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Original Article

Change in Spousal Human Capital and Housework: A Longitudinal Analysis

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Abstract

We bring a novel, longitudinal, perspective to an ongoing series of influential papers that investigates the relationship between housework, marital bargaining, and spousal resources. For the first time, we believe, in this long debate, we combine a longitudinal perspective with a measure of resources—human capital—that provides an indicator of the likely economic bargaining power of the non-employed, thereby enabling their inclusion in analysis. We use longitudinal fixed-effects models to address the relationship between housework hours and spousal resources based on yearly couples' data from the nationally representative British Household Panel Study ($N = 6{,}541$ couples). Using the measure of human capital, we find change in wives' own human capital to be the most important factor determining housework for both spouses, and no evidence for gender deviance neutralization. We conclude it is women's resources that are the critical determining factor in bargaining over housework.

Over the past 20 years a series of influential papers have investigated the relationship between couples' earned income and housework (e.g. Brines, 1994; Greenstein, 2000; Bittman *et al.*, 2003; Evertsson and Nermo, 2004; Gupta, 2007; Gupta and Ash, 2008; Killewald and Gough, 2010). The assumption underpinning this literature is that spousal economic resources are instrumental in determining the outcome of spousal marital bargaining over desirable and undesirable activities. One of the more controversial findings to emerge suggested that women who earn more than their husbands do more housework to compensate for their non-normative economic status, and that, for the same reasons, unemployed husbands do less housework than equivalent men in employment (the so-called 'gender deviance neutralization' effect).

In this article we use nationally representative, yearly longitudinal British couples' data to assess whether change in partners' relative or absolute resources is associated with change in their housework time, or the couples' share of housework. We combine this longitudinal perspective with a measure of resources—human capital—that, very unusually in this literature, provides an indicator of the underlying marital bargaining power of the non-employed, enabling their inclusion in analysis.

The majority of the sociological literature on this topic has been based on cross-sectional analysis. The cross-sectional approach, however, is dogged by problems of selection bias. Longitudinal data allow inferences of causal rather than simply associative relationships to be made with greater confidence. A measure of human capital serves as a useful extension to the standard analysis of current earnings as the measure of spousal economic resources. In particular, it enables the assessment of the contributions of non-earners (e.g. women or men who are unemployed or on parental leave) to housework. Using this wider measure of

economically salient resources, we test the effect of spousal absolute and relative resources on housework time, comparing our results to previous research in this tradition that has addressed the relative strengths of marital bargaining theory against gender deviance neutralization.

Review of Literature

The relationship between housework, marital power, and spousal relative resources was first advanced by Blood and Wolfe (1960), and the continuing importance of housework as an indicator of marital power was underlined by Davis and Greenstein in their editors' introductory article to an entire issue of *Journal of Family Theory and Review* devoted to the topic of household labour (Davis and Greenstein, 2013). The studies referred to in the review of literature below took housework as their dependent measure in an effort to determine how the spousal division of this undesirable, feminine-associated, activity can be best explained by the competing hypotheses of economic bargaining or *gender deviance neutralization* (see, for example, Bittman *et al.*, 2003; Gupta, 2007).

Economic bargaining theory suggested that the allocation of housework depends on the distribution of marital power between spouses, which in turn depends upon their relative economic resources (i.e. their 'economic dependency'). Spouses can use economically based bargaining power to reduce their own time in housework, and increase that of their partner. In contrast, the theoretical base for gender deviance neutralization lies in the *doing gender* perspective (West and Zimmerman, 1987). Within this perspective, women 'display' their gender by doing the bulk of feminine-defined tasks such as routine housework, while men 'display' theirs by doing none or very little of it. Gender deviance neutralization occurs when men who were not fulfilling their normative breadwinner role compensate by emphasizing their masculinity through the minimal performance of housework, while women who earn substantially more than their spouses compensate by emphasizing their femininity through the over-performance of housework. In fact, as Bittman *et al.* (2003) point out, the two hypotheses are not necessarily mutually exclusive. The fact that this debate is still active is testimony to the importance of this topic to our understanding of the processes of marital bargaining.

Earlier papers in this area suggested that there was a linear dependence between relative spousal earned incomes (the usual measure of economic dependency) and the division of housework within couples, supporting the suppositions of economic bargaining theory. In general, the higher the earned income of a member of the couple relative to their spouse, the less housework they performed (e.g. Brines, 1994; Presser, 1994; Greenstein, 2000). But at the same time highly influential evidence was also found for a gender deviance neutralization effect—so-called by Bittman *et al.* (2003). Brines's analysis of Panel Study of Income Dynamics data from 1985 found a curvilinear relationship between relative income and men's housework hours (based on the squared term of relative income). This was interpreted to mean that husbands who were more economically dependent did less housework than others, as a means of emphasizing their masculinity. She found no support for the existence of any complementary behaviour by breadwinner wives (women who earn substantially more than their spouses emphasizing their femininity through the over-performance of housework). However, using the 1987/1988 National Survey of Families and Households (NSFH), Greenstein (2000) concluded that both economically dependent men and breadwinner wives tended to neutralize their deviant identity by undertaking less housework (in the case of economically dependent men) or more housework (in the case of breadwinner wives). These analyses lent strong support to gender theory by seeming to demonstrate that in certain structural situations the power of gender can override the power of money.

Studies, thereafter, have produced mixed results. Using the Australian 1992 Time Use Survey, Bittman *et al.* (2003) again found curvilinear relationships, indicating gender deviance neutralization, between relative spousal earnings and housework hours in the case of women but not in the case of men. Only among couples with breadwinner wives was the gender deviance neutralization effect evident. A comparative, quasi-longitudinal, perspective was introduced by Evertsson and Nermo (2004), who compared Swedish and US couples in the period between 1973 and 2000 using Panel Study of Income Dynamics (PSID) and the Swedish Level of Living Survey data. They reported persistent evidence of gender deviance neutralization only among women in the United States. They followed up with a similar study of a more limited number of surviving Swedish couples from the Level of Living Survey who had remained together over the period 1991–2000 (Evertsson and Nermo, 2007), finding that increases in all three of their measures of a woman's relative resources (education, occupation, and earnings) were

linearly associated with decreases in her share of housework, and that this decrease mostly occurred through increases in the male partners' housework hours. However, they again found no evidence for a gender deviance neutralization effect in the Swedish data. Kan's (2008) analysis of pooled cross-sectional British Household Panel Data over the period 1993–2003 (utilizing an earlier version of the human capital measure described in this article) found support for a negative linear effect of relative income on housework hours, but no conclusive evidence for gender deviance neutralization.

Following the intense interest generated by the findings on gender deviance neutralization—frequently misinterpreted in the media to mean that high-earning professional women with demanding full-time jobs also do an excess of compensatory housework—more recent research has focused on an exploration of gender deviance neutralization among full-time employed couples (to overcome the problem of missing values on the earnings variable). Using NSFH data, Gupta (2007) introduced a new dimension into the argument. While the main variable used to explain husbands and wives' housework hours in the literature to date had been relative spousal earned incomes ('who earns more'), Gupta asked what the effect of including the absolute incomes of husbands and wives would be. He found that the relative earnings of full-time employed women contributed little to the explanation of housework hours when their absolute earnings were also included in the model. He concluded that it was these women's absolute, rather than their relative, earnings that determine their housework hours, dubbing this the *women's autonomy* model (Gupta, 2007; Gupta and Ash, 2008). The argument goes that, for full-time employed women, higher absolute, rather than relative, earnings are the most important factor in being able to get out of doing the housework. He also noted that the simplest potential explanation for this is that such women use their earnings to purchase substitutes for their own domestic work. However, recent research has shown this 'outsourcing' explanation to be something of a red herring, at least in respect to housework. One of the main findings, from several countries, is that relatively few households (less than 10 per cent) outsource routine domestic tasks (as opposed to child care—Sullivan and Gershuny, 2013; Bittman, Matheson and Meagher, 1999; de Ruijter, 2004; Stancanelli and Stratton, 2010). Moreover, outsourcing does not seem to have a strong impact in multivariate analysis on women's overall hours of housework (Sullivan and Gershuny, 2013; Killewald, 2011).

Recently, in a continuation of the debate, but again analysing only full-time employed couples, Killewald and Gough found no longitudinal relationship in the PSID data between changes in women's relative earnings and their housework (Killewald and Gough, 2010). However, they demonstrated a non-linear association between changes in women's absolute earnings and housework, arguing that previous findings of a curvilinear relationship between relative earnings and housework could be accounted for by a misspecification of the relationship between women's absolute earnings and their housework time as linear. The combination of the importance of women's absolute earnings, as demonstrated by Gupta (2007), and of their non-linear relationship with housework hours, as demonstrated by Killewald and Gough (2010), could be sufficient to account for the contrary findings of Schneider (2011) who, using American Time Use Study data, once more found evidence for a curvilinear relationship between relative earned income and wife's housework hours. For a more comprehensive review of the literature on gender deviance neutralization (see Sullivan, 2011).

The question of whether to include non-earners in the analysis of economic bargaining power has been a thorny question through this debate, and has led some recent researchers to include in their analyses only those couples where both spouses were in full-time employment (e.g. Gupta, 2007; Killewald and Gough, 2010), leaving others to assess the contribution of unemployed spouses to housework separately (e.g. Gough and Killewald, 2011). The majority of analyses have taken the option of including non-employed spouses, but accorded them an economic resource score of zero. While this may be the correct treatment if one adopts the narrowest economic definition of the determinants of marital bargaining power, the sociological tradition of relative resource theory presents a wider perspective on marital power, in which current earnings represent just one aspect of a wide range of potential resources which may be brought into play in couples' bargaining processes (Blood and Wolf, 1960). We, therefore, argue that for certain groups of people, in particular women who have taken time out of employment to care for children, a measure of human capital, based on a range of market-related factors (such as educational achievement and employment/occupational histories), is likely to more accurately reflect their real marital bargaining power. For example, a highly paid career woman on maternity leave is likely to be in a more powerful position to bargain within her relationship than one who has very little employment experience and who has been continuously unemployed. And if her marriage should

end, her accrued human capital resources would put her in a relatively strong economic position (certainly stronger than that of her counterpart, despite their equal zero current earnings), a factor that, according to standard divorce-threat bargaining theory (Lundburg and Pollak, 1993), should also have the effect of increasing her current marital bargaining power.

The measure of human capital that we employ, following the sociological approach, is based upon a wider definition of economically salient spousal resources than current earnings alone. Using this measure we are able to assess the relationship between spousal relative resources and housework hours across the whole range of the observed spousal resources distribution, including those couples where one partner is not in paid employment. A few researchers (e.g. Presser, 1994; Evertsson and Nermo, 2004, 2007) have previously included other more inclusive measures of relative resources in their analyses (e.g. relative spousal educational levels). However, because these other measures were directly compared with relative earnings within the same models, the analyses of these papers did not include the non-employed, a group that, as we show below, represents a very substantial sub-group of the population.

Data and Method

The British Household Panel Study (BHPS) is a large-scale nationally representative annual panel survey based on interviews with all adult members of a random sample of British households. The original BHPS sample consisted of 5,050 households containing 9,092 interviewed adults at Wave 1 (1991), a response rate of 74 per cent of eligible households, with re-interview rates rising to well above 90 per cent. Panel data are collected together with retrospective information on employment and other circumstances prior to the start of the panel.

For our purposes the BHPS has a number of advantages. First, the collection of information from all adult household members permits the direct calculation of couples' relative resources and contributions to domestic labour. Secondly, detailed current and retrospective information on employment, occupation, and wage data allows us to use historical and other accumulated personal characteristics to construct a measure of economically salient human capital. Finally, panel data can give us an insight into causal relationships between changes in respondents' characteristics and behaviour.

The sample used in this study consisted of couples aged 20–59 who defined themselves as married or living as married. The point about a sample of couples is that relative resources may be calculated for actual couples. For simplicity, we have referred throughout to these couples as 'wives and husbands', rather than the more cumbersome 'female partner' and 'male partner'. Consistent with previous research, we excluded from our analyses same-sex couples, those in full-time education, and the long-term sick/disabled. Following these exclusions, we arrived at a total sample size of 27,413 observations from 3,810 couples for the analyses based on human capital. For those analyses where the main explanatory variable was based on earned income, there are two options in terms of sample selection. The first is to include the non-employed, according them a score of zero—a strategy which we have argued risks distorting the measurement of their actual bargaining power. The second option, as in most of the recent literature, is to include only employed couples. We chose the second option for our models based on earned income—selecting those couples where both partner had some earned income (i.e. including the part-time employed but excluding the non-employed). This results in a smaller sample size of 19,848 observations from 3,163 couples.

Variables

Ranges, means, and standard deviations for the variables described in this section are shown in Table 1A. In most previous research on this topic the dependent measure of time spent in housework has been derived from a question asking respondents to estimate their weekly hours in housework (or in various components of housework). The two main data sources used in this area of research have been the PSID and the NSFH because of their sample size and coverage of a large range of socio-economic and demographic variables—advantages which are shared by the BHPS. However, a few studies in this area (e.g. Bittman *et al.*, 2003; Connelly and Kimmel, 2007; Schneider, 2011) have based their analyses on time-diary information, which is generally acknowledged to yield a more accurate measure of time spent in specific activities (Robinson, 1985). Nevertheless, we considered that for the purposes of this study the advantage of having panel couple data from the BHPS—including retrospective education and employment histories and permitting longitudinal analysis—outweighed the disadvantages associated with the use of stylized questions. The BHPS question about housework time is similar to that from the PSID:

'About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning and doing the laundry?'

The focus of this measure is on the core, routine, aspects of housework that are traditionally feminine-defined, and widely regarded as undesirable. The main advantage that the BHPS has over the PSID is that the information is collected directly from both partners: in the PSID one partner (which, at least in the past, was usually the man) reports on the hours of housework contributed by their spouse, a methodology generally regarded as problematic (see Bryant *et al.*, 2003). The American Time Use Survey (ATUS), similarly, only collects diary information on time use from one member of each household, with the result that no measure of the relative share of housework is calculable.

With respect to the independent variables, all the papers referred to above have used the calculation of 'income transfer' introduced originally by Sorensen and McLanahan (1987) as their primary explanatory variable. This measure deducts one spousal income from the other and divides the result by the total combined spousal income, creating an index of relative spousal earned income. However, as we have argued, the absence of a current wage for people who are not in employment does not necessarily mean that they have zero economic bargaining power. The gap between a measure of relative earned income and actual bargaining power is likely to be most acute for women because of the burden of caring responsibilities. At any one point in time a woman's current income may, therefore, represent a substantial underestimation of her economically salient resources as measured through her education, occupation, and employment history.

To illustrate the extent of the omission of the non-employed from analyses of the relationship between relative resources and housework, Table 1 shows the percentages of non-employed wives and husbands across the distribution of relative spousal human capital. At the extreme end of the distribution where wives' human capital was at its highest relative to their husbands', 26 per cent of husbands were not in employment. The equivalent percentage for wives at the opposite end of the distribution of relative human capital was 36 per cent not in employment. The implication is that over one quarter of husbands and a third of wives at these points of the distribution of relative spousal human capital have been treated in previous earnings-based analyses as either (1) excluded or (2) having zero resources. The impact of this exclusion and its effect on interpretation are discussed below, with reference to Table 2.

In response to these considerations, the measure of spousal relative resources that we estimate (human capital) takes into account a range of market-related factors, such as educational achievement and employment/occupational histories. Support for this combinatory approach comes from Evertsson and Nermo (2007), who compared spousal education, job status, and earned income as measures of relative resources, finding for all three measures very similar patterns of relationship to spousal housework hours. The human capital measure, a continuously scaled indicator designed originally as a tool to investigate patterns of differentiation in life chances, is calculated from retrospective (recall) and prospective (panel study) evidence on individuals' educational qualifications, recent experience in employment and non-employment, current wage (for those in employment), and present or previous occupational membership using data from all the currently available waves of the BHPS (Gershuny, 2000; Kan and Gershuny, 2006). The calculation of this measure is described in greater detail in Appendix B.

The relative human capital measure was calculated in the standard way as the wife's human capital score minus that of her husband, divided by the overall combined score of husband and wife. We followed the analytic strategy of previous authors and controlled for other demographic variables known to affect time spent in housework: age of the respondent (and its squared term) and the number of own children aged under 18 in the household. For our cross-sectional comparison of the spousal resource measures using the pooled panel data we included a marker for survey wave and its squared term, since recent years have shown a levelling-off of the rate of decline in the proportion of domestic labour done by women, leading some commentators to refer to a

Table 1. Percentage of wives and husbands not in employment by spousal relative human capital; BHPS 1992–2008 (pooled) sample

	Grouped relative human capital (wife−husband)/(wife+husband)					
	Lowest to −0.30	−0.29 to −0.10	−0.09 to 0.09	0.10 to −0.29	0.30 to highest	Number of observations
Per cent wives not in employment	36	25	17	13	8	27,034
Per cent husbands not in employment	3	6	11	17	26	27,034
Number (per cent) of observations	4,278 (16)	9,761 (36)	9,421 (35)	3,028 (11)	546 (2)	27,034

Table 2. OLS regression of housework hours on different measures of resources: BHPS 1992–2008 (pooled)

	Wives' housework hours			Husbands' housework hours		
	Earned income[a]	Wage rate[a]	Human capital[a]	Earned income[a]	Wage rate[a]	Human capital[a]
Wife's resources	−0.01***	−0.32***	−3.43***			
Wife's resources squared	0.00***	0.00***	0.16***			
Husband's resources				−0.00**	−0.03	−0.69***
Husband's resources squared				−0.00*	0.00*	0.04***
Relative resources	−0.21	−1.09**	−2.18*	1.05***	1.10***	4.49***
Relative resources squared	−0.67	0.62	−0.86	−0.36	−0.27	2.85*
Hours employed/week	−0.31***			−0.16***		
Hours employed/week squared	0.26***			0.13***		
Number of children less than 18 years	2.04***	3.19***	3.56***	0.49***	0.48***	0.49***
Wife's age	0.46***	0.26**	0.65***	0.03	0.01	−0.02
Wife's age squared/100	−0.32**	−0.01	−0.49***	−0.04	−0.01	0.03
Wave	−0.48***	−0.55***	−0.57***	−0.13**	−0.14***	−0.15***
Wave squared/100	1.20***	1.39***	1.99***	0.65***	0.71***	0.69***
Intercept	13.23***	7.96***	12.52***	10.09***	6.00**	9.08***
Model R^2	0.25	0.18	0.22	0.03	0.02	0.04
Number of observations	19,848	19,848	27,413	19,848	19,848	27,413
Number of clusters	3,163	3,163	3,810	3,163	3,163	3,810

$^{***}P < 0.001$, $^{**}P < 0.01$, $^{*}P < 0.5$.

[a]Note that all models include relative and own resources, and not spousal resources, due to the direct mathematical dependence between these three variables (knowing two of them enables the calculation of the third). Relative resources represent the effect of spousal resources when own resources are held constant.

slowing or stalling of the trend towards convergence (e.g. England, 2010). We also included hours of paid work in the model for earned income only. In the previous literature based on earned income, this variable has been included as a test of 'time availability'. However, there is a serious problem with using paid work hours as a *predictor* of unpaid work hours, since we can assume that in most household decision-making the two are jointly dependent. This joint dependency will have the result of creating significant model endogeneity. We include it here, for the earned income model only, to provide a better comparison with previous literature.

To test the robustness of the human capital measure against other measures of spousal resources used in previous analyses, we compared the cross-sectional relationship between wives' and husbands' housework and their human capital, with that based on earned income and the wage rate (earned income divided by hours in employment). We analysed pooled BHPS couples' data from the period 1992 to 2008 (the 1991 wave did not include a question on housework hours), using ordinary least squares regression to compare our results to previous research. For the longitudinal analyses we used fixed-effects regression, modelling change in wives' and husbands' housework hours by changes in absolute and relative human capital across the same waves of the BHPS panel. A year-on-year change model calculated as a robustness check produced very similar outcomes to the fixed-effects model, giving us more confidence that other period-effect changes over the period analysed, such as changes in gender expectations or divorce rates, did not significantly affect our findings.

Findings

Cross-Sectional Comparison of Human Capital with Other Resources Measures

Table 2 shows regression statistics and coefficients from models comparing the effects of different measures of spousal economic resources on housework hours. Note first the differences in the number of observations. After excluding couples where one or both spouses were non-employed, the models for earned income and the wage rate were based on 7,500 fewer observations than the model for human capital. In terms of model fit (R^2), there was not a great difference between the models. However, as we have noted, the earned income model not only excludes a substantial proportion of the population but is also likely to suffer from model endogeneity, which would

artificially inflate the variance explained. The wage rate measure of relative resources takes hours of employment out of the right-hand side of the equation. The effect is to reduce the variance explained; R^2s for this model were somewhat lower for both husbands and wives than in the model including earned income. The human capital model, however, is conceptually more akin to that for wage rate, yet its explanatory power in relation to time spent in housework was greater. The reason is that this model contains a substantially larger number of observations (reflecting the inclusion of the non-employed population). The inclusion of this group enables the assessment of whether there is indeed a monotonic relationship between relative resources and housework hours at the extreme ends of the spousal resources distribution.

The signs of the coefficients for the measures of absolute resources are for the most part consistent across the measures—both husbands and wives with higher absolute resources spent less time in housework than those with lower resources. There was an interesting difference in the model coefficients for women and men, however, that resonates with more recent findings from the previous literature. Across the models, the negative coefficient for own absolute resources was larger for wives than for husbands, while the effect of relative resources appeared to be larger for husbands than for wives. Due to the mathematical dependency between the terms, in the model for husband's housework time, we may infer the effect of wife's resources from the relative resources term (i.e. while holding his own resources constant), and vice versa. These results, therefore, indicate that the wife's own resources have a greater effect on her husband's housework time than his resources do on hers, and her housework time is more affected by her own resources than by her husband's.

The positive squared term of absolute own resources for both wives and husbands appears to suggest a non-linear relationship. The gender deviance neutralization hypothesis has frequently been (mis)interpreted as meaning that well-off professional wives do increased compensatory amounts of housework, and that men with very little economic resources emphasize their masculinity by doing correspondingly little housework—and at first sight there would appear to be some support for that idea in this finding. However, since the coefficients of a regression line predict values of the dependent variable according to a mathematical relationship continuing beyond the observed values, it is never clear from the statistical significance of coefficients alone whether there is in fact any turn-up within the observed range of the independent variable, or merely a slowing in the rate of decline. Below we graph regression predictions from the coefficients for these models, giving us a picture of the pattern of the relationship across the observed distribution of spousal relative resources.

The model coefficients for relative resources were also as expected from previous literature. The greater the relative resources of wives, the less housework they did on average (negative coefficient) and the more their partners did (positive coefficient). As noted above, for husbands the association of housework with relative resources were much more important than that for absolute resources—the reverse of the finding for women.

The main thing of note in relation to the comparison of measures was that the squared coefficients for the earned income and human capital models for husbands were different in sign. Although non-significant, for those models based on earned income, there was a positive coefficient for earned income and a negative one for earned income squared, interpreted in some of the previous literature as indicating a slowing down or reversal of the increase in husband's housework time as their female partner's resources increased relative to their own. In contrast, for the human capital model (which includes unemployed husbands) the direction of the squared term was positive, and was strongly statistically significant. This suggests (but, as we have argued above, does not absolutely demonstrate) a progressive rate of increase in husband's housework time as their partner's resources increase relative to their own. To see the effects of the coefficients across the range of spousal relative resources we need to examine the model predictions (see below).

Findings were consistent in the expected directions for the control variables. There was an overall decrease in the time spent on housework over the period 1992–2008, which was greater for wives than for husbands (although the statistically significant squared term does imply a slowing of this decline in more recent years). The number of children aged under 18 in the household had a significantly positive effect on housework time for both spouses, while age was positively associated with housework for wives, but had no effect for husbands. For the earned income model, employment hours had the expected negative effect on housework time for both wives and husbands.

As we have argued, rather than rely on the sign and significance of model coefficients to assess the shape of the relationship between housework hours and resources, it is also important to graph the model predictions. Figure 1 shows predicted housework hours for husbands and wives based on wage rate and human capital. The model predictions are based on the coefficients presented in Table 2, and instantiated for 1999 (midway

through the 17 panel waves), for households with one dependent child where the wife is aged 41. These instantiations of the regression predictions for specific values of the independent variables allow us to see graphically the combined effect of the regression model coefficients across the observed range of couple's relative resources. The horizontal axis shows the range of couples' relative resources (in deciles)—from couples in which the wife was in the bottom decile and husbands in the top decile on the left, to those where the wife was in the top decile and husbands in the bottom decile on the right. The vertical axis shows predicted housework hours. Note first the contrasting curves for husbands and wives. As expected, as a wife's relative resources increased they did less housework, while their husbands did more. Also as expected, the effect was more dramatic for wives than for husbands. The outcome was that the total combined time spent in housework by spouses was greater in those households where husband's resources substantially outstrip those of their wife's, than in those where the wife's resources substantially outstrip those of their husband's. This difference (previously noted by, for example, Bianchi *et al.*, 2006) reflects the fact that men have not filled the domestic labour gap as women's resources rise and their housework hours decline. (Note, too, as previously referred to, this effect is unlikely to be due to the effect of the outsourcing of housework by wives with higher resources than their spouses.)

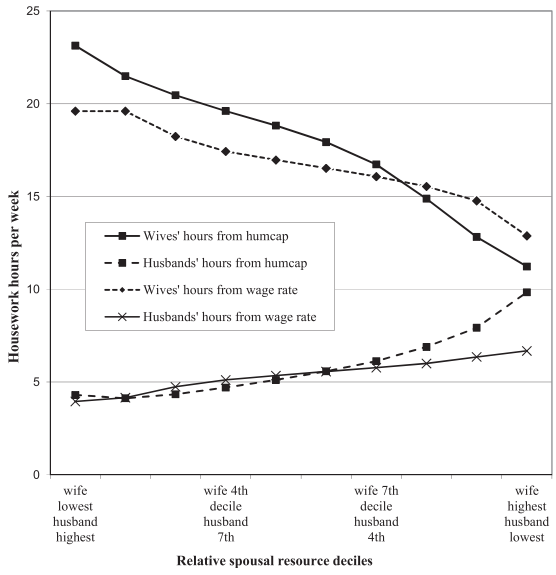

Figure 1. Modelled predicted housework hours by couples' relative human capital and wage rate deciles: BHPS 1992–2008 (pooled). *Notes*: Predicted values are based on the models shown in Table 1, instantiated for 1999 (midway through the 17 panel waves), for couples with one dependent child where the wife is aged 41, using mean values of the decile distribution of resources for husbands and wives

There is no evidence in Figure 1 for a gender deviance neutralization effect either for wives or husbands. This is especially clear for the human capital model where there is a pronounced upturn in husband's domestic work contributions at the extreme right-hand side of the graph (where their relative resources are lowest), compared to the much flatter (although still rising) line for the wage rate model. It is also clear that where wives' resources most significantly outstripped those of their husbands (right side of the graph), their housework time was the lowest of all.

In the difference between the modelled lines for relative human capital and relative wage rate we see the effects of the inclusion of the non-employed population. At the extreme ends of the distribution of spousal relative human capital, employment rates are at their lowest (see Table 1), and housework hours are correspondingly longest for those partners with the lower level of human capital. In the upturn of the modelled line for husband's relative human capital observable at the right-hand side of the graph, we see the effects of the contribution to housework made by men married to women who have significantly more human capital than themselves. Over one quarter of these men are non-earning (the majority unemployed). For wives, the line for relative human capital is steeper than that for wage rate, starting at a higher level of housework hours, because it also includes the housework contributions of non-employed women. However, it continues to decline steeply towards the right-hand side of the graph (where wives' human capital outstrips that of their husbands), dipping below the line predicted from the wage rate model and reaching near equality with the curve for husbands. The most equal households in terms of the gender division of housework were, therefore, found at the extreme end of the relative spousal human capital distribution where wives' resources substantially outstrip those of their husbands. To make this point more clearly, Figure 2 shows model predictions for the couples' percentage division of housework (rather than their housework hours) based on the same model variables, and instantiated in the same way as in Figure 1 (models not shown). It can be seen that there is a decline in the percentage of housework done by the woman in a couple as her relative resources (both wage rate and human capital models) increase. However, in the case of the human capital model it falls dramatically where her human capital outstrips that of her husband, to reach a level of around 55 per cent of housework at the extreme right-hand side of

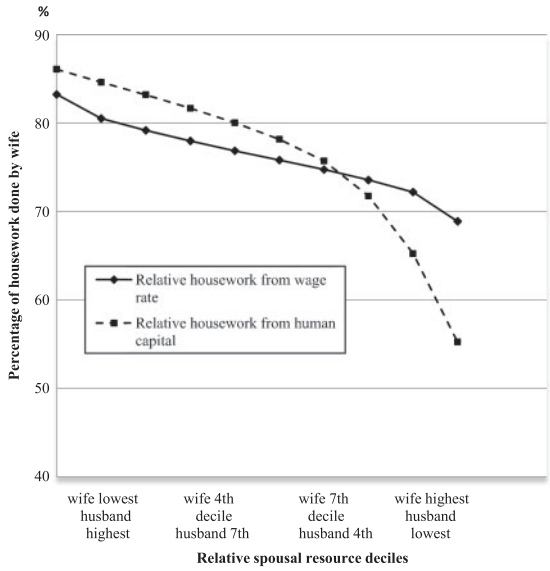

Figure 2. Modelled predicted relative housework hours by couples' relative human capital and wage rate deciles: BHPS 1992–2008 (pooled). *Notes*: (i) Predicted values were based on models including the same variables as those shown in Table 1, but using wife's share of housework hours as the dependent variable (not shown). (ii) Predictions were instantiated for 1999, for couples with one dependent child where the wife is aged 41, using mean values of the decile distribution of resources for husbands and wives

the graph where the woman's human capital substantially exceeds that of her husband.

Longitudinal Analyses; the Effect of Change in Absolute and Relative Human Capital

Overall, in cross-sectional analysis, the human capital measure performed as consistently as earned income as a predictor of housework hours (found also by Kan, 2008), and the differences between the models were explicable by the inclusion of the non-employed population for the human capital model. This gives us confidence that the human capital is indeed capturing a dimension of the economically salient resources that are pertinent to marital bargaining. In the following analyses we utilize the 1992–2008 panel data of the BHPS to provide longitudinal fixed-term regression estimations for wives' and husbands' hours of housework from human capital. The fixed-effects model is standardly used with panel data to control for unobserved heterogeneity by removing time-invariant model components. Note that, because of the way in which human capital was measured, change in the measure of human capital for both partners may reflect a number of different events, such as changes in employment status, position in job hierarchy, educational qualifications, or occupation. For a non-employed person it is most likely to involve moving into some form of employment. (A similar consideration applies to change analyses based on earnings—for those employed a change in earnings can arise from several quite distinct causes: a change of job, a change in number of hours worked, a promotion or pay cut, a seniority increment, etc.)

From Table 3 we see that the models predicting change in housework hours do not account for as much variance as the same cross-sectional models. This is expected, since the variance of change in housework hours is considerably less than that in housework hours itself, and it also excludes the effects of any unobserved heterogeneity.

As was the case for the cross-sectional model shown in Table 2, the coefficient for wife's absolute human capital is negative and strongly statistically significant. Any increase in wives' human capital was associated with a substantial and significant decline in their housework hours. These findings provide a powerful, longitudinal, example of the importance of changes in women's absolute economic resources in the determination of their own housework. The equivalent effect for husbands was less strong than in the cross-sectional model, although it reaches statistical significance.

Overall, a noticeable gender difference in respect of absolute and relative human capital is found in the longitudinal analysis that echoes the gender asymmetry of the pooled cross-sectional results. For husbands, a change in relative spousal human capital had a stronger effect on their housework hours than a change in their own human capital, whereas for wives a change in their own human capital proved to be the only statistically significant resource change. The implication is that changes in women's absolute resources are the primary driving force behind changes in the time that both partners spend doing housework.

As expected from existing literature, the birth of a child was also associated with a significant increase in the number of hours spent on housework, especially for wives.

Instantiations of the Longitudinal Model

Figure 3a and b shows model predictions from the fixed-effect regression coefficients of Table 3. These instantiations of the regression predictions for specific values of the independent variables allow us to see graphically the combined effect of the regression coefficients across the observed range of couple's relative resources.

Table 3. Fixed-effect longitudinal regression: wives' housework hours (Model 1) and husbands' housework hours (Model 2). BHPS 1992–2008

Variables and model statistics	Model 1: wives' housework hours[a]	Model 2: husbands' housework hours[a]
Wife's human capital	−1.63***	
Wife's human capital squared	0.09***	
Husband's human capital		−0.27*
Husband's human capital squared		0.01
Relative human capital	−1.29	1.58**
Relative human capital squared	−0.68	1.05
Number of children <18	2.98***	0.23**
Wife's age	0.09	−0.36*
Wife's age squared/100	−0.43**	0.14*
Wave	−0.23	0.16
Wave squared/100	2.13***	0.58**
Intercept	24.01**	16.96***
R^2 within	0.08	0.01
R^2 between	0.02	0.00
Number of observations	27,413	27,413
Number of clusters	3,810	3,810

***$P < 0.001$, **$P < 0.01$, *$P < 0.5$.

[a]Note that the models include relative and own resources, and not spousal resources, due to the direct mathematical dependence between these three variables (knowing two of them enables the calculation of the third). Relative resources represent the effect of spousal resources when own resources are held constant.

Predicted housework hours for women and men in couples with different relative human capital are shown, under different conditions of change in absolute and relative human capital. The models are again instantiated for 1999 (midway through the 17 waves of the panel) for men and women aged 41 with one dependent child in the household. The horizontal axis shows the range (in deciles) of couples with different relative resources—from women in the bottom decile/men in the top decile on the left to women in the top decile/men in the bottom decile on the right. The vertical axis shows predicted housework hours. The trend lines shown in the body of the graph are instantiations (model predictions) of housework hours. They show 'before' and 'after' levels of housework associated with changes in human capital, for wives (Figure 3a) and husbands (Figure 3b), respectively. One line of each graph shows the situation of no change in human capital over the panel waves. The other lines demonstrate the effect on housework hours of a positive and negative change of one decile of human capital for wives and husbands, respectively.

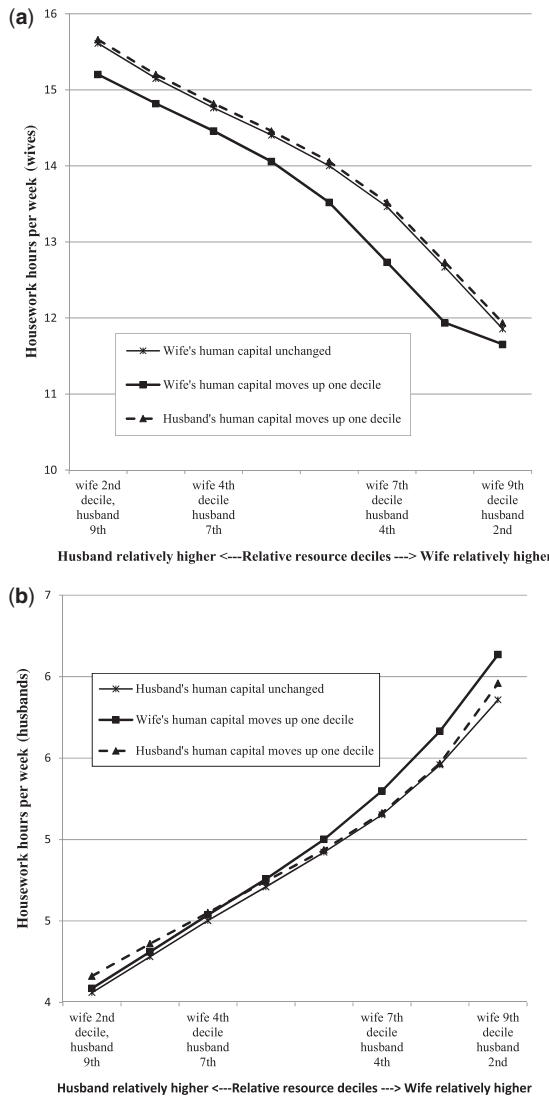

Figure 3. (a) Changes in wives' housework hours by changes in couples' relative human capital deciles: BHPS 1992–2008. *Note*: Predictions were based on the models shown in Table 3, and instantiated for 1999 (midway through the 17 panel waves), for couples with one dependent child where the wife is aged 41, using mean values of the decile distribution of human capital for husbands and wives. (b) Changes in husbands' housework hours by changes in couples' relative human capital deciles: BHPS 1992–2008. *Note*: Predictions were based on the models shown in Table 3, and instantiated for 1999 (midway through the 17 panel waves), for couples with one dependent child where the wife is aged 41, using mean values of the decile distribution of human capital for husbands and wives

First, there is again no evidence in these instantiations for an effect of gender deviance neutralization. The trend lines are essentially linear in character, with women's housework hours declining steadily, and men's

increasing steadily, through the range of relative spousal human capital. A clear difference, however, is evident in the effects for husbands and wives of changes in human capital. For wives (Figure 3a) it is clear that an increase in her partner's human capital of one decile led to very little increase in her housework hours across the range of joint human capital deciles (in fact one can barely distinguish this line from that for no change). In contrast, an increase in a wife's own human capital led to a pronounced decrease in her housework hours across the range of couples' joint human capital deciles. This asymmetry reflects the far greater importance in the determination of a woman's housework hours of a change in her own resources as opposed to a change in her partner's (i.e. the couple's relative) resources.

For husbands (Figure 3b) the picture was the mirror image of that for wives. There was little change in husbands' housework hours when their own human capital increased by one decile. However, for that part of the distribution of relative spousal human capital where wives' human capital exceeded that of their husbands', the effect of an increase of one decile in a wife's human capital was associated with a clear increase in her husband's housework hours. This asymmetry can be seen in the coefficients of Table 3, Model 2, in the relatively weak and barely significant coefficient associated with change in husbands' own human capital, compared to the stronger and more statistically significant coefficient for change in relative human capital.

Concluding Discussion

In this article we have presented a fresh perspective on questions which have engaged researchers interested in the relationship between marital bargaining and housework over a couple of decades. We used large nationally representative yearly panel data to overcome the problems of unobserved heterogeneity that affect cross-sectional research, and to give greater confidence to inferences of causal rather than simply associative relationships. We also used a measure of human capital to address the relationship with housework over the whole range of the distribution of spousal resources, including where one or both spouses are not in employment. The inclusion of a wider range of economically salient resources within the human capital measure, and the inclusion thereby of the non-employed population, gives us, we argue, a truer picture of marital bargaining power in relation to housework than earned income alone.

In cross-sectional robustness checks we found that this measure produced results that were not just largely consistent with, but in terms of model fit also closely matched, a model based on earnings—the conventional measure of spousal economic resources. This shows that the human capital measure, more inclusive of the entire population than earned income, does indeed capture key variation in spousal resources which have been found to be important in the previous literature.

The key addition to the existing literature arising from comparing predicted housework time from cross-sectional models based on human capital (and therefore including the non-employed population) with those based on earnings (in the form of the wage rate), is to show that husbands in couples with the most extreme relative human capital distribution in favour of the woman in fact contribute very substantially to housework, and substantially more than in the model based on wage rate (see Figure 1). Equally, wives in couples with this distribution of human capital do substantially less housework than in the wage rate model. Indeed, in such couples the division of housework time approaches equity (Figure 2). This result shows the effect of the addition of the non-employed to the analysis. It strongly supports bargaining theory and shows no evidence at the cross-sectional level for gender deviance neutralization behaviour by husbands who are the most disadvantaged, or wives who are the most advantaged, in terms of their relative human capital.

The main substantive conclusion from the longitudinal models using the human capital measure concerns the effect of changes in absolute and relative spousal resources in the prediction of housework. Here, there was again an important difference between the models for husband's and wives' housework time. Change in wives' own human capital proved to have a strong effect on their own housework time, while the effect of a change in relative resources was less convincingly significant. These findings support the cross-sectional results of Gupta (2007), and the longitudinal analyses of Killewald and Gough (2010). These papers, however, were based on analyses of a more limited group of the population—full-time earner couples—to avoid the problem of missing values on earnings and hours in employment.

For husbands, on the other hand, a change in their wives' human capital appeared to be more significant than a change in their own. Our overall conclusion from the longitudinal models is that it is women's resources that are the critical determining element in the outcome of bargaining over an undesirable activity such as housework. Men's resources are also important, but less so than those of women. These findings of gender asymmetry in the longitudinal effects of men's and women's

resources on housework time also resonate with a limited number of other studies. They are consistent with the findings of Evertsson and Nermo (2007) who showed that, over a period separated by 9 years, increases in Swedish women's relative resources (in couples who survived the 9-year gap) were associated with increases in their male partner's housework hours. They also accord with the *lagged adaptation* thesis (Gershuny *et al*., 1994). According to this, men make adjustments in their unpaid labour over an extended period of time following changes in their female partner's employment status.

We found no evidence for gender deviance neutralization in the longitudinal models. The straightforward decline in housework hours among those wives whose human capital increases relative to their husbands, and the corresponding rise in housework hours among the group of husbands whose human capital decreases relative to their wives, underpins this conclusion. In combination with the fact that over one quarter of husbands in the group with the lowest human capital relative to their wives were not in employment (Table 1), this suggests that unemployed husbands are spending significant amounts of their time doing housework (although not as much, of course, as unemployed wives—as also found by Gough and Killewald, 2011).

While we found no support for gender deviance neutralization, the strong asymmetry of the findings for wives and husbands does point to an important effect of gender, as a structure rather than as a 'trump card' (Risman, 2011). The fact that wives continue to do more of the housework even when their resources significantly outstrip those of their husbands points to the key significance of wives' absolute resources in moving towards a more gender equal society. Women's resources evidently constitute a central component of marital bargaining power, and this conclusion adds emphasis to the negative consequences of the gender wage gap for equality both in the public and in the domestic sphere. It also lends strong support to feminist efforts to improve women's employment opportunities and status as a strategy for achieving greater gender equality, both in the private as well as in the public sphere.

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Appendix A

Table A1. Variable means, standard deviations (in brackets), and ranges by survey waves: BHPS 1992–2008

		Survey wave groups			All years	*N* (all years)
		1992–1996	1997–2002	2003–2008		
Housework hours	Wives	18.9	16.2	15.4	16.8	27,413
		(12.6)	(10.5)	(9.6)	(11.1)	
		1, 99	1, 99	1, 99	1, 99	
	Husbands	5.9	5.6	5.8	5.8	27,413
		(5.5)	(5.0)	(4.9)	(5.1)	
		1, 65	1, 90	1, 56	1, 90	
Housework share (per cent done by women)		74	72	71	72	27,413
		(18.9)	(19.4)	(19.6)	(19.4)	
		3, 99	2, 99	2, 99	2, 99	
Human capital	Wives	4.9	5.5	6.4	5.6	27,413
		(2.1)	(2.2)	(2.5)	(2.3)	
		1.7, 16.2	2.1, 15.4	2.4, 17.3	1.7, 17.3	
	Husbands	6.4	6.8	7.6	6.9	27,413
		(2.5)	(2.5)	(2.8)	(2.6)	
		1.6, 17.5	1.9, 18.4	2.5, 22.5	1.6, 22.5	
Relative human capital		−0.13	−0.10	−0.09	−0.11	27,413
		(.20)	(.18)	(.18)	(.19)	
		−0.66, 0.69	−0.60, 0.57	−0.58, 0.52	−0.66, 0.69	
Earnings (£/week)	Wives	169	190	214	191	21,903
		(126)	(155)	(185)	(159)	
		0, 1,772	0, 4,000	0, 7,879	0, 7,879	
	Husbands	320	338	365	341	24,934
		(224)	(270)	(264)	(255)	
		0, 5,468	0, 13,386	0, 5,019	0, 13,386	
Relative earnings		−0.30	−0.27	−0.24	−0.27	20,445
		(.35)	(.37)	(.39)	(.37)	
		−1.0, 1.0	−1.0, 1.0	−1.0, 1.0	−1.0, 1.0	
Wage rate (earnings/hour)	Wives	5.6	6.2	7.1	6.3	20,935
		(5.3)	(6.4)	(7.0)	(6.3)	
		0, 242	0, 390	0, 297	0, 390	
	Husbands	7.7	8.2	9.0	8.3	24,440
		(7.1)	(6.8)	(7.0)	(7.0)	
		0, 276	0, 225	0, 173	0, 277	
Relative wage rate		−0.13	−0.11	−0.10	−0.11	19,848
		(0.31)	(0.32)	(0.35)	(0.33)	
		−1.0, 1.0	−1.0, 1.0	−1.0, 1.0	−1.0, 1.0	
Wife's age		38	39	41	39	27,413
		(10.1)	(10.3)	(10.0)	(10.3)	
		20, 59	20, 59	20, 59	20, 59	
Number of dependent children/household		0.90	0.88	0.90	0.89	27,413
		(1.1)	(1.1)	(1.0)	(1.1)	
		0, 6	0, 6	0, 7	0, 7	

Appendix B
Estimation of the market-related human capital score

We follow the conventional economists' procedure (Heckman, 1979) of combining an estimation of the probability of an individual's selection into employment, with an appropriately adjusted regression estimate of the economic value of the various characteristics for those actually in employment. First, we estimate the quality of jobs by their market valuation (i.e. the expected wage rate of those doing them). We construct a Mean Occupational Wage (MOW) scale of job quality by pooling all the 18 waves of the BHPS responses (yielding 239,043 observations), adjusting hourly wage rates by the Retail Price Index (RPI), and calculating the mean for each two-digit group in the standard occupational classification. We take the natural log of mean income for each occupational category, and then normalize the result so that the lowest-income job is scored 0, and the highest is scored 100.

The regression stage of the Heckman procedure estimates the equation:

$$\text{Lwage} = f(\text{age agesq mow mowsq higra agegr agrsq medgra agemd agmsq educ1 to educ6, jobtot1 to jobtot4, unmtot1 to unmtot4})$$

where:

- lwage is the log of the hourly expected wage rate
- higra is a dummy variable indicating membership of the top 10 per cent of the MOW scale (83–100), and medgra indicates membership of the next 30 per cent (60–82)
- agegr, agrsq, agemd, and agmsq are the products and squared products of age and the high- and medium-grade dummies, introduced to allow for differing age/earnings curves across high-, medium-, and low-level occupations
- educ1 to educ6 provide dummy variables for, respectively, higher degree, first degree, other tertiary qualification, A-level, O-level/higher-grade GCSE and other GCSE/CSE
- jobtot_ and unmtot_ represent, respectively, months in employment, and unemployment in each of the 4 years immediately preceding the date of interview

We estimate the equation using a pooled file of the full set of 18 waves of BHPS data. Table B1 below shows the regression coefficients and standard errors for this estimation. The coefficients from the Heckman regression are used to estimate a predicted value for the log (expected) wage rate for each respondent for each wave of the BHPS. Our human capital score is the exponential of that predicted log wage rate.

The selection stage of the Heckman procedure includes the same variables, plus gender to identify the equation. Despite the use of gender to identify the selection equation, which means in turn that the effects of gender are used indirectly to adjust the size of the coefficients in the regression stage of the equations, it is not used directly in the imputation of the Human Capital Score (HCS), so that any statistical association between gender and the HCS is a result of associations with the incidence of values of its component variables. This procedure diverges from the Heckman (1979) specification that produces separate estimations for men and women. These separate estimations have the consequence that estimates of the human capital of women with a given set of characteristics salient to their productivity in the workplace will always be lower than estimates for men with identical market-related characteristics. Of course, this may well reflect the real consequences of discriminatory practices in the workplace. But for a range of sociological analyses—particularly related to the examination of the consequence of precisely those discriminatory practices—this specification may not be appropriate. By building that discrimination into the estimations, it becomes impossible to directly compare the effects of human capital on housework for women and men.

Table B1. Human capital estimation equation: BHPS 1991–2008, respondents aged 16–64 (Dependent variable: log hourly wage)

Variables	Regression stage	Coefficient	Standard error
age	Age	0.038	0.001
agesq	Age squared	0.000	0.000
mow	MOW	0.002	0.000
mowsq	MOW squared	0.000	0.000
higra	MOW = 83–100 (dummy)	−0.998	0.064
agegr	higra*age	0.044	0.003
agrsq	higra*age squared	0.000	0.000
medgra	MOW = 61–82 (dummy)	−0.464	0.032
agemd	medgra*age	0.023	0.002
agmsq	medgra*age squared	0.000	0.000
educ1	Higher degree (dummy)	0.563	0.010
educ2	First degree (dummy)	0.456	0.008
educ3	Other tertiary (dummy)	0.287	0.006
educ4	University entrance (dummy)	0.180	0.005
educ5	Medium school (dummy)	0.105	0.005
educ6	Low school (dummy)	0.035	0.006
	No school qualifications (omitted)		
higrahied	higra*(educ1 or educ2)	−0.055	0.011
medgrahied	medgra*(educ1 or educ2)	−0.027	0.009
jobtots	Months in employment year 3	0.004	0.001
jobtotr	Months in employment year 3	0.005	0.001
jobtotq	Months in employment year 1	0.004	0.001
jobtotp	Months in employment this year	0.005	0.000
unmtots	Months unemployment year 3	−0.011	0.002
unmtotr	Months unemployment year 3	−0.004	0.001
unmtotq	Months unemployment year 1	−0.004	0.001
unmtotp	Months unemployment this year	−0.008	0.001
wave	Year count 1991 = 1	0.030	0.002
wavesq	Wave squared	0.000	0.000
wavemow	Wave*MOW	−0.001	0.000
wavemowsq	Wave*MOW squared	0.000	0.000
constant		0.084	0.026
	R	0.655	
	Selection stage	Coefficient	SE
women	Women	−0.057	0.007
age	Age	−0.004	0.002
agesq	Aage squared	0.000	0.000
mow	MOW	0.051	0.001
mowsq	MOW squared	−0.001	0.000
higra	MOW = 83–100 (dummy)	3.658	0.229
agegr	higra*age	−0.062	0.011
agrsq	higra*age squared	0.001	0.000
medgra	MOW = 61–82 (dummy)	2.109	0.102
agemd	medgra*age	−0.051	0.005
agmsq	medgra*age squared	0.001	0.000
educ1	Higher degree (dummy)	0.449	0.031
educ2	First degree (dummy)	0.518	0.019
educ3	Other tertiary (dummy)	0.591	0.017
educ4	University entrance (dummy)	0.540	0.011
educ5	Medium school (dummy)	0.522	0.010

(continued)

Table B1. (Continued)

Variables	Regression stage	Coefficient	Standard error
educ6	Low school (dummy)	0.401	0.017
	No school qualifications (omitted)		
higrahied	higra*(educ1 or educ2)	0.331	0.040
medgrahied	medgra*(educ1 or educ2)	0.485	0.029
jobtots	Months in employment year 3	0.120	0.001
jobtotr	Months in employment year 3	0.012	0.001
jobtotq	Months in employment year 1	0.010	0.002
jobtotp	Months in employment this year	0.023	0.001
unmtots	Months unemployment year 3	−0.044	0.003
unmtotr	Months unemployment year 3	0.003	0.003
unmtotq	Months unemployment year 1	−0.007	0.003
unmtotp	Months unemployment this year	−0.001	0.003
wave	Year count 1991 = 1	−0.001	0.004
wavesq	Wave squared	0.002	0.000
wavemow	Wave*MOW	−0.001	0.000
wavemowsq	Wave*MOW squared	0.000	0.000
constant		−1.085	0.042
	/athro	0.136	0.029
	/lnsigma	−0.789	0.002
	Rho	0.135	0.029
	Sigma	0.454	0.001
	Lambda	0.061	0.013