

Zeitschrift: Schweizerische Zeitschrift für Soziologie = Revue suisse de sociologie
= Swiss journal of sociology

Herausgeber: Schweizerische Gesellschaft für Soziologie

Band: 31 (2005)

Heft: 2

Artikel: "To my Wife, with Love!" : Does within-household specialisation explain husbands' better job-education-match?

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DOI: <https://doi.org/10.5169/seals-815073>

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“To my Wife, with Love!” Does Within-Household Specialisation Explain Husbands’ better Job-Education-Match?

Aniela Maria Wirz*

1 Introduction – Saying: “Behind every great man there is a great woman”

The above saying reflects the common idea that a husband’s success is partly due to the support of his wife. Married men are indeed found to have a significantly higher probability of working in a job that matches their educational qualifications and hence a lower probability of being overeducated for their job than single men have. A theoretical explanation for this better *job-education-match (JEM)* of husbands is lacking so far in the overeducation literature.¹ Recent research in this area undertaken by Bauer (2002) and Chevalier (2003) amongst others emphasises that workers having educational qualifications that are superior to the requirements of their jobs simply lack other productive characteristics (ability, motivation, effort, etc.). Hence, they have lesser chances of getting an appropriate job. For an overview on the overeducation literature see Sloane (2002), Hartog (2000) and Groot and Maassen van den Brink (2000). The question then arises whether and how being married affects such unobservable productive characteristics thereby improving the JEM of men.

In this study we aim to test whether “traditional” specialisation of married men and women between market and home production explains the improved JEM of husbands. Or, put differently, the question we aim to answer is: “Do married men get better jobs if they have a ‘stay-at-home’ spouse doing the housework for them?” If this is the case, the question would be “What enables married men to get a better job given their education?”

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This study was supported by the Swiss National Science Foundation (SNSF, grant 5004-069458/1). It has been realised using the data collected by the Swiss Household Panel (SHP), University of Neuchâtel, a project financed by the SNSF Program (Grant 5004-53205).

I thank Jan van Ours, Rafael Lalive, Josef Zweimüller and Erdal Atukeren for valuable discussion of this work. Remaining errors are my own.

1 The term bad JEM is used throughout the paper to describe a worker “being overeducated” for his job. Similarly a good JEM describes a worker being “adequately educated” in the terminology of the overeducation literature. Furthermore, the terms husbands and partners are used as mutual equivalents. Workers may also be “undereducated” for their job. These cases, however, represent less than 3% of the total sample and are dropped for homogeneity reasons.

We do this by testing two theoretical explanations. The first one is Becker's (1985) seminal work on specialisation generally used to explain higher wages of married men (marriage wage premia). Basically, Becker stipulates that married men are more productive in paid work because they are able to channel all their energy and effort into paid work when their wives do the housework for them. Although this model is intuitively quite appealing and therefore very much in line with the introductory saying, recent empirical research seriously questions it. Using more detailed information about the number of hours men spend on housework, Hersch and Stratton (2000) could not confirm the causal mechanism formulated in the model. This might be due to the very restrictive assumptions underlying it. This becomes obvious when considering the fact that *within-household specialisation* (WHS) is assumed to have a positive impact on the husband's productivity exclusively by lowering his housework burden when getting married. This model excludes many cases in which WHS is increased and this burden not lowered. For instance, when having children, husbands may frequently be found to increase their amount of housework, e. g. from 7 to 15 hours a week, while their wives increase the hours they spend on housework from 15 to 50. Hence, in these cases the degree of WHS increases strongly, but the husband's productivity is assumed to be unaffected.

Therefore, in a next step, we develop a new test of the specialisation hypothesis, following the theory of within-household interaction of François (1998). Within his theoretical framework WHS has an impact on a husband's work effort and hence his JEM in a more general way. The assumed behaviour of spouses is suggested to be the result of a bargaining process between two distinct individuals with differing interests. In short, François explains that the work effort of a husband is greater than the work effort of a single man, because having a good job not only allows him to earn a high wage but in addition improves his bargaining position within the household. Thus his work motivation is increased by his gains from the within-household trade. This trade gain is the amount of home production taken over by his wife, which he loses when he shirks and gets fired. This model thus argues on a less romantic level than the introductory saying which assumes implicitly that it is the support of a woman which helps a man to be more productive. Strongly simplified, it suggests that a husband's fear of having to do a larger share of the home production increases his motivation to get and keep a good job. It is important to note that in this case the amount of housework hours spent by the wife has an effect on the work effort and JEM of her husband independently of the amount of his own housework hours.

Thus, the contribution of this study to the literature is twofold. First, we try to clarify whether WHS explains the improved JEM of married men. Does "the woman behind the man" matter or does only his own human capital matter for his productivity at work in the market-place. Second, we perform a new test

for the specialisation theory in order to explain more precisely why specialisation has such an impact. We can do this because information on both spouses' market work hours and housework hours are available in our data set.

More generally, this study contributes to a better understanding of gender differences in the labour market by choosing an approach opposite to the conventional one that focuses on women's situation in the labour market. The idea is that if we know what contributes to the success of men at work in the market-place, we should also know better what makes women worse off in the labour market compared to men.

In our empirical analysis we use the Swiss Household Panel (SHP) data for 1999. Using probit analysis we test whether husbands with wives highly specialised in home production enjoy, on average, a significantly higher probability of having a good JEM than husbands with wives sharing the household work more equally. This degree of specialisation (WHS) will be measured using both spouses' home production (weekly hours of housework). This allows us also to distinguish between the two theoretical models. If specialisation has an effect mainly through the husband's lower home production, then this supports Becker's model (1985). On the contrary, if the husband's higher probability of obtaining a good JEM is explained less by the amount of his own housework than by his wife's housework hours and/or the difference between their housework hours, we conclude that François' (1998) model applies.

Particular emphasis will be given to measuring a possible impact of unobserved heterogeneity of husbands, respectively couples. More precisely, we adapt our model to test whether a sorting process of more able husbands with "traditional" spouses is at work instead of the expected specialisation effect. In addition, we test whether measurement errors of the JEM could possibly bias the results.

This study is organised as follows. Section 2 gives a more detailed discussion of the relevant literature. In Section 3, the methodology and model specification issues are described in detail. In Section 4, the data used is described and in Section 5 the descriptive statistical evidence presented. Section 6 shows the full model estimation results and Section 7 concludes.

2 Theoretical and empirical background

There are two strands of literature related to our study. The first one is the overeducation literature, which provides no theory for the improved *job-education-match* (JEM) of husbands but a vast array of empirical evidence about the relationship between the JEM and family commitments. The second one is the research about *within-household specialisation* (WHS) or bargaining and its impact on a husband's work effort. This literature covers both theoretical and empirical approaches. As

these two strands of literature have not been related to each other so far, they are treated separately in the Subsections 2.1 and 2.2. The theories of Becker (1985) and François (1998) are discussed in depth in Subsection 2.2.

2.1 Quality of the JEM and family commitments

There is clear empirical evidence that marital status significantly reduces the probability of men being overeducated. See Van der Meer and Batenburg (2002) for the Netherlands, Sloane, Battu and Seaman (1996) for the UK and Wirz and Atukeren (2004) for Switzerland. However, this result is mostly contingent on a gender-specific test of the determinants of overeducation, owing to the fact that family responsibilities frequently have an adverse impact on women's overeducation incidence. As an exception, Büchel and Battu (2002) do not find a significant impact of marriage on men in Germany even if detailed interaction terms are used. Differences in the model specifications are, however, important.² Finally, Green and MacIntosh (2002), using data from the UK, find a significant negative impact of marital status on the probability of being over-skilled for one's job even when gender is not interacted with.

Hence, a positive impact of marital status on the quality of a husband's JEM is rather the norm. A theoretical explanation for this better JEM or lower overeducation incidence of married men is lacking so far in the overeducation literature.

The only theoretical model explaining a possible relationship between geographical factors, family commitments and overeducation is given by the theory of "differential overqualification" following the seminal paper of Frank (1978). According to this theory, married women are at a higher risk of working in jobs for which they are overqualified. They are supposed to be "tied movers" or "tied stayers" in the sense that their job searches are undertaken under the condition that their husbands' job searches are optimised first. If the size of the local labour market, where their husbands have found jobs, is small, their job searches are restricted and they have an increased incidence of overeducation. Following this theory, there is no reason for husbands to have a better JEM than single men. So far, empirical evidence for this theory is mixed as shown by Büchel and Battu (2002) for Germany, and McGoldrick and Robst (1996) for the US. On the contrary, Dolton and Silles (2001) find empirical support for rigidities, linked to geographical factors and family commitments, affecting the matching process of both genders. The willingness to relocate for the first job and have children prior

2 Differences in specification concern mostly variables approximating unmeasured productive differences of workers, the location of the household and controls for part-time working. Büchel and Battu (2002) add controls for the location of the household, add a variable measuring the importance of occupational success but they do not control part-time working of either gender.

to the first job significantly improve the chances of having a good JEM respectively lower the chances of being overeducated in their jobs for young graduates in the U. K. The impact of spatial factors is clearly confirmed by Büchel and van Ham (2003).

Overall, these results suggest that motivation and effort to get a good job, for instance by looking further than the local labour market, seem to be an important part of the unmeasured individual characteristics determining the quality of the JEM. Similarly, marital status and family commitments seem to affect the efficiency of this matching process. The causal mechanisms governing these effects, however, are quite unclear so far.

2.2 WHS and the work effort of husbands

The theory of specialisation, which will be tested to explain husbands' improved JEM, goes back to Becker (1985, 1991). In his theory of the family (1991) he stipulates that it is efficient for spouses to specialise between home and market production according to their respective comparative advantages and preferences. Therefore, a woman with a lower wage rate and/or higher productivity in household production than her husband tends to lower her market work hours and increase her home production. Such WHS is assumed to have a positive effect on a husband's productivity in market work.

How such positive specialisation effects materialise remains open. Becker (1985) argues that total effort is limited and thus any effort allocated to home production reduces the effort available for market work. Hence, married men may benefit from specialisation. By reducing the time they spend on housework they can concentrate their time and effort on their market production and thereby improve their chances of getting a better job. However, empirical tests of this theory, mostly carried out while analysing marriage wage premia, showed ambiguous results. Women's lower employment status, for example, clearly seemed to be correlated with higher work efforts on the part of their husbands as measured by higher wages, see Hersch and Stratton (2000) for an overview.³ Surprisingly, this higher wage could not be explained by lower housework hours of the husband, as the theory stipulates. Becker's specialisation explanation was rejected by Hersch and Stratton (2000) on these grounds. Bonke, Datta Gupta, and Smith's (2003) results from a Danish data set also hint at a more complex relationship between hours spend on housework and a husband's wage.

More recent models of within-household interaction are based on less restrictive assumptions than the model of Becker. Following the seminal work of

³ Using data on monozygotic twins Antonovics and Town (2004) find robust evidence for the marriage wage premia but no impact of women's work experience on their husband's wage. Therefore, they question the specialisation explanation. However, as the impact of women's weekly working hour was not tested in their estimation setting, a direct comparison is not possible.

Manser and Brown (1980) and McElroy and Horney (1981, 1990), a wide array of bargaining models explain the allocation of consumption and production between spouses. In these models the utility functions of spouses are allowed to differ. The time allocation decision process can be determined by the respective bargaining power of spouses mostly approximated by their respective earning power. If home production is taken as an “undesired activity”, then the spouse with a higher bargaining power will contribute less to home and more to market production. However, the question whether and how specialisation between spouses may benefit the husband’s success in the labour market (improved JEM) remains unanswered by most of these models.

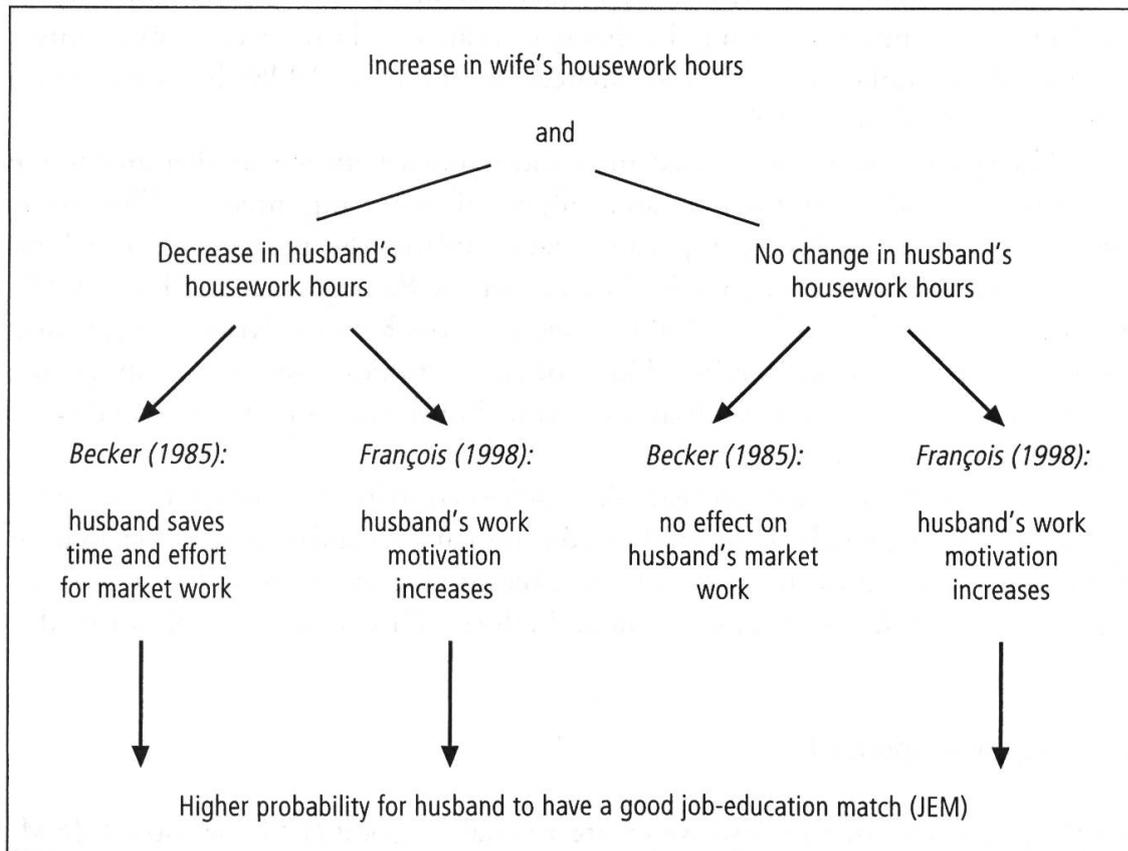
To our knowledge, François (1998) formulated the only model allowing for a bargaining process between spouses about their respective time allocation, thereby explaining why men should have a higher probability of having a good job if they are married.⁴ Based on the assumption that household production can only partly be substituted by market production and that spouses differ in employment characteristics on average, he argues that it is reasonable to assume that one spouse specialises in home production. Married men are then expected to outperform single men since they are able to trade with their spouses to undertake the provision of household services. So far, the argumentation is very similar to Becker’s explanation of the specialisation behaviour within households. But the mechanism assumed to improve a husband’s productivity is quite different. In Figure 1 the difference between the two transmission mechanisms is represented for two distinct cases of an increase in WHS. First, WHS increases because of a change in housework hours of both spouses. Second, only the wife increases her housework hours.

The difference between these two transmission mechanisms is due to the fact that in François’s model the labour market entails *efficiency wages*. The work effort of a husband is thus increasing in the level of wages or other forms of compensation he earns with his market production. Thus he stipulates that a husband is less likely to shirk than single men, because of the higher costs of getting fired. He not only loses his efficiency wage income but also his gains from the within-household trade.⁵ Without the wage income of a good job he may not

4 Skatun (2004) recently formulated an alternative bargaining model explaining the male wage premium by a better bargaining position of married men when compared to single men. The higher is the earnings potential of the female partner the higher is the expected wage of the husband. However, he does not make any assumptions about married man being indeed more motivated and productive at work.

5 François (1998) makes many assumptions to simplify the analysis although they are not critical. For instance, all results of the analysis hold also if workers are simply assumed to be less likely to shirk when their spouses have bad jobs. Hence, this model does not exclude other models of within-household interactions based on altruistic motives of partners for instance. In such a model a husband then increases his work effort mainly because he wants his family to have the highest possible utility level.

Figure 1 Difference between the transmission mechanism of an increase in within household specialisation (WHS) of Becker (1985) and François (1998)



be able to convince his wife to do the larger share of the housework burden. Hence, a husband's effort at work is expressed as a function of the amount of home production he gets from his wife (benefits in kind) in exchange for his higher wage income.

The argumentation of François (1998) includes both cases in Figure 1. Therefore, it is a more general mechanism than the one suggested by Becker, where a husband's effort at work is increased exclusively by the amount of time on housework hours that the husband does not have to spend compared to a single man. However, the energy level of a husband may increase with activities improving his health like physical exercise, sleep and having a balanced diet. Hence, saving time on housework helps a husband improve his health and energy level and thus increases his productivity at market work. But contrary to the efficiency wage model the wage income or other forms of compensation do not increase his effort spent on market work. Neither does Becker stipulate that the home production of a wife may have an independent impact on the work effort of her husband by

improving his health, e. g. when cooking more frequently at home instead of buying ready made dinners at low costs. Following this same logic, an increase of women's total housework, e. g. after the birth of a child, is not thought to have an independent impact in the model of Becker (second case). On the contrary, it should have an impact following the theory of François. However, the mechanism of within-household interaction stipulated by François (1998) has never been tested micro-econometrically.

The specialisation of married men and women between market and home production in Switzerland is a research subject of increasing interest. The results from more recent analysis using panel data confirm the persistence of a high degree of specialisation prevailing in Switzerland, see Baumgartner and Fux (2004), Widmer, Levy and Gauthier (2004). See also Buchmann, Kriesi, Pfeifer and Sacchi (2002) for earlier results. None of these studies, however, analysed the impact of the degree of specialisation within households on the job quality or wage income of the husband.

Hence, so far it is still unclear what factors contribute to a better chance for husbands of having good jobs given their educational level and whether specialisation of spouses' time between home and market production indeed has a positive impact on husbands' work motivation and effort. This is the focus of our study.

3 Empirical approach

For the purpose of our analysis we create a variable "good JEM" denoted GJEM. GJEM is a binary variable, taking value 1 if the husband's qualifications are adequate for his job and 0 if his qualifications are superior to his job. In doing this we invert the notation generally used in the overeducation literature, where the overeducation variable takes value 1 when a worker is overeducated and 0 otherwise. Apart from that we follow the basic model used in the overeducation literature in a first step (*Model 1*). The probability of a husband having a GJEM of 1, denoted by variable y^h , is then formulated as an index model, where y^{h*} is an underlying latent variable expressed as a function of the productive characteristics of the husband such as experience or education summarised in vector x^h and the degree of within-household specialisation (WHS) approximated by the housework hours of both spouses.

For estimation we use observations of N households (or couples), which are assumed to be independent and identically distributed following *Model 1*. The household as the unit of observation is denoted by i . Hence, the relationship to be estimated is the following,

$$y_i^h = \begin{cases} 1 & \text{if } y_i^{h*} > 0 \\ 0 & \text{else} \end{cases}$$

$$y_i^{h*} = \beta_1 + x_{2i}^h \beta_2 + x_{3i}^h \beta_3 + \dots + x_{Li}^h \beta_L + whs_i \beta_{whs} + \varepsilon_i \quad (1)$$

where β_1 denotes the constant, $\beta_2, \beta_3, \dots, \beta_L$, the coefficients of the productive characteristics of the husband. It is ultimately β_{whs} , the coefficient of variable whs , we are interested in, as it measures the impact of WHS on the probability of a husband having a good job-education-match. The error term of the equation, ε_i , is a continuously distributed random variable (i.i.d.), independent of the explanatory variables x_{li}^h , $l = 1, 2, 3, \dots, L$, and whs_i . Assuming a standard normal distribution of ε_i , we estimate this relationship by means of a probit model.

We will test two variations of this basic *Model 1* denoted by a) and b), where in each case equation (1) is slightly modified. In a first step (equation 1a), WHS will be approximated by the housework hours of both spouses hh_i^w and hh_i^h using this information individually. In a second step (equation 1b) we use the difference between spouses' housework hours dhh_i^{wh} as measures for WHS, data which is available in the SHP (1999).

$$y_i^{h*} = \beta_1 + x_{2i}^h \beta_2 + x_{3i}^h \beta_3 + \dots + x_{Li}^h \beta_L + hh_i^w \beta_{hhw} + hh_i^h \beta_{hhh} + \varepsilon_i \quad (1a)$$

$$y_i^{h*} = \beta_1 + x_{2i}^h \beta_2 + x_{3i}^h \beta_3 + \dots + x_{Li}^h \beta_L + dhh_i^{wh} \beta_{dhh} + \varepsilon_i \quad (1b)$$

Both variations provide us first of all with a direct measure of WHS and its impact on GJEM (β_{hhw} , β_{hhh} , β_{dhh}). Secondly, these two variations allow us to investigate more precisely how WHS has an impact on GJEM and hence to discriminate between the two theoretical models. If specialisation takes its effect mainly through the husband's lower home production, as measured by the size and statistical significance of coefficient β_{hhh} in equation (1a), then this lends support to Becker's (1985) more restrictive model of specialisation effects. On the contrary, if the husband's higher probability of obtaining a good JEM is explained less by his own housework (β_{hhh}) than by his wife's housework hours (β_{hhw}) in equation (1a) and/or the difference between their housework hours (β_{dhh}) in equation (1b), we conclude that rather François' model (1998) applies, as discussed in detail in Section 2.

3.1 Neglected heterogeneity of households and measurement problems of quality of the JEM

There are two main problems arising in this estimation setting. The first is unmeasured heterogeneity of couples with respect to important characteristics

such as a husband's ability and his wife's preference for housework. The second potential problem is measurement error of the JEM. Such omitted variables or measurement error could bias the results if they are correlated with the explanatory variable of interest WHS respectively hh_i^w , hh_i^h or dhh_i^{wh} . One of the main critical assumptions in *Model 1* would then be violated and the simple probit estimation would not give consistent results.

Omitting a variable which controls for an important characteristic of the couple could indeed bias the results, if there is a sorting process, whereby husbands who are more able and motivated to get a good job more frequently get married to "traditional" woman specialising in home production. The positive correlation between WHS and the propensity of a husband to have a good JEM ($GJEM = 1$) would then merely reflect this sorting mechanism or unmeasured heterogeneity of households and not a causal relationship as stipulated by the theories about specialisation effects.

The argumentation is the same in the presence of measurement error problems. These could be important in our case, where the quality of the JEM of a husband is a subjectively measured variable, see Section 1 for further discussion. If such a measurement error is correlated with WHS, the results are biased. This could be the case if for instance husbands having above average self-confidence regard themselves as having a bad JEM, because they wrongly judge themselves as being capable of a better job, are systematically more often married to "traditional" women. The negative impact of WHS on the quality of the JEM measured in *Model 1* would then merely reflect this sorting and measurement error effect.

In these cases the true model would be *Model 2*, a recursive equation system, where WHS of household i , denoted by the variable dhh_i^{wh} , is modelled endogenously. Instead of equation (1b) the following equation system (2b) is then to be estimated,

$$dhh_i^{wh} = \gamma_1 + x_{2i}^w \gamma_2 + x_{3i}^w \gamma_3 + \dots + x_{Ki}^w \gamma_K + v_i > 0 \quad (2b)$$

$$y_i^h = \begin{cases} 1 & \text{if } y_i^{h*} = \beta_1 + x_{2i}^h \beta_2 + x_{3i}^h \beta_3 + \dots + x_{Li}^h \beta_L + dhh_i^{wh} \beta_{dhh} > 0 \\ 0 & \text{else} \end{cases}$$

where x_i^w is a vector of K , $k = 1, 2, 3, \dots, K$, variables representing a wife's personal characteristics such as age, number and age of children including a first element being unity. Variables such as parents' educational levels, social statuses and the spouses' individual attitudes towards gender measures and national traditions are added. x_i^h is again a vector of L variables representing the productive characteristics of the husband. v_i and e_i denote the error terms of the equations, which are assumed to be joint normally distributed, each with mean zero, unit variance, and correlated due to the omitted variable or measurement error ($\rho_1 \neq 0, \rho_1 = \text{Corr}(v_i, e_i)$).

The estimation is complicated by the fact that the JEM represented above by the variable y_i^b is a binary variable. Hence, standard two-step would need the additional assumption of a linear probability model for the second step, which is a strong simplification. Estimation of the equation system by Maximum Likelihood Estimation (MLE) is efficient although cumbersome. Given this fact, it is appropriate to test beforehand whether there is indeed a reason to assume an endogeneity bias. We do this using a method suggested by Rivers and Vuong, see Wooldridge (2002, 473–477).

For this endogeneity test we estimate in a first step a reduced form where WHS represented by variable dbh_i^{wh} is estimated as a function of all exogenous variables of *Model 2* with ordinary least squares. From this equation we obtain the estimated value of the residual \hat{v}_i , which is added to the probit estimation of GJEM, denoted by the variable y_i^b in a second step.⁶

$$y_i^b = \begin{cases} 1 & \text{if } y_i^{b*} = \beta_1 + x_{2i}^b \beta_2 + x_{3i}^b \beta_3 + \dots + x_{Li}^b \beta_L + dbh_i^{wh} \beta_{dbh} + \hat{v}_i \beta_v + \varepsilon_i > 0 \\ 0 & \text{else} \end{cases} \quad (3a)$$

The probit t statistic on \hat{v}_i is then a valid test of the null hypothesis that dbh_i^{wh} is exogenous. This conclusion is dependent on the instruments for specialisation x_{ki}^w being themselves exogenous. If the null hypothesis of exogeneity of dbh_i^{wh} has to be rejected, then *Model 2* is the true model. Estimation of the non-linear equation system (2b) by MLE is then appropriate. Otherwise *Model 1* is the true model and one-step probit estimation of the husbands' quality of the JEM as shown by equations (1a) and (1b) applies.⁷

6 The distribution of v has no relevance under the null hypothesis. Therefore, the test of exogeneity is valid without assuming normality or homoscedasticity of v , and it can be applied very broadly, even if whs_i , respectively dbh_i^{wh} is a limited dependent variable, see Wooldridge (2002, 474).

7 The best method to tackle the problem of unobserved heterogeneity would be to estimate the probability of a good JEM for the husband by a fixed effect logit model. This method has the advantage of thoroughly controlling any individual specific unmeasured component. Unfortunately problems of measurement errors are increased by this method. In addition, the relevant sample size is strongly reduced by this method as only the individuals changing their JEM quality identify the model. Hence, a sufficiently long panel would be needed in order to get reliable results. Given the fact that only three waves of the Swiss Household Panel (SHP) were available at the time this study was undertaken, we leave the estimation with this method to subsequent research.

4 Data and sample statistics

4.1 Data

We use the Swiss Household Panel data (SHP) of 1999 in our empirical analyses. This data set includes information on approximately 7'000 individuals from about 5'000 households. The data are obtained by computer-assisted telephone interviews and adjusted by appropriate weights for design and non-response bias and thus the data set is representative of the permanent resident population of Switzerland.

We are interested in two main attributes of this data set. First, it contains information about the quality of the JEM of respondents and second it contains detailed information about both spouses or partners living in a consensual partnership and in particular about their labour market and home production.

JEM: The information about the JEM is based on the self-assessment of respondents. Workers are asked how they perceive their qualifications with regard to their current jobs. If they say their qualifications are superior to their jobs they are then considered as overeducated or not having a "good JEM" ($GJEM = 0$). When a worker reports that his qualifications correspond to his job, he is not considered overeducated but as having a "good JEM" ($GJEM = 1$). Individuals reporting to have educational qualifications that are not sufficient or not related to their jobs are excluded from the analysis in order to increase the homogeneity of the sample.

Beside this subjective measure there are two alternative methods used for measuring educational mismatch: the objective measure based on a systematic job evaluation by experts and the statistical or empirical method determining educational mismatch as a level of education which is more than one standard deviation above or below the mean or modal value within a particular occupation. Each method has its advantages and weaknesses, see Sloane (2002). The direct-self-response method is a subjective measure and has the advantage to avoid the pitfall of statistical arbitrariness inherent in the objective measure. For instance, the size of the sample of "overeducated" workers and employees changes according to the statistical decisions taken. Or, should one use the mean or the mode of the distribution of the number of years of schooling in an occupational field as a cut-off line? In addition, how many standard deviations should one allow from the mean to classify a worker as overeducated? An evaluation by experts would be a good alternative if not outdated. But such an evaluation is not available for Switzerland. The subjective measure, however may suffer from a self-response bias. This should not normally be a problem as long as there is no uncontrolled systematic bias or correlation of the responses across individuals. Measurement error may although be a major issues in the measuring of overeducation as high-

lighted by Sloane (2002). This highlights the importance of testing for the presence of a measurement error bias as discussed in Subsection 3.1. It is important to remember, however, that mismeasurement of the job-education match is only a problem if the specialisation behaviour within households is correlated with it. This means, if the JEM of husbands is mismeasured in the same way for husbands married to very "traditional" women as for husbands with wives sharing housework equally with them, the results are not biased.

Furthermore, it is worth noting that if the quality of the JEM at first appears to be a measure lacking in precision when compared to a measure of labour market productivity such as the wage rate, it has also an advantage. For our research the fact that the JEM is unaffected by pure wage discrimination of employers, a problem so far unresolved in the research about the male marriage wage premia, is particularly interesting.

WHS: Within-household specialisation (WHS) is measured by the degree of „traditional“ specialisation of married men and women between market and home production.⁸ Labour market production is measured by weekly market work hours and the years of experience since the last long interruption of work (at least six months). Home production is measured by weekly hours of housework. In the survey, persons are asked how many hours they spend on average on housework (such as doing laundry, cooking or cleaning) on weekdays, on Saturdays, and on Sundays. These values are then summed up to the weekly amount of housework hours. These are less precise measures than time use survey data, which is only available for Switzerland for the years 1979/1980, as we will discuss in the next Section.

We report results using two measures of home production: first, the weekly housework hours without child care; and second, the total housework hours including child care. Spouses whose youngest child is between 14 and 18 years old and who give no information about child care are assumed to spend no time on it. Despite this assumption, the number of observations with no information about the hours of child care is very high. The sample is reduced by about a third if the observations with missing information on child care are dropped. Therefore, the main sample is the one including information on housework hours only. But summary statistics and a subset of estimations are also presented for the reduced sample with information on total housework hours.

Sample definition: Within the total sample we have about 3'000 individuals married or living in consensual partnerships, for whom the relevant information about demographic variables, market and housework is available. Previously married persons are excluded from the sample as the within-household bargaining

⁸ In this we follow the approach chosen in previous work about the marriage wage premia. In further research, however, an extension of this approach taking into account the specialisation of men and women between different housework tasks might be worth the endeavor.

process is assumed to be more complex in these cases than the theoretical models suggest. In addition, workers being “undereducated” for their job are excluded from the sample for homogeneity reasons. Following our theoretical model, the men’s sample is furthermore restricted to male employees aged between 18 and 65. For homogeneity reasons we include only Swiss citizens or foreigners with annual or residential permits. School leavers, domestic servants and employees on their own or in a relative’s firm are excluded for similar reasons. Unfortunately, for many men and women there is no or only partial information available about their spouses. But for our analysis we can only use the observations of couples where information about market and housework hours as well as demographic information of both spouses is available. This leaves us with a sample of 1’574 individuals living in 787 couples. A comparison of the main variables as shown in Table A2 (Appendix), however, does not hint at the presence of a substantial bias in the estimation sample due to this reduction in sample size.

4.2 Sample statistics

Table 1 reports the main characteristics of partners and households. The means and standard deviations are calculated taking account of sampling weights. In the total sample reported in the first column, 86% of all husbands of the sample have a good JEM, which is equivalent to a share of overeducated workers of 14%. This is at the lower boundary of the incidence of overeducation in international comparison, as shown by Groot and Maassen van den Brink (2000). Firstly, educational mismatch in Switzerland is low, at 15–20% for the total sample of employees, the precise level depending on the definition of mismatch as pointed out by Wirz and Atukeren (2004). Secondly, restricting the sample to married men or men living in a partnership reduces the average further.

Differences between spouses in main demographic and educational characteristics are rather small. Husbands are aged 42,2 on average, wives only slightly younger at 39,8. The difference between the gender averages of education years is only one year. We approximated the true years of schooling of an individual by applying average years of schooling to each educational level (by gender) following in that earlier work of Weber (1998). See Table A1 in the Appendix for details. Despite this small difference in human capital endowments, spouses differ substantially in their respective market and home production. While married men work on average 44,1 hours a week in the labour market, women’s average amounts to 16,8 hours. Similarly, market work experience of men is 13,8 years on average, almost a double of women’s level of 7,5 years. The average of women’s housework hours is in contrast more than three times the level of men’s with 19,8 vs. 6,1 hours a week. Hence, these averages suggest that traditional specialisation of spouses, where the wife takes over the greater part of the housework and the husband concentrates on market work, is rather the norm in Switzerland. These

Table 1 Descriptive statistics of spouses, mean (standard deviation)

	<i>Total sample</i>		<i>Restricted sample information on childcare available</i>	
	mean	SD	mean	SD
<i>Husband's characteristics</i>				
Good job-education-match (GJEM) (1)	0.86	–	0.88	–
Age	42.15	(10.34)	45.17	(11.51)
Experience (2)	20.81	(11.92)	23.91	(13.16)
Market work hours (HMWH), weekly	44.14	(9.03)	43.56	(9.02)
Education years	13.80	(2.46)	13.74	(2.34)
Tenure	11.21	(10.32)	12.85	(11.54)
Non-Swiss nationality	0.18	–	0.14	–
Housework hours (HHWH), weekly	6.10	(5.72)	5.77	(5.37)
Total housework hours, including child care (THHWH), weekly	–		6.95	(7.44)
<i>Wife's characteristics</i>				
Age	39.80	(10.20)	42.85	(11.54)
Experience (2)	7.53	(9.51)	9.86	(10.64)
Market work hours (WMWH), weekly	16.84	(16.38)	21.41	(16.92)
Education years	12.79	(2.37)	12.75	(2.28)
Non-Swiss nationality	0.17	–	0.10	–
Housework hours (WHWH), weekly	19.77	(10.91)	17.61	(10.55)
Total housework hours, including child care (TWHWH), weekly	–		19.17	(11.84)
Number of observations (couples) (3)	787		439	

Source: Swiss Household Panel (SHP) 1999.

Notes:

- (1) GJEM is a dichotomous variable taking value 1 when a husband's educational qualifications correspond to his job and 0 if his overeducation variable takes the value 1 when a person is working overeducated and 0 otherwise.
- (2) Years since last long interruption of market work (min. 6 months).
- (3) The sample includes male employees, between 18 and 65 years old, married or living in consensual partnerships, Swiss or foreigners with an annual or a permanent residential permit, and have at least obtained compulsory schooling. The reference individuals are Swiss, have obtained vocational training at highest education degree and do not have children.

results are confirmed by earlier and more recent research for Switzerland, see Baumgartner and Fux (2004), Widmer, Levy and Gauthier (2004) and Buchmann, Kriesi, Pfeifer and Sacchi (2002). However, there seems to be considerable heterogeneity between households. This becomes visible when looking at the high level of the standard deviations of the WHS variables (women's market hours and years of experience and the housework hours of both genders).

Comparison with other data sources: The same picture can be drawn using other data sources for Switzerland, like the Swiss Labour Force Survey (SLFS) of 2000, where a detailed questionnaire on “unpaid work” was added. But in the SLFS, the amount of housework is recorded to be substantially higher than in the SHP (1999), i. e. by about 10 hours on average for both genders, see Bundesamt für Statistik (1999, 2003). This represents 30% for women and even more than 100% for men. This might be due to the more restrictive definition of housework and the less detailed question used in the SHP than in the SLFS. Strub and Bauer (2002) found comparable average hours to the SHP (1999) for weekly hours of housework, that is 7,6 hours for men and 21,6 hours for women, when only cleaning, cooking, laundry and shopping were included. Hence, overall housework hours seem to be substantially underestimated by the SHP (1999) data. Bauer (1998, 2000) finds similar results using a comparable question and methodology. Furthermore, he concludes that the correct amount of weekly housework hours of women is around 30–50% higher than the presented figure, when comparing earlier SLFS to the detailed time use survey data of 1979/1980 and 1994 in Switzerland and to similar survey data for Germany in 1991/1992. Strub and Bauer (2002) making similar comparisons find that even the SLFS data still underestimates the correct weekly housework hours of women by 3 hours. At the same time men’s housework hours in the SLF seem to overestimate the corresponding hours of men also by 3 hours.

Thus, we conclude from the above figures that the amount of housework done by women in the SHP (2000) data must be considered as being underestimated by at least 30%, due to the more restrictive definition of housework and the less precise methodology used in the survey. Due to the more restrictive definition of housework in the SHP it seems reasonable to assume some underestimation of men’s total housework also, although the extent of this underestimation should be quite limited. This last conclusion is also supported when comparing total work hours for both genders. The total amount of work including home and market work as measured by the SHP (1999) is reported to be 37 hours for women and 50 hours for men. Such a large difference between women’s and men’s total working hours is not confirmed by the SLFS data for Switzerland, hence the underestimation of men’s housework hours in the SHP data is probably not that high. These conclusions should be kept in mind in interpreting the results.

General household characteristics: The rather traditional preferences of Swiss couples are also highlighted by the fact that the clear majority of couples are married. Only about 9% of couples in the sample are living in consensual partnerships. Table 2 reports these households’ characteristics. Furthermore, the sample is quite representative for Swiss households with respect to family composition. The majority of households (60%) have at least one child younger than 18 at home and in about 50% of these households the youngest child is aged between

Table 2 Descriptive statistics of households, mean (standard deviation)

<i>Household characteristics</i>	<i>Total sample</i>	<i>Restricted sample information on childcare available</i>
Consensual partnership	0.09	0.15
Child / children living in household (HH) younger than 18 years old	0.59	0.28
Child / children living in household (HH) between 0 and 6 years old	0.33	0.11
Child / children living in household (HH) between 7 and 13 years old	0.18	0.04
Child / children living in household (HH) between 14 and 17 years old	0.08	0.14
Child / children living in household (HH) older than 18	0.08	0.14
Child / children living outside household (HH)	0.12	0.22
No children	0.20	0.36
Difference between spouses' housework hours, weekly (WHWH-HHWH)	13.67 (12.43)	11.84 (12.10)
Difference between spouses' total housework hours, including child care, weekly, (TWHWH – THHWH)	–	12.22 (13.64)
Number of observations (couples) (1)	787	439

Source: Swiss Household Panel (SHP) 1999

Notes: (1) Sample definition see Table 1.

0 and 6. Eight percent of couples have children older than 18 living in their household and 12% of couples have children living outside their household. Finally, 20% of couples did not have children when the survey was taken. The second column documents the fact that in the sample restricted to couples where information on child care is not missing the couples without children are somewhat overrepresented, their share increasing from 20% to 36%. Similarly the share of consensual partnerships is higher. These facts will be taken into consideration in the estimation. For both measures of housework the difference between spouses' average hours is substantial at around 12–13 hours a week. But again, the level of the standard deviation of these differences in both housework measures is quite high.

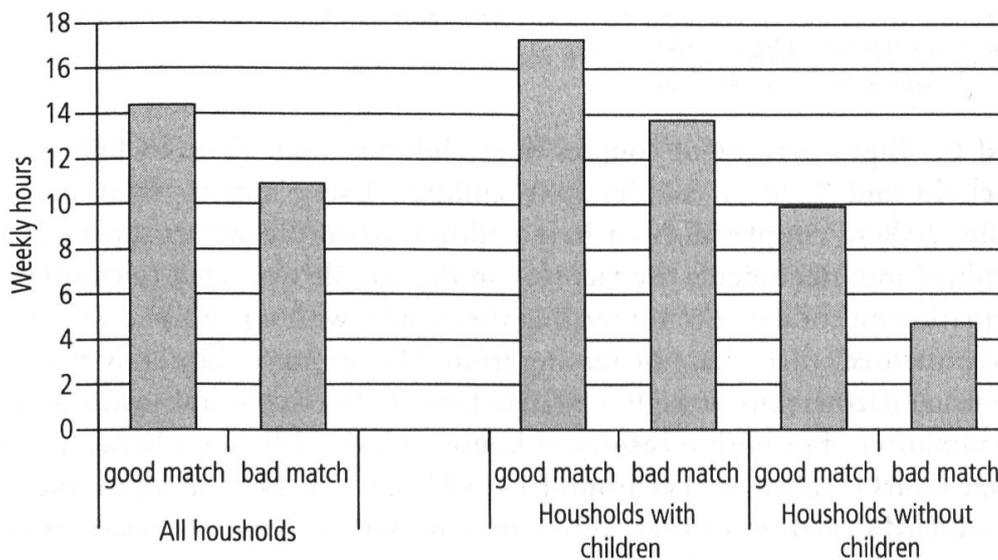
Restricted sample: Restricting the sample to couples for whom information on child care is available does not alter the picture substantially. Overall, the sample averages of age and labour market experience are slightly higher, as the problem of the missing variable is by definition less important for older parents with older children. Linked to that, average hours of weekly housework are also somewhat lower, roughly two hours for women and half an hour for men. On average, including the hours for child care increases the total housework hours by one hour for men and by one and a half hour for women.

These descriptive statistics clearly show that a high degree of specialisation of spouses between market and home production (WHS) is rather the norm in Switzerland. However, there also seems to be a substantial amount of variation in WHS between households, the impact of which on the husband's JEM quality will be investigated in the following analysis.

5 Descriptive evidence

Figures 2–5 and Tables 3 and 4 show the relationship between a husband's JEM quality and the degree of WHS measured by sample averages of spouses' housework hours. Following the theory, we expect husbands with "stay-at-home spouses" with a high degree of WHS to have a significantly better JEM quality than husbands whose spouses share the housework more equally.

Figure 2 Average difference between spouses' housework hours by quality of the job-education-match of the husband



Following the specification of equations (1b) WHS is measured directly by the difference between spouses' housework hours (women's minus men's hours). In Figure 2 we see that the descriptive results are in line with theoretical expectations. Husbands with a good JEM are found (on average) to have wives who spend more hours on housework than the wives whose husbands have a bad JEM. This is also the case when child care is included in household work, as shown in Figure 3.

In Figure 4 and 5 both spouses' average housework hours are added up in order to see which spouse's homework hours vary most, and thereby determine

Figure 3 Average difference between spouses' total housework hours by quality of the job-education-match of the husband (incl. child care hours, restricted sample)

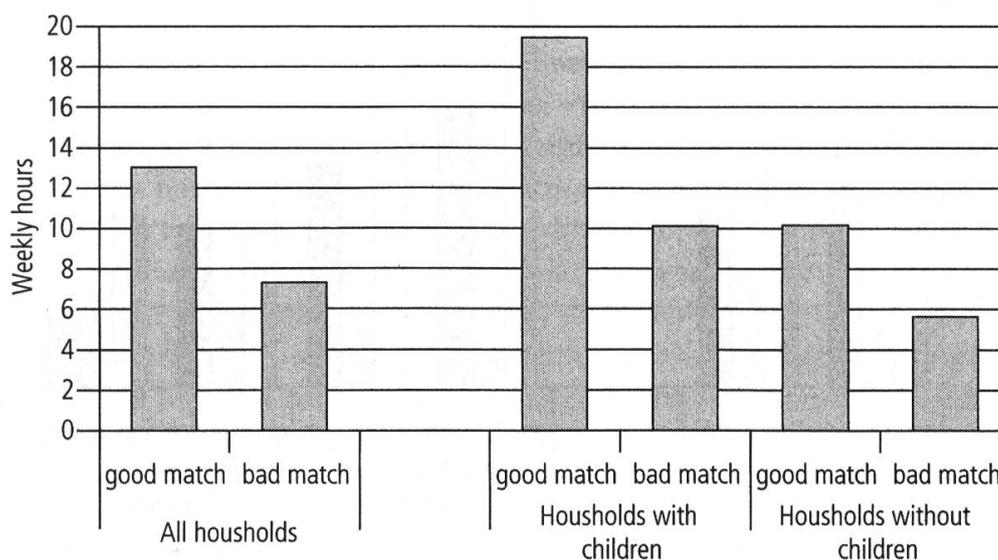


Table 3 Within-household specialisation (WHS) and husband's job-education-match (JEM) – total sample

	<i>All households</i>		<i>Households with dependent children (4)</i>		<i>Households without dependent children (5)</i>	
	Yes (2)	No (3)	Yes (2)	No (3)	Yes (2)	No (3)
<i>Mean of WHS measures: (1)</i>						
Wife's housework hours (WHWH), weekly	20.34 (11.21)	17.96 (10.01)	23.59 (11.09)	21.34 (9.17)	15.28 (9.38)	10.62 (7.60)
Husband's housework hours (HHWH), weekly	5.95 (5.74)	7.07 (6.35)	6.30 (6.09)	7.61 (6.96)	5.40 (5.12)	5.91 (4.63)
Difference between spouses' housework hours (WHWH-HHWH)	14.39 (12.77)	10.89 (11.56)	17.29 (12.76)	13.73 (11.73)	9.88 (11.41)	4.71 (8.42)
Number of observations	679	108	413	74	266	34
% of total	86.28	13.72	52.48	9.40	33.80	4.32

Source: Swiss Household Panel (SHP) 1999.

Notes:

(1) Standard deviations in parentheses.

(2) GJEM=1, educational qualifications correspond to worker's job.

(3) GJEM=0, educational qualifications are superior to worker's job (overeducated worker).

(4) Families with children younger than 18 years old, living in the same household.

(5) Couples without children, with children living outside their household or with children older than 18 years old, living in the same household.

Figure 4 Average difference between spouses' housework hours by quality of the job-education-match of the husband

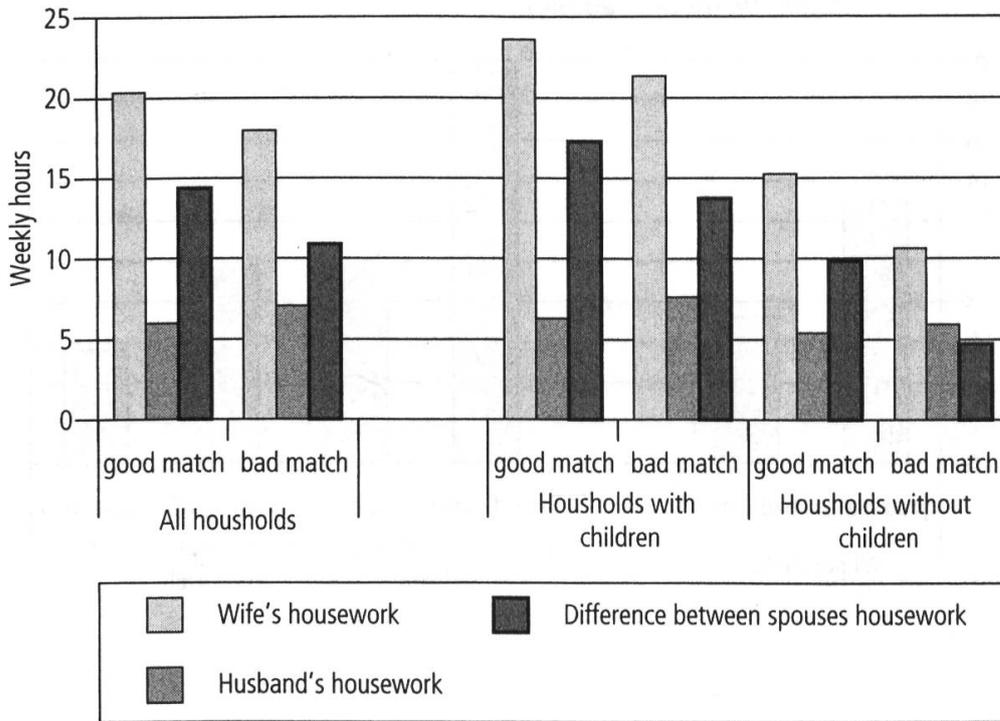
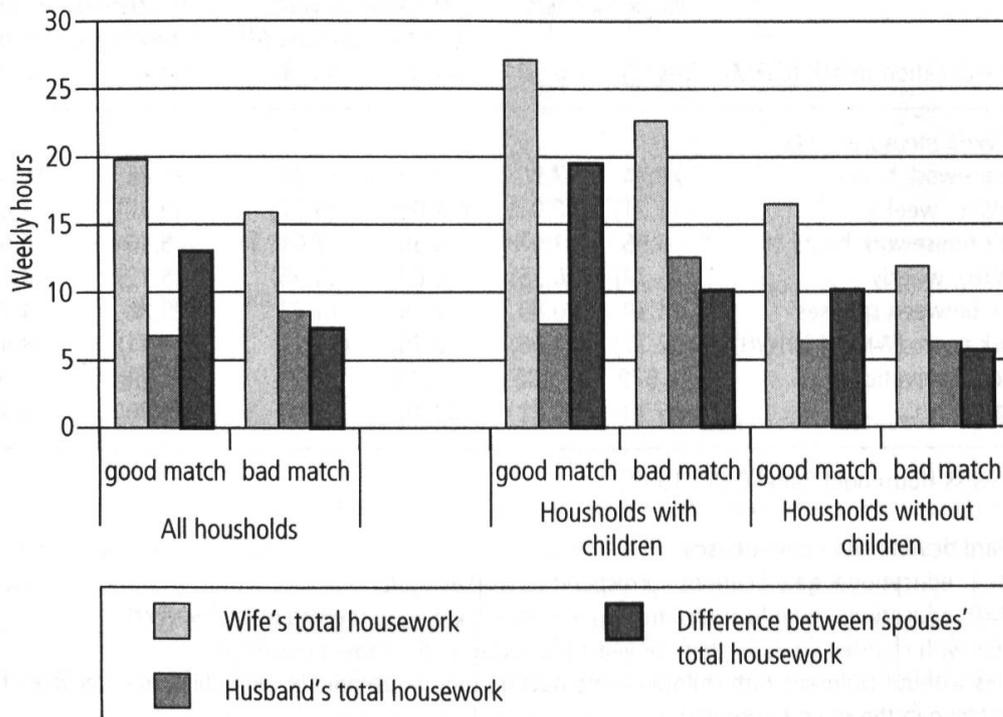


Figure 5 Average difference between spouses' total housework hours by quality of the job-education-match of the husband (incl. child care hours, restricted sample)



the variation of WHS. Clearly, this variation is mostly determined by the difference in average homework hours between the wives of more successful husbands and the wives of less successful employees – independently of the presence of children in the household. Men's variation in housework hours contributes only to a minor extent to these differences between spouses' housework. It seems that the amount of hours spent on home production varies significantly only in the case of men living in the same household with children, where child care increases the hours spent on household work. This variation is negatively related to the quality of the JEM, as expected. But overall, the housework hours of men seem to be remarkably robust, around 7 hours a week. This is in line with results from studies on other comparable countries, e. g. Stratton (2003).

Most interestingly, spouses with no children younger than 18 living in their household still report a substantial amount of hours spent on child care. They may take care of children of neighbours, friends or family members, probably mostly of grandchildren. This fact will be taken into account when interpreting the results.

Hence, a first look at the data shows clear evidence for an effect of WHS on a husband's JEM when taking the housework hours of each spouse as a direct measure for WHS. Moreover, based on these simple sample averages, it seems that mainly the women's housework hours contribute to the positive correlation

Table 4 Within-household specialisation (WHS) and husbands' job-education-match (JEM) – sample restricted to couples with information on child care

	<i>All households</i>		<i>Households with dependent children (4)</i>		<i>Households without dependent children (5)</i>	
	Yes (2)	No (3)	Yes (2)	No (3)	Yes (2)	No (3)
<i>Mean of WHS measures (1)</i>						
Wife's total housework hours (TWHWH), weekly (6)	19.78 (12.15)	15.89 (10.60)	27.12 (11.76)	22.67 (10.15)	16.50 (10.83)	11.90 (8.77)
Husband's total housework hours (THHWH), weekly (6)	6.75 (6.98)	8.58 (10.28)	7.67 (7.96)	12.54 (14.89)	6.34 (6.46)	6.25 (5.20)
Difference between spouses' total housework hours (TWHWH – THHWH) (6)	13.03 (13.86)	7.31 (13.15)	19.45 (14.07)	10.13 (18.47)	10.16 (12.78)	5.65 (8.58)
Number of observations	385	54	119	20	266	34
% of total	87.70	12.30	27.11	4.56	60.59	7.74

Source: Swiss Household Panel (SHP) 1999.

Notes: (1)–(5) see Table 3; (6) Total housework hours, including child care.

of the difference between spouses' housework hours and the quality of the husband's JEM. These initial findings from descriptive data analysis speak against the model of Becker (1985) and lend support rather to the theory of within-household interaction of François (1998).

6 Estimation results

In this section we test for the impact of WHS on the quality of the JEM of husbands using probit estimation following the empirical approach outlined in Section 3. Sampling weights adjusted for design and non-response bias are taken into account in the estimation. These estimations will be carried out for the two different measures of WHS discussed in the previous Sections.⁹

In Table 5 the results of the probit model using both spouses' home production as measure for WHS (equation (1a) and (1b)) are shown. As discussed before, this allows us first to measure WHS more precisely and to discriminate between different models of within-household interaction.

In Table 5, column (A) the results of the probit estimation including both spouses' housework hours as individual variables as formulated in equation (1b) are presented. Most interestingly, women's housework hours are shown to have a significant positive and independent impact on a husband's probability of having a good JEM. Husbands' housework hours, on the contrary, do not seem to have a significant impact on their own JEM, although the exact significance level of the coefficient's *z*-statistic is close to 10%. Overall these results confirm the expectation that WHS improves the JEM of a husband. The specialisation of a wife in home production seems to improve the chances of her husband having a good job. Furthermore, this result clearly speaks against the hypothesis of Becker's model suggesting that WHS has its effect exclusively through the lowering of the husband's housework burden. This result is, however, in line with the results of Hersch and Stratton (2000).

Taking the difference between spouses' housework hours as a measure for WHS (column (B)) confirms these conclusions. This is the specification formulated in equation (1b). A significant positive impact of this difference on the JEM of husbands is found. The impact of specialisation on husbands' productivity seems

9 In a former version of this paper the impact of a wife's weekly market work hours and market work experience (years) were tested as measures of WHS. Most interestingly, women's weekly working hours was not shown to have the expected negative impact on the JEM of the husband. However, this fact can also be attributed to the high variation of women's working time observed over their working life on average in Switzerland, making this measure of specialisation very imprecise. Taking women's working experience as a proxy for WHS, however, was shown to have a robust negative impact on the JEM of the husband as suggested by the theory. Detailed results are available from the author upon request.

Table 5 The impact of within-household specialisation (WHS) – measured by spouses' housework hours – on husbands' job-education-match (JEM)

Probit estimates, marginal effects are presented	All households		Households with dependent children		Households without dependent children	
<i>Dependent variable: Good job-education-match (GJEM) (1) (2)</i>	(A)	(B)	(C)	(D)	(E)	(F)
Wife's housework hours (WHW)	0.002 (1.65)*	–	0.002 (1.56)	–	0.004 (1.74)*	–
Husband's housework hours (HHW)	–0.002 (1.40)	–	–0.003 (1.13)	–	–0.002 (0.66)	–
Difference in housework hours (DHW = WHW-HHW)	–	0.002 (2.13)**	–	0.003 (1.93)*	–	0.003 (2.00)**
Number of observations (3)	787	787	457	457	300	300
Log-likelihood value	–281.4	–281.5	–182.1	–182.1	–92.5	–92.6
Pseudo R-squared	0.100	0.100	0.101	0.101	0.142	0.141
<i>Rivers-Vuong test for exogeneity:</i>						
<i>p</i> -value (4)	–	0.507	–	0.580	–	0.659
<i>F</i> -Test of validity of instruments (5)	–	6.14	–	2.49	–	3.87
(<i>p</i> , <i>n</i> - <i>k</i>)		(34, 651)		(31, 389)		(33, 217)
<i>p</i> -value		0.000		0.000		0.000

Robust z-statistics in parentheses, * significant at 10%, ** significant at 5%

Source: Swiss Household Panel (SHP) 1999

Notes:

- (1) GJEM is a dichotomous variable taking value 1 when a husband's educational qualifications correspond to his job and 0 if his qualifications are superior to his job.
- (2) Also included in the regression are the husband's education, age squared, health, a dummy for difficulties in professional or private life and a dummy for individuals who are not married but living in consensual partnerships. Sample definition see Table 1.
- (3) 30 observations are lost in the estimation of the model in the subsample of households with dependent children (column (C)–(D)) due to the lack of variation of the dependent variable within the education categories "compulsory schooling" and "general training".
- (4) *p*-value of the estimated residual of the reduced form for the difference in housework hours, see Section 3.1. A high *p*-value means the null-hypothesis of exogeneity cannot be rejected.
- (5) The term instrument is used for the explanatory variables of the WHS measure in the first step of the Rivers-Vuong test. A low *p*-value means that the null hypothesis that none of these variables has an effect on the explained WHS measure has to be rejected. The variables used are age, education and nationality of the wife, her attitude towards tradition, her non-wage income, the number of children, six dummies for the age of children living inside or outside the household, nationality of the mother, education of parents and social status of fathers' jobs (Treiman's prestige scala). The exogeneity of these variables was tested adding them to the probit of the husband's JEM and performing a simple significance test (based on the z-statistics). The optimal choice of instruments was adapted to the subsamples of households.

clearly related to the degree to which the housework burden is shared between spouses and not to the number of housework hours spared to a husband when getting married.

The p-value of the Rivers-Vuong test being above the 50% level clearly indicates that the null hypothesis of exogeneity of the specialisation variable ($H_0 : \rho_1 = 0$) as measured in equation (1b) cannot be rejected at conventional levels of significance. The significance level indicates the probability that a given result is only due to chance when we think it is true, and such high levels are of course unacceptable. This test was carried out in a set-up where the difference between spouses housework hours is explained in a first step as a function of her age, education and nationality, the number and age of children, her non-wage income, her parents' education, nationality and social status and the woman's attitude towards national traditions. In a second step, equation (3b) is estimated taking into account the residual of the first step, see Section 3.1. for a more detailed description of this test. The fact that education is measured by dummies (nine classes) increases the number of instruments artificially. However, the guideline suggested by Staiger and Stock (1997) to have 10–20 observations per instrument is still respected. In order to evaluate the quality of the instruments we perform a joint test of the significance of the instrumental variables in the first-stage regression. The F-statistic of this test is clearly satisfactory for the total sample. Hence, we conclude that sorting of more able husbands with “traditional” spouses or measurement error of the quality of the JEM of the husbands do not bias the results of the one-stage probit estimation. Therefore, the *Model 1* applies when testing the impact of housework hours of both spouses as a measure for specialisation.

The main results are also shown to be robust to variations in the amount of housework accruing to a household as summarised in columns (C)–(F) for the subsamples with and without dependent children living in the household, although the efficiency of the estimates is again lowered due to the smaller sample size. As an exception to this, the z-statistic of the coefficient of women's housework hours for families with dependent children dropped slightly below the significance level of 10%, but its size is unaltered. Intuitively, housework without hours spent on child care is not the most appropriate measure for WHS in this subsample. This explanation will be confirmed subsequently. Partly due to the smaller sample sizes the F-statistic of the instruments' test is rather at the lower boundaries. In general, the impact of WHS is quite robust to variations in the amount of overall housework accruing to the household.

These estimations are repeated taking total housework hours, including child care for measuring WHS. The results are presented in Table 6.

The picture is almost identical when the results for the total sample and for household with dependent children are looked at (columns (A)–(D)). The statistical significance of the estimated coefficients is even improved. Nevertheless, contrary

Table 6 The impact of within-household specialisation (WHS) – measured by spouses' total housework hours - on husbands' job-education-match (JEM)

Probit estimates, marginal effects are presented <i>Dependent variable: Good job-education-match (GJEM) (1) (2)</i>	All households		Households with dependent children		Households without dependent children	
	(A)	(B)	(C)	(D)	(E)	(F)
Wife's total housework hours (TWHW) (3)	0.002 (1.76)*	–	0.005 (2.49)**	–	0.003 (1.48)	–
Husband's housework hours (HHW) (3)	–0.002 (1.31)	–	–0.002	–	–0.001	–
Difference in housework hours (DHW= WWH-HHW) (3)	–	0.002 (2.23)**	–	0.003 (2.92)***	–	0.002 (1.60)
Number of observations (3)	439	439	131	131	300	300
Log-likelihood value	–144.0	–144.0	–39.3	–39.8	–93.4	–93.5
Pseudo R-squared	0.117	0.117	0.281	0.272	0.134	0.132
<i>Rivers-Vuong test for exogeneity:</i>						
<i>p</i> -value (4)	–	0.137	–	0.713	–	0.735
<i>F</i> -Test of validity of instruments (5) (<i>p</i> , <i>n-k</i>)	–	4.01 (34, 337)	–	8.22 (30, 76)	–	3.19 (33, 217)
<i>p</i> -value		0.000		0.000		0.000

Robust z-statistics in parentheses, * significant at 10%, ** significant at 5%.

Source: Swiss Household Panel (SHP) 1999.

Notes:

- (1) GJEM is a dichotomous variable taking value 1 when a husband's educational qualifications correspond to his job and 0 if his qualifications are superior to his job.
- (2) Also included in the regression are husband's education, age squared, health, a dummy for difficulties in professional or private life and a dummy for individuals who are not married but living in consensual partnerships. Sample definition see Table 1.
- (3) Total housework hours, including child care.
- (4) 8 observations are lost in the estimation of the model in the subsample of households with dependent children (column (C)-(D)) due to the lack of variation of the dependent variable within the education categories "compulsory schooling" and "general training".
- (5) *p*-value of estimated residual of the reduced form for the difference in total housework hours, see Section 3.1. A high *p*-value means the null-hypothesis of exogeneity can not be rejected.
- (6) The term instrument is used for the explanatory variables of the WHS measure in the first step of the Rivers-Vuong test. A low *p*-value means that the null-hypothesis that none of these variables has an effect on the explained WHS measure has to be rejected. The variables used are age, education and nationality of the wife, her attitude towards tradition, her non-wage income, the number of children, six dummies for the age of children living inside or outside the household, nationality of the mother, education of parents and social status of fathers' jobs (Treiman's prestige scala). The exogeneity of these variables was tested adding them to the probit of the husband's JEM and performing a simple significance test (based on the z-statistics).

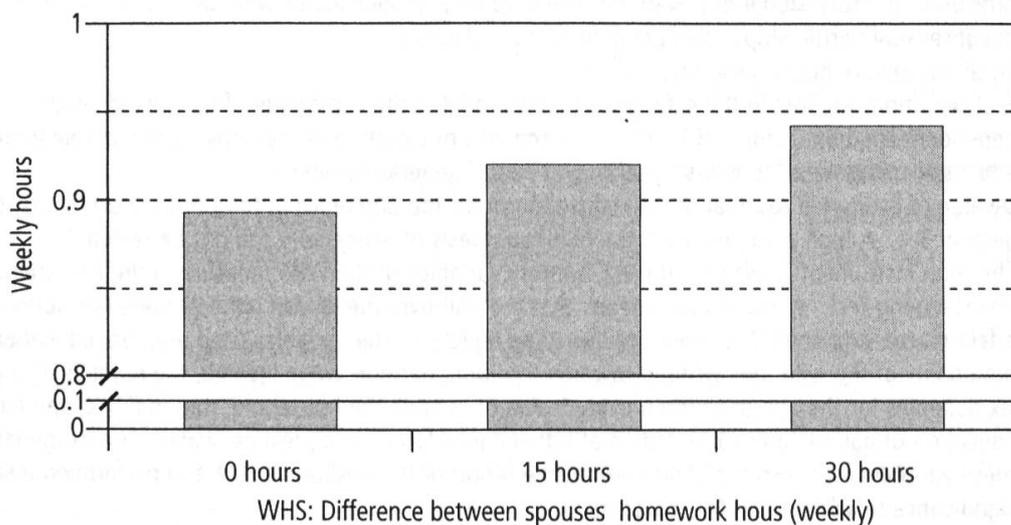
to the previous results, the impact of housework of women in families with dependent children is highly significant and at the upper boundaries of the range of estimates. This confirms the strong and independent impact of women's housework. The results for couples without dependent children living in their household are less clear-cut in this case (columns (E)–(F)). Including child care, which probably concerns children of neighbours, friends or family members, does not seem to have the same impact as the housework or the care of own children. This result could be interpreted in the sense that such housework is considered a rather optional activity by the spouses and is not subject to a bargaining process within the household.

Additional robustness checks were done adding dummies for women's education as proxy for their potential earnings directly to the probit estimation following the argumentation of Skatun (2004). The results are shown in Table A3 in the Appendix. Again the size and significance of the impact of WHS on the JEM of the husbands are unaltered by these additional controls. Hence, the impact of WHS measured by spouses' housework hours is not biased by a possible impact of potential earnings of the wife on her husband's bargaining power at work.

6.1 Simulation of the quantitative impact:

Figure 6 presents the quantitative implications of the results found. More precisely, we see in this figure how the predicted probability for a husband to have a good JEM varies with the degree of WHS when approximated by the difference between spouses' housework hours. In order to estimate this impact, we estimate the

Figure 6 Husbands' predicted probability to have a good job-education-match (GJEM=1)



probability for a husband with average values in explanatory variables (see Table 7) and differing degrees of WHS. In the first case, the wife does not specialise in housework at all, therefore the difference between their housework hours equals zero. Then, this difference is increased to 15 and 30 hours respectively. This range represents roughly the variation of one standard deviation (12,4 hours) above and below the mean of this difference in weekly work hours (13,7) hours observed in our sample. In this context, it is important to remember that the correct amount of housework hours in the SHP (2000) is underestimated by 30–50% for women. Thus, we conclude that women indicating in the survey to perform 30 hours more of household work than their husbands may actually work 40 hours more, being fully specialised in home production. The predicted

Table 7 Evaluation of the impact within-household specialisation (WHS) on the predicted probability of having a good job-education-match (JEM)

Dependent variable:	dF/dx(2)	X(3)	dF/dx(2)	X(3)	dF/dx(2)	X(3)
Good job-education-match (GJEM) (1)						
Age	0.006 (0.95)	42.15 –	0.004 (0.95)	42.15 –	0.004 (0.95)	42.15 –
Experience	0.001 (0.63)	20.81 –	0.001 (0.63)	20.81 –	0.001 (0.63)	20.81 –
Part-time job	–0.004 (0.10)	0.00 –	–0.003 (0.10)	0.00 –	–0.002 (0.10)	0.00 –
Tenure	0.005 (3.09)***	11.21 –	0.004 (3.09)***	11.21 –	0.003 (3.09)***	11.21 –
Non-Swiss nationality	0.025 (0.73)	0.00 –	0.020 (0.73)	0.00 –	0.015 (0.73)	0.00 –
Difference in housework hours (Wife's – husband's hours)	0.002 (2.13)**	0.00 –	0.002 (2.13)**	15.00 –	0.001 (2.13)**	30.00 –
Husband's predicted probability of having a good JEM	0.893		0.920		0.942	
Number of observations	787		787		787	

Robust z-statistics in parentheses, **significant at 5%, *** significant at 1%.

Source: Swiss Household Panel (SHP) 2000.

Notes:

- (1) GJEM is a dichotomous variable taking value 1 when a husband's educational qualifications correspond to his job and 0 if his qualifications are superior to his job.
- (2) Probit estimation, marginal effects.
- (3) The probability is evaluated for a Swiss man, married, working in a full-time job, of average age, experience and tenure, having obtained vocational training as the highest education degree. Furthermore he reports having no difficulties in his professional or private life and his satisfaction with health status and social skills is at an average level.

probability of having a good JEM increases from 89% to 94% overall following the two increases of 15 hours each ranging from no specialisation at all to complete specialisation of the spouse in housework.

Therefore, when WHS is measured by the amount of housework production the wife does in surplus to her husband, it is clearly shown to have a noticeable positive impact on his probability of having a good JEM. Given the average level of 15 hours of difference between the spouses' housework, the average impact of WHS should be around 3 percentage points. The size of this impact is estimated under the assumption of a standard normal distribution of the error term in our model. 3 percentage points represent around 30% of the size of the marginal effect of marriage on men's probability of having a good JEM, estimated at 9,5 percentage points by Wirz and Atukeren (2004). Hence, a substantial share of the impact of marital status on the JEM of men can indeed be attributed to WHS effects.

However, since these results and tests are based on cross-section estimates, it is not possible to infer directly the existence of causal relations between the independent variables and the dependent variable. Nevertheless, the regularities described are robust and could possibly indicate the direction of causal links. At least, empirical evidence does not seem to contradict our hypotheses. However, further research based on data from a panel covering a sufficiently long time period is needed to confirm these results.

7 Conclusion

We indeed find support for the common idea cited in the introduction, that a "great woman" may help a man to be "great". A "great woman" is defined in this context in the admittedly simplified sense as being a woman taking over a larger share of the housework burden. Overall, the results show clearly that such *within-household specialisation (WHS)* explains a substantial part of the improved *job-education-match (JEM)* of husbands, when both spouses' housework hours are used to measure WHS. Testing for a possible endogeneity bias we do not find evidence for a sorting process of more able husbands with "traditional" spouses to bias this result. However, further research based on panel data of spouses' market and home production, covering a sufficiently long time span, is needed to test whether these results based on cross-sectional data show a true causal relationship.

Nevertheless, the empirical evidence so far strongly hints at an independent and significant impact of women's housework hours on their husbands' JEM. The impact of WHS seems clearly related to the amount of housework hours taken on by the wife independently of the husband's number of housework hours. This clearly speaks against the explanation of Becker (1985) but for the theory of François (1998) stipulating that the work motivation of a husband is increased by

his gains from within-household trade. These conclusions are robust to various assumptions about the bargaining process between spouses.

These findings imply that the impact of education policy is affected by social and economic factors determining the time allocation decisions of spouses. More precisely, measures favouring a traditional specialisation of spouses between market and home production help improve the allocation of husbands to jobs matching their education. However, it is important to note in this context that this improvement in allocation is acquired at the cost of more frequently interrupted working careers of women on average, hence their lower involvement in the labour market. Thus, if household specialisation indeed improves the JEM of husbands, then social policies favouring “traditional” marriages clearly favour the utilisation of men’s human capital to the detriment of the utilisation of women’s capital.

8 References

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9 Annexes

Table A1 Education years by educational level

Level	Classification labels	Years assigned	
		Men	Women
1	Incomplete mandatory schooling	8.0	8.0
2	Mandatory schooling	9.0	9.0
3	1 year school of commerce	10.0	10.0
4	General training school	11.0	11.0
5	Vocational education, recognised degree	12.5	12.0
6	High school degree, maturity	13.0	13.0
7	Vocational high education	14.5	14.0
8	Technical or vocational school	14.5	14.0
9	Vocational high school	14.5	14.0
10	University, higher specialised school	17.0	17.0

Table A2 Descriptive statistics of total sample and sample of matched spouses; mean (standard deviation)

	<i>Husband's characteristics</i>		<i>Wife's characteristics</i>	
	Total sample	Sample with matched Spouses (3)	Total sample	Sample with matched Spouses (3)
Good job-education-match (GJEM) (1)	0.87	0.86	–	–
Age	43.33 (10.40)	42.15 (10.34)	42.34 (11.76)	39.8 (10.20)
Market work experience (2)	22.34 (12.09)	20.81 (11.92)	6.75 (9.40)	7.53 (9.51)
Market work hours, weekly	45.05 (9.74)	44.14 (9.03)	15.23 (16.52)	16.84 (16.38)
Education years	13.67 (2.41)	13.80 (2.46)	12.45 (2.40)	12.79 (2.37)
Tenure	11.86 (10.61)	11.21 (10.32)	–	–
Non-Swiss nationality	0.20	0.18	0.19	0.17
Housework hours, weekly	6.10 (6.00)	6.10 (5.72)	20.12 (11.34)	19.77 (10.91)
Consensual partnership	0.09	0.09	0.08	0.09
Dependent child living in household	0.55	0.59	0.50	0.59
Number of observations	1507	787	1570	787

Table A3: The impact of within-household specialisation (WHS) on husbands' job-education-match (JEM) – with controls for wives' potential earnings (1)

Probit, marginal effects are presented <i>Dependent variable:</i> Good job-education-match (GJEM) (2) (3)	All households	
	(A)	(B)
<i>Wife's education:</i> Compulsory schooling	-0.005 (0.10)	0.002 (0.04)
General training school	0.053 (0.67)	0.050 (0.59)
Vocational school, full time	0.036 (0.81)	0.048 (1.19)
Maturity	-0.043 (1.24)	-0.044 (1.08)
Vocational high education	0.000 (0.01)	-0.011 (0.15)
Technical or vocational school	-0.135 (1.16)	-0.140 (0.85)
Vocational high school	0.028 (0.49)	0.056 (0.88)
University, higher specialised school	-0.058 (1.30)	-0.108 (1.62)
<i>WHS:</i>		
Difference in housework hours (wife's – husband's hours, weekly)	0.002 (2.15)**	–
Difference in total housework hours, including child care (wife's – husband's hours, weekly)	–	0.002 (2.15)**
Number of observations (4)	787	439
Log-likelihood value	-278.2	-140.1
Pseudo <i>R</i> -squared	0.111	0.137

Robust z-statistics in parentheses, ** significant at 5%

Source: Swiss Household Panel (SHP) 1999

Notes:

1. Potential earnings of wives is approximated by their education measured in 9 levels. Therefore, 8 dummies are added to the probit equation, the default being a woman having certified vocational training as her highest education degree.
2. GJEM is a dichotomous variable taking value 1 when a husband's educational qualifications correspond to his job and 0 if his qualifications are superior to his job.
3. Also included in the regression are the husband's education, age squared, health, a dummy for difficulties in professional or private life and a dummy for individuals who are not married but living in consensual partnerships. Sample definition see Table 1.