husband, μ_h, are expected to have significant effects on his labour market outcomes, $\boldsymbol{Y}_h$. If such characteristics are observed by potential wives and if the potential wives value more those men with greater μ_h, then these same characteristics also enter into the determination of the wife's education as indicated in the homogamy equation (2). This possibility allows us to obtain an estimate of the husband's (or wife's) unobserved human capital and of its impact on his (her) labour market outcomes.[15] The estimated residuals $u_i = \mu_j + \varepsilon_i$ can then be thought of as a proxy of the "uncertificated" human capital of individual j in the outcome equations (3).[16] A formal test of Hypothesis 3 is that β_4 in (3) is positive and significantly different from zero.

To test Hypothesis 4 we re-estimate equation (2) by birth cohort and assess whether the effects of S_j and $\boldsymbol{F}_j$ on S_i decline (in absolute value) as we move from earlier to more recent birth

[15] Rather than imposing the strict exogeneity assumption required by a fixed-effects model—i.e., the observed covariates ought to be uncorrelated with the time-varying error terms in equation (3) (see Wooldridge, 2001, chapter 10)—we identify the parameters β_4 under the assumption that μ is orthogonal to the linear combination of the observed variables in equation (2). The same assumption is introduced by Behrman, Birdsall and Deolalikar (1995).

[16] This comes about because, from equation (2), $u_i = S_i - \hat{S}_i$, and ε_i is by assumption an i.i.d. zero mean error term, so that the probability limit of u_i coincides with the probability limit of μ_j, and u_i is a consistent estimate of μ_j.

cohorts. That is, for example, $\boldsymbol{\alpha}_1^{(1)} > \boldsymbol{\alpha}_1^{(2)} > ... > \boldsymbol{\alpha}_1^{(K)}$, where the superscript k=1,2,…, K indexes year of birth sorted in ascending order.[17] In the case of Hypothesis 5, which requires the re-estimation of equation (3) with the inclusion of cohort-specific μ terms, we anticipate β_4 to differ for husbands and wives of early birth cohorts and to be equal for men and women of more recent cohorts. Specifically, we expect $\boldsymbol{\beta}_{4h}^{(1)} \neq \boldsymbol{\beta}_{4w}^{(1)}$ and $\boldsymbol{\beta}_{4h}^{(K)} = \boldsymbol{\beta}_{4w}^{(K)}$, although we hold no prior as to what birth cohort k experiences the change in this gender effect for the first time.

Finally, to assess Hypothesis 6, we estimate the following variant of model (1) for husbands and wives separately:

$$\boldsymbol{Y}_i = \delta_{0i} + \delta_{2i}\boldsymbol{F}_i + \delta_{3i}\boldsymbol{Z}_i + \delta_{4i}S_j + \delta_{5i}\boldsymbol{F}_j + \delta_{6i}\mu_j + \eta_i, \quad (4)$$

where η_i is a vector of i.i.d. shocks, and μ_j are the homogamy residuals of the spouse (called "cross-homogamy" residuals) obtained from the first-step estimation of equation (2).[18] A verification of Hypothesis 6 implies δ_6 to affect positively and significantly the labour market outcomes of both husbands and wives, over and above the effects of partner's education and family background.

Estimating Sample and Variables of Interest

The data used in our empirical analysis come from the first nine waves of the British Household Panel Survey (BHPS), covering the period between 1991 and 1999. Since 1991, the BHPS has interviewed a representative sample of some 5,500 households (comprising about 10,000

[17] In our empirical analysis, we set K=3.

[18] Note that own education S_i cannot be included in (4) as it is collinear with μ_j through equation (2). A similar consideration applies also to S_j. For this reason, in the empirical analysis below, we estimate two spefications of model (4), one in which we set δ_4=0 and the other in which δ_4 is also estimated.

individuals).[19] Our analysis is based on the sample of individuals born after 1939 (thus aged less than 60 in the last survey year), who provided complete information on all the variables of interest in each interview, and who have been successfully matched with their partner at each interview date. These restrictions yield a sample of 2,997 husbands and 2,902 wives for a total of 16,040 and 17,647 person-wave observations respectively.

Table A1 reports the means of the variables used in the analysis. The vast majority of the observations in our sample are for white men and women, who are on average 37-38 years old. A few (unsurprising) differences emerge by gender in terms of full-time and part-time work experience, and distribution of men and women over occupations, industries and employing sectors. Clear gender differences emerge also in the case of the key variables of our analysis, namely education, *S*, and the three labour market outcomes, $\boldsymbol{Y}$ (labour force participation, wages and occupational prestige). There is a significantly larger proportion of men holding 'A-level' or higher qualifications than women, 57 versus 48 percent.[20] Almost 89 percent of men are employed (and report positive earnings) over the sample period, with the figure for women being 73 percent only. The difference of 15.2 percentage point is significant at any conventional level. Over the 1991-1999 period, men earn an average of £10.60 per hour (1999 prices), which is about 36 percent more than women earn: the difference of £2.87 is again significant at any conventional level. Finally, our measure of social status, the Hope-Goldthorpe (HG) score of occupational prestige, indicates that husbands are in occupations whose average prestige is about

[19] Detailed information about the BHPS can be found at http://www.iser.essex.ac.uk/bhps/docs.

[20] For readers who are not familiar with the British school system, 'A(Advanced)-level' corresponds to education beyond high school, but short of a university degree; 'O(Ordinary)-level' and General Certificate of Secondary Education (GCSE) correspond to a high school diploma; 'Higher vocational degree' corresponds to Higher National Diploma, Higher National Certificate, Nursing, Teaching and other qualifications. The *t*-test of equality of the proportions of male and female partners holding 'A-level' or higher qualification is 20.109. The Pearson χ^2-statistic on the six-category variable is 5829.8, which rejects equality at any statistical level.

5 points higher than the prestige associated with their wives' occupations. Again this differential is significant at any conventional level.

RESULTS

Intrahousehold Educational Transfers and Gender Asymmetries

We start by checking whether partner's education and family background have any direct effect on own labour market outcomes (participation, wages and HG scores), after controlling for a host of individual-specific and own family background characteristics (Hypothesis 1).[21] The results are listed in Table 1, where – besides the estimates for γ_4 – we also present the estimates for γ_1.[22] For both husbands and wives, we observe strong and positive effects of own education on wages, in line with most of the results outlined in the economic literature (see Card, 1999, for a review of mainly American studies; Harmon and Walker, 1995 and Ermisch and Francesconi, 2000 provide examples using British data). The wage returns to own education tend to be higher at the top of the schooling distribution for both sexes.[23] As for the impact of partner's education on wages, we find evidence of a potential intrafamily effect. Qualifying earlier findings for Britain (e.g., Brynin and Schupp, 2000), which revealed that this outcome favours men (if not greatly), here we can notice that—with more characteristics held constant, but especially using data from

[21] Notice that the wage and HG score ordinary least squares (OLS) regressions for wives are selectivity corrected to account for women's non-random participation in the labour market. For this purpose, we used the procedure described in Vella (1998) with three approximating terms from the selection equation (see the note of Table 1 for further details). We have also performed the analysis without correcting for sample selection, and found results that are qualitatively similar to those reported in the table. (These results are not reported for convenience but can be obtained from the authors upon request). The husbands' equations are not corrected because the selection correction terms are never statistically significant.

[22] These results have been obtained from estimation of equation (1) after setting $\gamma_2=\gamma_5=0$. Estimates of γ_2 and γ_5 are reported in Table A2 and discussed below.

[23] This is a potential source of inequality between *individuals* (Card, 1999; Machin, Harkness, and McIntosh, 2001). If people partner homogamously, it is then a source of further inequality between *couples*.

later waves of the BHPS—the balance of advantage is broadly equal, albeit it varies by educational level. The most significant differential is at the level of higher vocational qualifications (which would, for instance, describe nurses and many teachers), and this is in favour of women. Similar results emerge in the case of occupational prestige. Both husbands and wives benefit from their own education, with the returns to schooling being again higher at the top of the distribution. As in the case of wages, the positive cross-education effects on HG scores favour men and women whose partners have higher qualifications, and women somewhat more than men.

Gender asymmetry is more apparent in the case of labour force participation. Own education seems to be less consequential to the likelihood of men being in a job than it is to women. This gender asymmetry may reflect the significantly higher participation rate of men than that of women (89 versus 73 percent). However, the table also shows that the husband's labour force participation is strongly correlated to his wife's education, increasing by about 4 percentage points if she has any qualification below 'University degree'.[24] For women, this cross-education effect does not occur. This confirms our expectation that there exist intrafamily transfers of human capital while, in this specific case, the advantage is more the man's than the woman's. Interestingly, this is the reverse of the finding by Bernasco, de Graaf, and Ultee (1998).

A more complete test of Hypothesis 1 must also analyse the γ_5 parameters in (1) on partner's family background. The results of such regressions are presented in Table A2, where for completeness we also report the estimates of γ_2, which capture the impact of own family

[24] If women with university or higher degrees tend to be in educationally homogamous marriages (see below), their husbands' participation rates are already high compared to, say, men with no qualification (95 versus 77 percent) and influenced by their own (husbands') education more than is the case for less educated men.

background variables. The role played by partner's family background is relatively minor.[25] But the effect of the γ_4 parameters in Table A2 is virtually the same as that discussed earlier for Table 1. In sum, therefore, the prediction of Hypothesis 1—according to which partner's education and family background positively affect own success in the labour market—finds strong empirical support in our data, especially in the case of partner's education.

The First-Step Estimates: Homogamy Equations

Table 2 shows the results obtained from estimating equation (1) using OLS and ordered probit regressions for husbands and wives separately.[26] For brevity, we report only the estimates on partner's education and family background. The other estimates can be obtained from the authors upon request. Regardless of the statistical procedure used in estimation and the difficulties in assigning an unambiguous interpretation to the estimates in terms of theory, the overall extent of human capital homogamy is quite clear. The estimates of α_1 in (2) are all positive and significant, suggesting that educational homogamy (i.e., the correlation between wives' and husbands' education) does exist in our sample, even after controlling for a large set of observables.

The table also demonstrates that the effect of partner's education on own attainment increases monotonically for both sexes, from 0.251 to 1.374 in the case of husbands and from 0.273 to 1.561 in the case of wives (ordered probit results). For both husbands and wives, the

[25] Appropriate tests for the joint significance of the γ_5 parameters reveal that family background variables are significant at the 5 percent level only in the case of labour market participation for women. In the other two labour market equations for women and for men, they are always jointly insignificant.

[26] In the second step, we shall be using the results obtained from the ordered probit models, because they directly take into account the *ordinal* nature of the dependent variable. To check whether these results are robust to estimation method, we also performed the entire analysis using standard OLS regressions and found similar estimates throughout. For ease of exposition, therefore, we report the OLS estimates only for the homogamy equations (Table 2) but not for the labour market outcomes reported in subsequent tables.

difference between such estimates is significant at any statistical level.[27] Therefore, as education increases, not only is the stock of observable human capital that can be shared between partners larger, but also the extent of educational homogamy—as measured by α_1—tends to increase. This may affect intrahousehold bargaining and resource allocation (and possibly be a source of considerable inequality between households). Although not all, some of the partner's family background characteristics, especially those reflecting a potentially large pool of parental material resources—as captured for instance by father-in-law's occupation—are positively and significantly correlated with own education. This is strongly consistent with the predictions of Hypothesis 2.

There is much, however, that equation (1) fails to explain. Indeed, if a person's ability, commitment and motivation are apparent to a prospective partner but are at best only partially observable by the analyst, equation (2) can be used instrumentally to infer whether the missing "glue" of homogamy is at least in part an assessment by one partner of the labour market success of the other (Behrman, Birdsall, and Deolalikar, 1995). We perform this exercise through the second step of our estimation procedure, in which the residuals from equation (2), i.e., the homogamy residuals, are used to explain labour market success for each partner separately. Before doing so, Figures 1 and 2 plot the kernel density estimates of the homogamy residuals for husbands and wives obtained from estimating (2) with ordered probit regressions and OLS regressions, respectively. Apart from their different locations (the OLS residuals are centred

[27] The differences between adjacent qualification levels are also significant in most cases, except for the differences between 'O-level' and 'Less than O-level' (p=0.706) and between 'A-level' and 'Higher vocational qualification' (p=0.327) for men, and the difference between 'O-level' and 'A-level' (p=0.108) for women. These results are broadly confirmed when we compute odd ratios, which are defined as the ratio of the odds that an individual with a given education marries within rather than outside the group to the odds that an individual with another education level marries a person with that specific education (Kalmijn, 1998).

around zero, whereas the ordered probit residuals are centred around 3), the shapes of the distributions are largely unaffected by method of estimation.[28] Furthermore, to check if the homogamy residuals are systematically correlated with the observables used in estimation, we regressed μ_i on the set of individual variables relevant for partner *i*, for *i*=*h*,*w*. Table A3 reports the statistics for the joint or single significance of such variables in each regression for husbands and wives. For both sexes, the homogamy residuals turn out to be correlated with full-time experience, housing tenure and education. No other significant relationship is detected. Therefore, they appear to capture unobserved material aspects of experience, personality and human capital that help match partners but are orthogonal to other personal and workplace circumstances, such as ethnicity, occupation and industry.

The Second-Step Estimates: Labour Market Outcomes

Table 3 reports the estimates of β_4 in equation (3) for the three labour market outcomes under study and for husbands and wives separately. We present the results from three different specifications, which add to a basic set of individual characteristics in specification [1] other individual covariates (specification [2]) and family background variables (specification [3]).[29] With the only exception of husbands' occupational prestige, the homogamy residuals estimates are broadly stable across specifications. For simplicity, we focus on the results from specification [3]. Regardless of gender, the homogamy residuals have no effect on the probability of working

[28] This suggests that the ordinal scale of *S* assumed by the ordered probit regressions is likely to have little effect on the estimates presented in the next subsection. The second-step results presented below are robust to the use of the OLS residuals. Such results are available from the authors upon request.
[29] These sets of variables are listed in the note of Table 3.

(panel A).[30] Labour force participation decisions thus seem to be driven by considerations other than unobserved characteristics of human capital which link couples together, such as work experience, education and children.

In panel B, we report the OLS estimates of (log) hourly pay.[31] Conditional on working, the homogamy residuals are positive and statistically significant for both men and women: one-unit increase in such residuals increases hourly wages by 1.6 and 2.0 percent for husbands and wives respectively. This result clearly supports Hypothesis 3. At least some of the unobservables that play a part in the marriage market do affect labour market success in terms of higher wage rates, while the decisions surrounding partnership formation appear to be associated with assessments of the earning potentials of prospective partners.

The last panel in Table 3 reports the β_4 estimates for the (log) Hope-Goldthorpe scores of occupational prestige. The impact of the homogamy residuals on husbands' prestige is not significant, although in the standard (Mincerian) specification [1] that controls only for work experience and education they are found to increase HG scores by about 1 percent. For wives, however, a one-unit increase in the residuals leads to scores that are almost 1.2 percent higher. This, again, is in line with Hypothesis 3. The muted effect for husbands (in specifications [2] and [3]) may be due to the fact that the homogamy equation (2) cannot satisfactorily identify their fixed, unobserved components μ_h. But it may also mean that, after a broad set of individual

[30] These estimates have been obtained from binary probit regressions. To ease the interpretation of this outcome, the figures in Table 3 are marginal effects, calculated as the derivative of the conditional expectation of the observed dependent variable and evaluated at the sample means, following the procedure in Greene (1997).

[31] Both the wage equation and the HG score equation are selectivity corrected using the semiparametric procedure described in Vella (1998) with three approximating terms from the selection equation. This is a generalisation of the well-known two-step procedure introduced by Heckman (1979). The number of approximating terms was chosen on the basis of the *t*-statistics on the additional higher-order terms. It should be noted that such approximating terms are always jointly insignificant in the case of men. The estimates for husbands, therefore, are not selectivity corrected. It should also be noted that the results for wages and HG scores found from tobit regressions are similar to those in Table 3. The tobit estimates are not shown for brevity, but can be obtained from the authors upon request.

characteristics and family background variables are controlled for, such fixed effects are genuinely inconsequential to husbands' occupational prestige, producing a compelling gender imbalance of effects.

Patterns by Birth Cohort

Tests of Hypotheses 4 and 5 are presented in Tables 4 and 5, respectively. The notion of trends over time as expressed in these two hypotheses is operationalised here in terms of trends by birth cohort, building on the accepted evidence that recent (birth) cohorts of women are more strongly attached to the labour market than older ones (Dex, 1999; Rubery, Smith, and Fagan, 1999).[32]

With almost no exception, the estimates of α_1 by birth cohort replicate the patterns reported in Table 2 for the whole samples of men and women. That is, there is a great deal of educational homogamy, and this is stronger the higher the qualifications of the partner. But, more importantly, we cannot detect a clear pattern by cohort. In fact, for a given level of partner's education, we find a substantially stable pattern of α_1 by birth cohort, suggesting that the intrafamily spillovers generated by human capital matching have not been eroded over time. The prediction of Hypothesis 4 that nonmaterial aspects of prospective partners are relatively more conspicuous in more recent partnerships is not borne out by our data.

Conversely, the estimates of β_4 shown in Table 5 uphold Hypothesis 5 by which we expect an equalisation of the effects of the homogamy residuals by gender over time. For men born before 1961, there is no significant impact on either of the three outcomes under study. For

[32] The results in Tables 4 and 5 refer to three birth cohorts that split the male and female samples in subgroups of fairly equal size. We performed a few experimentations using slightly different cutoff values, and found similar estimates (which are therefore not reported). Splitting the samples in a greater number of subgroups would lead to a considerable reduction in size for each subsample, and this could weaken the inference we can draw from our estimates.

these men, therefore, the observed components of human capital (as well as the other controls included in our regressions) seem to provide a reliable indication of their position in the marriage and labour markets. We find exactly the opposite for women in the same birth cohorts, whose wages and occupational prestige are powerfully affected by their homogamy residuals. For men and women from later cohorts, we observe instead a more symmetrical set of influences by gender, if not a reversal. In the case of men, $\mu_h^{(3)}$ is significantly associated with an increase in the probability of working by more than half of one percentage point, with higher hourly wages by 2 percent, and with greater HG scores by nearly 1 percent. For women born after 1960, the only significant effect emerges in the case of wages, and this is statistically identical to the corresponding effect for husbands (that is, we cannot reject the hypothesis that $\boldsymbol{\beta}_{4h}^{(3)} = \boldsymbol{\beta}_{4w}^{(3)}$ from the wage regressions). For the other two outcomes, the point estimates of β_4 are again close to those found for men but are not statistically significant. Standard *t*-tests, however, cannot reject the hypothesis that they are equal by gender.

Labour Market Effects of Cross-Homogamy Residuals

The relevance of the two-step procedure used so far can also be appreciated by revisiting our analysis of intrahousehold transfers of human capital, and augmenting it as indicated in equations (4). The estimates of the γ_4 and γ_6 parameters from such equations are shown in Table 6.[33] The coefficients of the cross-homogamy residuals are positive and precisely measured for both husbands and wives and for the three labour market outcomes under study. This is true independently of whether we exclude or include partner's education (specifications [1] and [2],

respectively). Hypothesis 6 is thus strongly supported by our analysis. Moreover, we can also distinguish selection from pure productivity effects of the intra-couple influences of human capital. As implied by Welch (1974), we can infer that a positive and significant coefficient on the cross-homogamy residuals in specification [2] captures the independent role of one partner's education on the productivity of the other. Therefore, although selection in the marriage market cannot be ruled out, it is likely to be only a part of the explanation of these intra-couple effects.

Two aspects of these results are noteworthy for the analysis of gender asymmetries. First, the effects of the cross-homogamy residuals are always significantly stronger for wives than for husbands, that is $\gamma_{6w}>\gamma_{6h}$. This suggests that, on average, a woman may benefit from her husband's uncertificated human capital more than he does from hers, which redefines to some extent the gender balance of intra-couple influences in favour of women (Bernasco, de Graaf, and Ultee, 1998). This also re-emphasises the salience, for both men and women, of material (albeit intangible) calculations surrounding their partnership decisions. Second, the direct effect of partner's education (measured through γ_4) does not alter this finding. Its estimates essentially point to the same considerations that were drawn from Table 1. For both wages and occupational prestige, there are some positive direct intrafamily effects, but the balance of advantage is fairly symmetrical by gender. The only gender imbalance emerges in the case of labour force participation, whereby a husband benefits from his wife's education while she does not from his. Therefore, the recovery of the cross-homogamy residuals through equation (2) allows us to isolate the effects that derive directly through the partner's education from the effects that derive from less visible dimensions of that person's human capital.

[33] As mentioned earlier, own education is not included in the estimation of (4) because of its collinearity with the cross-homogamy residuals. Indeed we have estimated models which also included own education and unsurpisingly found a significant reduction in model fit for all three labour market outcomes.

CONCLUSION

Partnership decisions have extremely important implications for personal and material welfare. It is likely that considerations of such outcomes play a significant role in these decisions. Individuals are on average likely to seek a partner who is at least of comparable material value, the potential for which is signalled through human capital. Some of this is directly observed both by a partner and by the analyst, because certificated; some is instead exclusively observable (and perhaps only partially) to a prospective partner. This latter element comprises motivation, efficiency, commitment, general capability, and so on. Such factors not only enhance an individual's own career, but within a partnership they also enhance the human capital of a partner and, through this, the partner's career too. A partner's educational level can then be used to predict someone's labour market outcomes and, once partners' educational levels are matched in regression models, the residuals from such regressions can be used to enhance our understanding of labour market success. These "homogamy residuals" in fact reflect aspects of one partner's assessment of the uncertificated element of the other's human capital. We extend the original study by Behrman, Birdsall, and Deolalikar (1995), who analysed only male outcomes, by considering both husbands and wives symmetrically and by examining the gender (im)balance of such hidden intra-couple influences in some detail.

Using the first nine waves of the BHPS 1991-99, our analysis confirms several distinct aspects of these relationships. First, we find that the educational achievement of each partner is directly associated with the labour-market outcomes of the other. This suggests that individuals in relationships—both men and women—are more effective in their careers the higher the human capital of their partner. Although this result has long been documented (Benham, 1974), our data

allow us to include a fuller set of controls than has been previously possible. Second, the "glue" that brings a couple together—a mix of factors which includes both explicit and implicit indicators of human capital—enhances the labour market outcomes of both partners, over and above the effects of their own education and other standard measures of human capital. Both marriage and labour markets are at least in part simultaneously determined (Van der Klaauw, 1996). Insofar as different facets of human capital attract people to each other, they also attract higher wages. We cannot measure the economic appeal of partnership directly, but this result suggests that people are drawn to each other on the basis of characteristics which *in the future* will be productive, and therefore of economic value to both partners. Third, these effects are symmetrical. Even though we still observe gender differences in labour market behaviour and outcomes, the man is no longer the sole provider. And more importantly for our argument, no longer does the woman invest her human capital in her partner's career without an equivalent return. He invests in hers too. This two-sided impact of uncertificated human capital is increasingly becoming symmetrical over time. This reflects the growing role of education in the labour market but also of homogamy in the marriage market.

We view human capital as providing the link between the marriage and labour markets. When people come together in personal relationships, they use judgements of each other's characteristics which an employer might seek to make of a prospective employee. These judgements are of that person's productivity, based on assessment not only of educational qualifications but also of a variety of personality and behavioural characteristics which betoken underlying commitment and capability. By inferring such judgements from the educational matching process associated with marital (and other) unions, this paper has added new insights into a number of issues, such as our understanding of the material basis of partnership decisions,

the intra-couple effects of human capital on labour market outcomes, and the balance of advantage between men and women deriving from these processes.

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Table 1: The impact of own and partner's education on labour market outcomes
Probit and OLS estimates (Robust standard errors in parentheses)

	Husbands			Wives		
	Labour market participation	Log hourly wages	Log HG scores	Labour market participation	Log hourly wages	Log HG scores
Own education: (γ_1)						
Less than O level	0.003	0.099**	0.068**	0.035	0.072*	0.074**
	(0.016)	(0.036)	(0.025)	(0.025)	(0.035)	(0.026)
GCSE/O level	0.022	0.148**	0.117**	0.109**	0.089*	0.101**
	(0.012)	(0.028)	(0.020)	(0.019)	(0.042)	(0.031)
A level	0.015	0.177**	0.177**	0.116**	0.123*	0.154**
	(0.013)	(0.030)	(0.022)	(0.021)	(0.058)	(0.036)
Higher vocational degree	0.034**	0.257**	0.231**	0.151**	0.172**	0.246**
	(0.011)	(0.030)	(0.020)	(0.019)	(0.051)	(0.041)
University or higher degree	0.033*	0.380**	0.372**	0.168**	0.258**	0.409**
	(0.013)	(0.040)	(0.023)	(0.020)	(0.081)	(0.047)
Partner's education: (γ_4)						
Less than O level	0.035**	-0.002	0.025	0.022	0.043	-0.005
	(0.011)	(0.031)	(0.022)	(0.027)	(0.029)	(0.027)
GCSE/O level	0.046**	0.028	0.022	0.010	0.034	0.052*
	(0.010)	(0.028)	(0.019)	(0.023)	(0.024)	(0.021)
A level	0.043**	0.065*	0.063**	0.012	0.048	0.080**
	(0.010)	(0.033)	(0.023)	(0.026)	(0.027)	(0.023)
Higher vocational degree	0.043**	0.020	0.046*	-0.011	0.078**	0.084**
	(0.010)	(0.029)	(0.019)	(0.023)	(0.025)	(0.020)
Higher degree	0.024	0.074*	0.077**	-0.051	0.070*	0.116**
	(0.014)	(0.036)	(0.022)	(0.032)	(0.035)	(0.024)
Mean of the dependent variable	0.886	10.601	50.482	0.734	7.734	45.536
Pseudo R^2	0.196			0.161		
R^2		0.306	0.319		0.367	0.329
N	15,749	12,065	12,065	17,647	11,141	11,141

Note: Hourly wages are expressed in 1999 prices. The estimates for the labour force participation equations are marginal effects calculated as the derivative of the conditional expectation of the observed dependent variable, and evaluated at the sample means. In all regressions, standard errors are robust to arbitrary forms of heteroskedasticity. Other variables included in the labour force participation equations are: quadratic polynomials in previous part-time work experience and previous full-time work experience, number of children by age group (age groups are (in years): 0-2, 3-4, 5-11, 12-15 and 16-18), and dummy variables for ethnic origin (4 dummy variables), whether or not respondent is in a cohabiting union, housing tenure (3), father's occupation when respondent was 14 years old (8), whether or not mother worked when respondent was 14 years old, whether or not mother was in managerial/professional occupations when respondent was 14 years old, and a constant. In addition to such variables, the wage and HG score regressions also include: dummy variables for trade union coverage, region of residence (16 dummy variables), employing sector (4), and industry (9). The wage regressions include also dummy variables for occupation (8 dummy variables). For women, both the wage and the HG equations are selectivity corrected using the procedure described in Vella (1998) with three approximating terms from the selection equation. The selection equation (probit) contains: age, number of children by age, and dummy variables for ethnic origin (4 dummy variables), marital status, housing tenure (3), region of residence (16), education and a constant.
** $p<0.01$, * $p<0.05$

Table 2: Partner's education and family background in the homogamy equation
Ordinary Least Squares (OLS) and Ordered probit equations (Robust standard errors in parentheses)

	Husbands' education		Wives' education	
	OLS	Ordered probit	OLS	Ordered probit
Partner's education: (α_1)				
Less than O level	0.299*	0.251*	0.348**	0.273**
	(0.137)	(0.104)	(0.130)	(0.091)
GCSE/O level	0.358**	0.287**	0.633**	0.446**
	(0.116)	(0.090)	(0.111)	(0.080)
A level	0.651**	0.494**	0.806**	0.564**
	(0.123)	(0.095)	(0.134)	(0.095)
Higher vocational qualification	0.743**	0.566**	1.009**	0.734**
	(0.112)	(0.087)	(0.118)	(0.086)
University or higher degree	1.665**	1.374**	1.845**	1.561**
	(0.138)	(0.118)	(0.143)	(0.127)
Partner's family background: (α_2)				
Ever lived in a non-intact family‡	-0.029	-0.016	-0.028	-0.003
	(0.092)	(0.071)	(0.103)	(0.075)
Father-in-law's occupation:				
Managerial§	0.412**	0.336**	0.482**	0.345**
	(0.138)	(0.109)	(0.131)	(0.097)
Professional§	0.730**	0.675**	0.540**	0.435**
	(0.164)	(0.143)	(0.152)	(0.120)
Technical§	0.427*	0.337*	0.522**	0.395**
	(0.185)	(0.142)	(0.183)	(0.145)
Clerical§	0.531**	0.409**	0.246	0.203
	(0.181)	(0.143)	(0.190)	(0.140)
Craft§	0.256*	0.209*	0.225	0.168
	(0.120)	(0.096)	(0.119)	(0.087)
Protection/personal services§	0.324	0.290	0.448**	0.320**
	(0.194)	(0.154)	(0.163)	(0.118)
Sales§	0.262	0.224	0.253	0.185
	(0.199)	(0.153)	(0.183)	(0.136)
Manual semiskilled§	0.174	0.159	0.166	0.113
	(0.130)	(0.103)	(0.126)	(0.092)
Mother-in-law was:				
In work§	0.073	0.056	0.058	0.032
	(0.068)	(0.053)	(0.069)	(0.050)
In professional/managerial occupation§	0.086	0.102	0.047	0.014
	(0.128)	(0.106)	(0.131)	(0.103)
R^2	0.295		0.276	
Log-likelihood		-20,686		-23,165
Model χ^2		700.0		738.2
		[0.0000]		[0.0000]
N	16,040	16,040	17,647	17,647

Note: Dependent variable is highest educational achievement categorised in 6 groups (in ascending order): no qualification; less than O level; GCSE/O level; A level; Higher vocational qualification; University or higher degree. Standard errors are robust to arbitrary forms of heteroskedasticity. All the variables included in all regressions refer to partner's variables. Other regressors are: quadratic polynomials in previous part-time work experience and previous full-time work experience, number of children by age group (age groups are (in years): 0-2, 3-4, 5-11, 12-15 and 16-18), and whether or not respondent is in a cohabiting union, trade union coverage (base is nonworking), ethnic origin (4 dummy variables), housing tenure (3), region of residence (16), occupation (9, base is nonworking), industry (10, base is nonworking), and five cut-off points. Model χ^2 is the Wald statistic for the goodness of fit test. In both ordered probit regressions, the χ^2 has 73 degrees of freedom. The p-value for this statistic is reported in square brackets.

‡ denotes a variable that is measured over the entire childhood (ages 0-15) of the partner.

§ denotes a variable that is measured when the partner was aged 14.

** $p<0.01$, * $p<0.05$

Table 3: The effect of homogamy residuals on labour force participation, hourly wages and Hope-Goldthorpe (HG) score (Robust standard errors in parentheses)

	Husbands (N=12,065)			Wives (N=11,141)		
	[1]	[2]	[3]	[1]	[2]	[3]
A. Labour force participation[a]	0.005	0.002	0.002	0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
Pseudo R^2	0.067	0.185	0.189	0.046	0.159	0.164
B. Log hourly wages	0.017*	0.016*	0.016*	0.025**	0.020**	0.020**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
R^2	0.176	0.265	0.271	0.222	0.301	0.305
C. Log HG scores	0.009*	0.007	0.007	0.014**	0.012**	0.012**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
R^2	0.230	0.314	0.324	0.266	0.323	0.330
Basic individual variables	√	√	√	√	√	√
Other individual variables		√	√		√	√
Family background variables			√			√

Note: The term "homogamy residuals" refers to the residuals from the ordered probit equations presented in Table 2. Estimates are obtained from probit regressions for the labour force participation outcome and from OLS regressions for the wage and HG score outcomes. 'Basic individual variables' are: quadratic polynomials in years of part-time work experience and years of full-time work experience, and dummy variables for education (5 dummy variables). 'Other individual variables' are: number of children by age group (age groups are (in years): 0-2, 3-4, 5-11, 12-15 and 16-18), and dummy variables for ethnic origin (4 dummy variables), marital status, housing tenure (3), region of residence (16), trade union coverage, sector (4) and industry (9). 'Family background variables' are: dummy variables for father's occupation when respondent was aged 14 (8 dummy variables), whether or not mother worked when respondent was 14 years old, and whether or not mother was in managerial/professional occupations when respondent was 14 years old. In the labour force participation equation, the variables on industry, sector and trade union coverage are excluded from specifications [2] and [3] (as they are available for workers only). The estimates for the labour force participation equations are marginal effects calculated as the derivative of the conditional expectation of the observed dependent variable, and evaluated at the sample means. For women, both the wage and the HG equations are selectivity corrected as described in the note of Table 1 and in the text.

[a] N=16,040 and 17,647 for husbands and wives respectively.

** $p<0.01$, * $p<0.05$

Table 4: Trends in educational homogamy by birth cohort
Ordered probit equations (Robust standard errors in parentheses)

	Husbands' education			Wives' education		
	<1951	1951-60	>1960	<1951	1951-60	>1960
Partner's education: (α_1)						
Less than O level	0.186	0.059	0.376*	0.039	0.547**	0.191
	(0.183)	(0.189)	(0.190)	(0.156)	(0.167)	(0.162)
GCSE/O level	0.349*	0.228	0.263	0.454**	0.602**	0.259
	(0.149)	(0.165)	(0.172)	(0.128)	(0.145)	(0.153)
A level	0.683**	0.252	0.445*	0.540**	0.633**	0.468**
	(0.159)	(0.170)	(0.181)	(0.201)	(0.165)	(0.173)
Higher vocational qualification	0.575**	0.411**	0.601**	0.624**	0.842*	0.708**
	(0.145)	(0.151)	(0.173)	(0.142)	(0.150)	(0.161)
University or higher degree	1.494**	1.232**	1.397**	1.594**	1.462**	1.581**
	(0.221)	(0.198)	(0.210)	(0.250)	(0.224)	(0.209)
Log-likelihood	-6,534	-7,101	6,361	-7,107	-6,907	8,575
N	4,499	4,581	4,341	4,767	4,548	5,636

Note: In each regression by birth cohort, the dependent variable is highest educational achievement categorised in 6 groups (in ascending order): no qualification; less than O level; GCSE/O level; A level; Higher vocational qualification; University or higher degree. Standard errors are robust to arbitrary forms of heteroskedasticity. All the variables included in all regressions refer to partner's characteristics. For a full description, see the note of Table 2.
** $p<0.01$, * $p<0.05$

Table 5: The effect of homogamy residuals on labour force participation, hourly wages and Hope-Goldthorpe (HG) score by birth cohort (Robust standard errors in parentheses)

Estimate of β_4 by gender and birth cohort	Labour force participation	Log hourly wages	Log HG scores
Husbands			
<1951	0.005	0.011	0.003
	(0.007)	(0.012)	(0.007)
1951-60	-0.002	0.001	0.008
	(0.003)	(0.011)	(0.007)
>1960	0.006*	0.021*	0.008*
	(0.003)	(0.010)	(0.004)
Wives			
<1951	-0.009	0.016**	0.012*
	(0.006)	(0.005)	(0.005)
1951-60	-0.002	0.022*	0.015*
	(0.008)	(0.010)	(0.006)
>1960	0.007	0.019*	0.010
	(0.008)	(0.008)	(0.007)

Note: The terms "homogamy residuals" refer to the residuals from the ordered probit regression estimates by birth cohort reported in Table 4. The figures are obtained from regressions that include all the variables of specification [3] in Table 3. For the other definitions and variables used in each equation, see the notes of Table 3.
** $p<0.01$, * $p<0.05$

Table 6: The impact of partner's education cross-homogamy residuals on labour market outcomes – Probit and OLS estimates (Robust standard errors in parentheses)

	Labour market participation		Log hourly wages		Log HG scores	
	[1]	[2]	[1]	[2]	[1]	[2]
Husbands						
Cross-homogamy residuals (γ_6)	0.012**	0.011**	0.086**	0.090**	0.058**	0.060**
	(0.003)	(0.003)	(0.007)	(0.007)	(0.005)	(0.004)
Partner's education: (γ_4)						
Less than O level		0.042**		0.033		0.063**
		(0.012)		(0.035)		(0.024)
GCSE/O level		0.053**		0.078*		0.074**
		(0.011)		(0.033)		(0.021)
A level		0.054**		0.152**		0.138**
		(0.011)		(0.040)		(0.026)
Higher vocational degree		0.050**		0.139**		0.132**
		(0.010)		(0.035)		(0.021)
Higher degree		0.043*		0.302**		0.242**
		(0.014)		(0.043)		(0.023)
Pseudo R^2	0.234	0.246				
R^2			0.231	0.249	0.277	0.307
Wives						
Cross-homogamy residuals (γ_6)	0.044**	0.044**	0.118**	0.122**	0.084**	0.087**
	(0.006)	(0.006)	(0.008)	(0.008)	(0.006)	(0.006)
Partner's education: (γ_4)						
Less than O level		0.029		0.055		0.011
		(0.030)		(0.041)		(0.033)
GCSE/O level		0.014		0.076*		0.059*
		(0.025)		(0.034)		(0.026)
A level		0.018		0.102**		0.088**
		(0.027)		(0.037)		(0.028)
Higher vocational degree		0.016		0.180**		0.120**
		(0.024)		(0.034)		(0.024)
Higher degree		-0.007		0.364**		0.252**
		(0.030)		(0.041)		(0.026)
Pseudo R^2	0.169	0.170				
R^2			0.273	0.301	0.293	0.327

Note: Specification [1] includes the same regressors as those reported in Table 1 except for own education and partner's education. Specification [2] includes also partner's education. See the note to Table 1 for details.
** $p<0.01$, * $p<0.05$

Table A1: Descriptive statistics – Selected variables

Variable	Husbands	Wives
Labour force participation[a]	0.886	0.734
Hourly wages	10.601	7.773
Hope-Goldthorpe scores	50.482	45.536
Age	38.314	37.332
Ethnic origin		
White	0.965	0.974
Black	0.006	0.005
Indian	0.017	0.014
Bangladeshi and Pakistani	0.004	0.001
Other	0.008	0.006
Education		
No qualification	0.147	0.152
Less than O level (or equivalent)	0.080	0.105
GCSE/O level (or equivalent)	0.199	0.264
A level (or equivalent)	0.141	0.113
Higher vocational degree	0.286	0.246
University or higher degree	0.147	0.120
Marital status		
Legally married	0.825	0.815
In live-in partnership	0.175	0.185
Housing tenure		
Owner (mortgage)	0.082	0.086
Owner (outright)	0.752	0.753
In social housing	0.094	0.092
In rented accommodation	0.072	0.069
Number of dependent children by age:		
0-2	0.135	0.088
3-4	0.133	0.093
5-11	0.437	0.373
12-15	0.219	0.221
16-18	0.044	0.044
Years of previous part-time work experience	0.370	5.088
Years of previous full-time work experience	20.800	10.307
Trade union covered	0.449	0.492
Sector		
Private	0.808	0.625
Civil service	0.038	0.040
Local government	0.079	0.179
Other public sector	0.045	0.110
Non profit	0.030	0.046
Occupation		
Managerial	0.209	0.100
Professional	0.117	0.107
Technical	0.099	0.117
Clerical	0.062	0.293
Craft	0.222	0.027
Protection/personal services	0.057	0.145
Sales	0.040	0.092
Manual semiskilled	0.140	0.039

Other unskilled	0.054	0.080
Industry		
Primary	0.026	0.006
Energy & water	0.029	0.007
Extraction/manufacturing	0.045	0.018
Metal goods	0.137	0.040
Other manufacturing	0.110	0.068
Construction	0.100	0.010
Distribution, hotels & catering	0.142	0.218
Transport and communication	0.087	0.032
Banking, finance & insurance services	0.131	0.145
Other services	0.193	0.456
Region of residence		
Greater London	0.085	0.086
Rest of South East	0.205	0.202
South West	0.092	0.089
East Anglia	0.041	0.040
East Midlands	0.094	0.091
West Midlands conurbation	0.031	0.029
Rest of West Midlands	0.059	0.059
Greater Manchester	0.033	0.036
Merseyside	0.020	0.018
Rest of North West	0.048	0.054
South Yorkshire	0.027	0.030
West Yorkshire	0.036	0.035
Rest of Yorkshire & Humberside	0.038	0.037
Tyne & Wear	0.018	0.019
Rest of North	0.042	0.042
Wales	0.044	0.041
Scotland	0.087	0.092
Number of individuals	2,997	2,902
Number of person-wave observations (N)	16,040	17,647

Note: Figures are means computed over the number of person-wave observations with positive wages (and positive Goldthorpe-Hope score).

[a] Computed over all person-wave observations, including those for which the individuals are not in a paid job: N=18,100 for men and 19,351 for women.

Table A2: The impact of own and partner's education and family background on labour market outcomes OLS estimates (Robust standard errors in parentheses)

	Husbands			Wives		
	Labour market participation	Log hourly wages	Log HG scores	Labour market participation	Log hourly wages	Log HG scores
Own education: (γ_1)						
Less than O level	0.004	0.093*	0.076**	0.041	0.069*	0.075**
	(0.016)	(0.037)	(0.026)	(0.026)	(0.034)	(0.027)
GCSE/O level	0.021	0.154**	0.112**	0.111**	0.085*	0.098**
	(0.012)	(0.028)	(0.020)	(0.020)	(0.043)	(0.032)
A level	0.013	0.176**	0.174**	0.119**	0.112*	0.158**
	(0.013)	(0.031)	(0.022)	(0.022)	(0.058)	(0.036)
Higher vocational degree	0.031**	0.257**	0.227**	0.160**	0.167*	0.252**
	(0.011)	(0.031)	(0.020)	(0.019)	(0.065)	(0.040)
University or higher degree	0.031*	0.387**	0.368**	0.182**	0.233**	0.422**
	(0.013)	(0.041)	(0.023)	(0.019)	(0.085)	(0.047)
Partner's education: (γ_4)						
Less than O level	0.037**	-0.003	0.024	0.032	0.060	0.003
	(0.010)	(0.031)	(0.022)	(0.029)	(0.031)	(0.029)
GCSE/O level	0.047**	0.029	0.022	0.014	0.039	0.051*
	(0.010)	(0.028)	(0.020)	(0.025)	(0.027)	(0.023)
A level	0.045**	0.071*	0.067**	0.025	0.046	0.075**
	(0.010)	(0.034)	(0.024)	(0.027)	(0.030)	(0.025)
Higher vocational degree	0.044**	0.023	0.049*	-0.001	0.081**	0.085**
	(0.010)	(0.029)	(0.020)	(0.024)	(0.027)	(0.021)
Higher degree	0.027	0.081*	0.084**	-0.036	0.068*	0.105**
	(0.015)	(0.037)	(0.024)	(0.034)	(0.034)	(0.026)
Ever lived in a non-intact family[‡] (γ_2)	-0.031**	-0.022	-0.001	-0.055**	-0.008	-0.019
	(0.012)	(0.022)	(0.015)	(0.018)	(0.021)	(0.017)
Father's occupation: (γ_2)						
Managerial[§]	-0.006	0.008	0.084**	0.045	0.006	0.049*
	(0.016)	(0.030)	(0.019)	(0.025)	(0.029)	(0.022)
Professional[§]	0.004	0.039	0.049*	0.011	0.021	0.060*
	(0.021)	(0.040)	(0.024)	(0.034)	(0.040)	(0.025)
Technical[§]	-0.037	0.040	0.109**	0.023	0.052	0.006
	(0.033)	(0.053)	(0.028)	(0.042)	(0.063)	(0.034)
Clerical[§]	0.016	0.024	0.029	-0.040	0.071	-0.026
	(0.017)	(0.040)	(0.030)	(0.041)	(0.047)	(0.035)
Craft[§]	-0.003	0.048*	0.036*	0.035	-0.009	0.033
	(0.012)	(0.024)	(0.016)	(0.022)	(0.023)	(0.020)
Protection/personal services[§]	-0.004	-0.032	0.037	0.037	-0.073	0.003
	(0.025)	(0.042)	(0.025)	(0.035)	(0.045)	(0.029)
Sales[§]	-0.021	-0.023	0.023	0.038	-0.031	0.072
	(0.029)	(0.044)	(0.037)	(0.043)	(0.051)	(0.039)
Manual semiskilled[§]	-0.005	-0.013	-0.004	0.039	-0.050	-0.001
	(0.013)	(0.027)	(0.019)	(0.023)	(0.029)	(0.023)
Mother was: (γ_2)						
In work[§]	0.004	0.024	0.002	0.042**	-0.068*	0.011
	(0.009)	(0.017)	(0.011)	(0.016)	(0.026)	(0.017)
In professional/managerial occupation[§]	0.013	0.017	0.004	0.024	0.009	0.027
	(0.018)	(0.038)	(0.026)	(0.031)	(0.038)	(0.023)

Partner ever lived in a non-intact family‡ (γ_5)	0.003	-0.039	-0.008	0.006	-0.034	-0.020
	(0.011)	(0.023)	(0.014)	(0.020)	(0.020)	(0.017)
Father-in-law's occupation: (γ_5)						
Managerial§	0.016	0.004	0.016	-0.080**	0.011	0.009
	(0.012)	(0.028)	(0.018)	(0.029)	(0.030)	(0.021)
Professional§	0.002	0.006	-0.017	-0.150**	0.065	0.014
	(0.018)	(0.032)	(0.023)	(0.048)	(0.038)	(0.025)
Technical§	-0.005	0.059	-0.045	-0.118*	0.001	0.009
	(0.023)	(0.050)	(0.037)	(0.052)	(0.046)	(0.037)
Clerical§	-0.001	-0.029	-0.028	-0.049	0.014	-0.013
	(0.023)	(0.047)	(0.028)	(0.044)	(0.040)	(0.033)
Craft§	0.009	0.047*	-0.005	-0.005	0.032	0.016
	(0.012)	(0.023)	(0.016)	(0.023)	(0.024)	(0.018)
Protection/personal services§	0.017	-0.015	-0.015	-0.023	-0.001	0.006
	(0.016)	(0.036)	(0.027)	(0.040)	(0.054)	(0.031)
Sales§	0.062**	0.121*	0.011	-0.040	0.041	-0.021
	(0.009)	(0.058)	(0.042)	(0.047)	(0.041)	(0.036)
Manual semiskilled§	-0.006	0.037	-0.013	-0.012	0.018	0.024
	(0.015)	(0.027)	(0.019)	(0.025)	(0.026)	(0.022)
Mother-in-law was: (γ_5)						
In work§	0.012	0.007	-0.002	0.020	0.014	0.001
	(0.009)	(0.017)	(0.012)	(0.016)	(0.018)	(0.013)
In professional/managerial occupation§	0.017	0.027	-0.024	0.001	0.022	(0.041)
	(0.021)	(0.038)	(0.023)	(0.035)	(0.038)	(0.024)
Pseudo R^2	0.202			0.167		
R^2		0.316	0.318		0.371	0.332

Note: For definitions and other control variables included in each regression, we follow the same procedures described in the note of Table 1.
‡ denotes a variable that is measured over the entire childhood (ages 0-15) of the partner.
§ denotes a variable that is measured when the partner was aged 14.
** $p<0.01$, * $p<0.05$

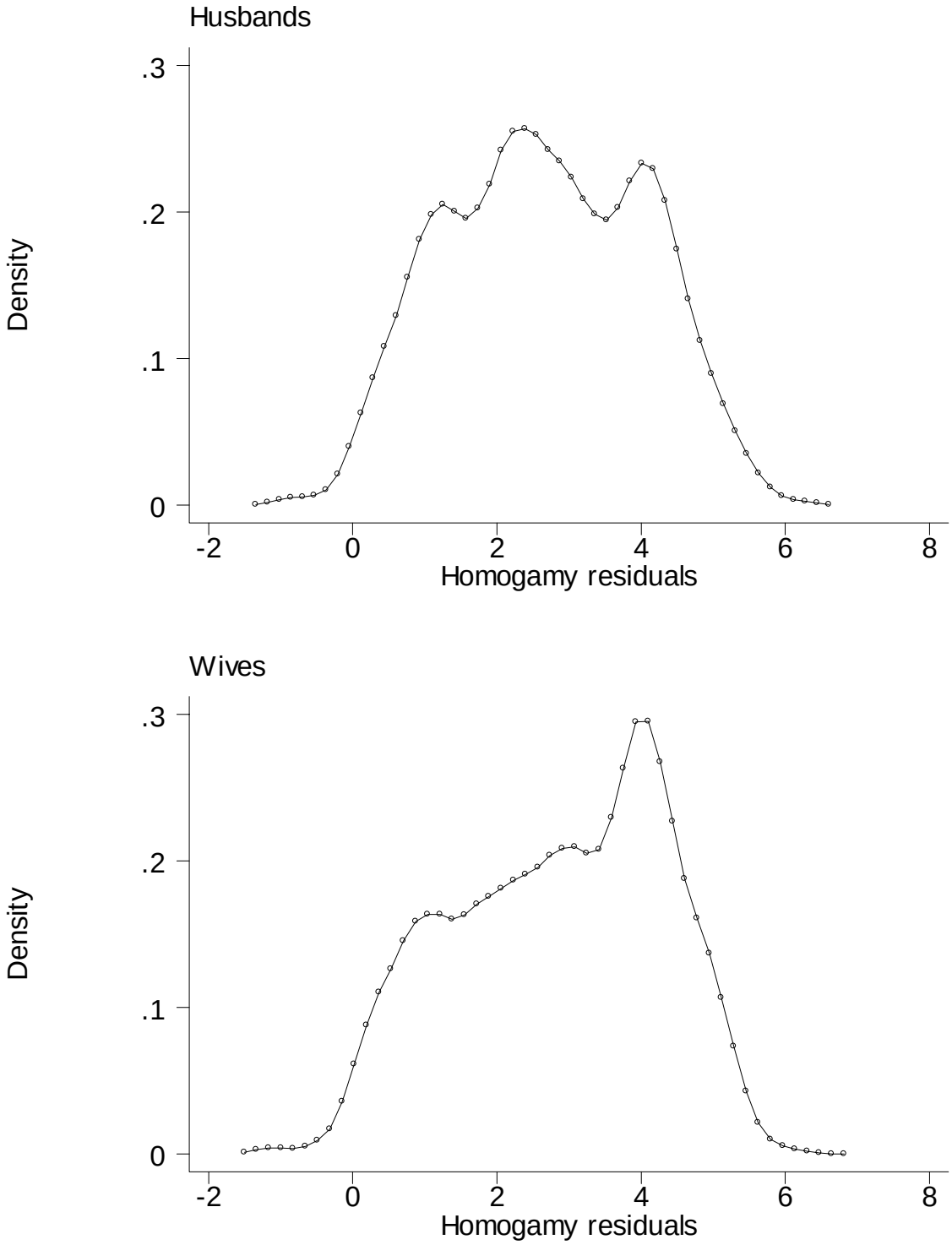
Table A3: The relationship between homogamy residuals and the other observable variables used in the analysis

Variable definition	Number of variables	Husbands	Wives
Part-time work experience	2	1.83	0.51
		(0.160)	(0.598)
Full-time work experience	2	4.22*	3.63*
		(0.015)	(0.027)
Ethnic origin	4	0.30	0.50
		(0.881)	(0.737)
In a cohabiting union	1	0.32	0.00
		(0.572)	(0.967)
Housing tenure	3	4.13*	15.16*
		(0.006)	(0.000)
Region of residence	16	0.66	1.55
		(0.833)	(0.074)
Education	5	7.22*	9.98*
		(0.000)	(0.000)
Occupation	8	0.66	1.42
		(0.726)	(0.183)
Industry	9	1.02	1.61
		(0.424)	(0.106)
Trade union coverage	1	0.04	0.05
		(0.848)	(0.830)
Employing sector	4	0.24	0.31
		(0.918)	(0.871)
Number of children by age	5	0.18	0.44
		(0.969)	(0.821)
Ever lived in a non-intact family	1	0.13	0.69
		(0.722)	(0.407)
Father's occupation	8	0.72	1.39
		(0.675)	(0.194)
Mother worked	1	0.41	1.02
		(0.520)	(0.313)
Mother in professional/managerial occupations	1	0.10	0.47
		(0.750)	(0.492)

Note: These figures come from OLS regressions of the homogamy residuals (dependent variable) obtained from the ordered probit models presented in Table 2 on the entire set of variables used in the analysis. The table reports F-statistics (*t*-statistics) for the joint (single) significance of the variables listed. The *p*-values of the tests are in parentheses.

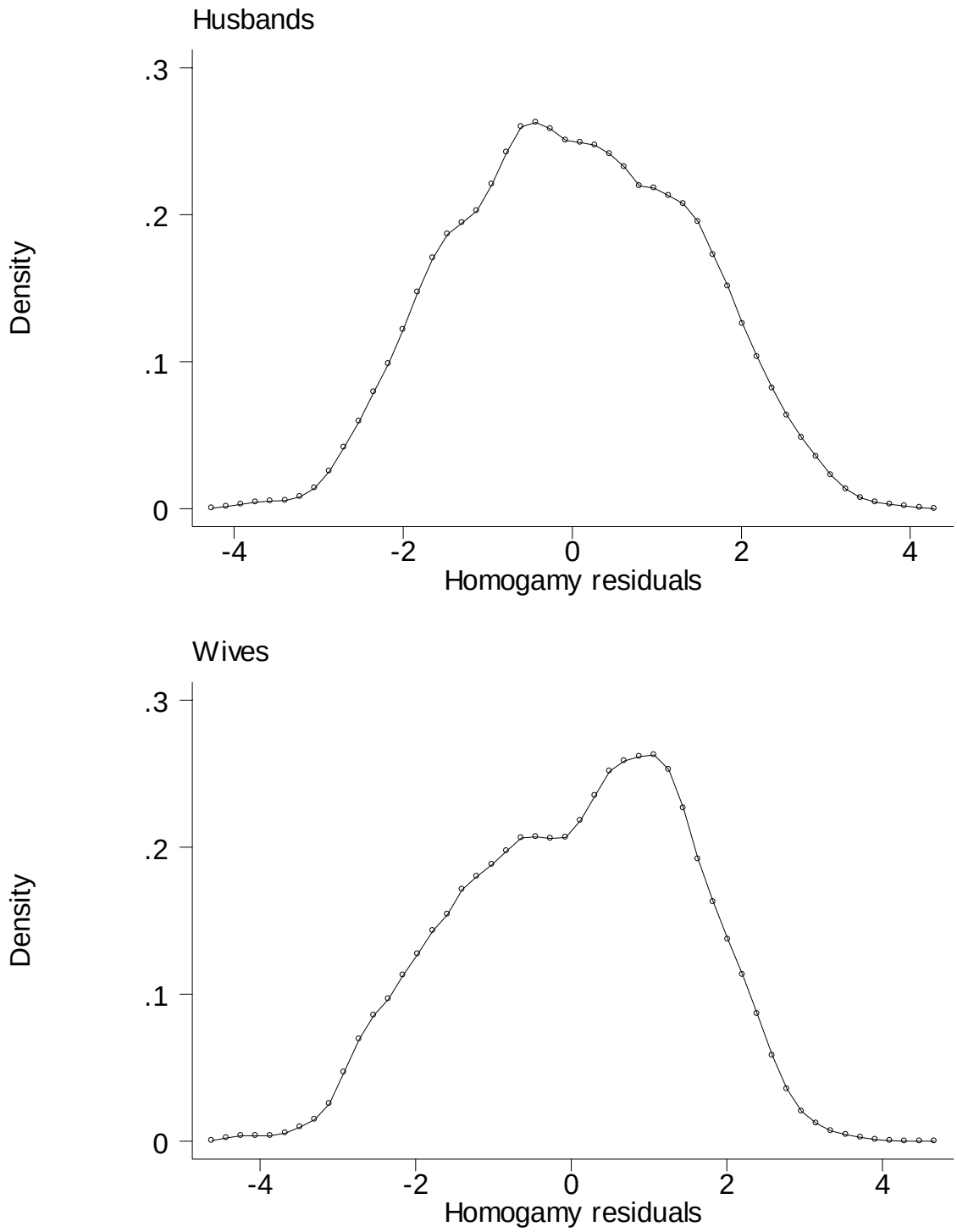
* denotes that the corresponding variable(s) is (are) significantly correlated to the homogamy residuals at the 5-percent level or less.

Figure 1: Kernel density estimates of the homogamy residuals by gender



Note: 'Homogamy residuals' are obtained from the ordered probit regressions reported in Table 2.

Figure 2: Kernel density estimates of the homogamy residuals by gender



Note: 'Homogamy residuals' are obtained from the OLS regressions reported in Table 2.