The Effects of Assortative Mating on Earnings: Human Capital Spillover or Specialization?

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Abstract

This paper studies how the spouse's productivity in the labor market affects one's individual earnings when married. Theoretically, the high productivity of a spouse in a marriage could affect the other spouse's earnings in two ways: negatively through specialization and division of labor, or positively from human capital spillover. Using longitudinal microdata on individuals as both single and married people allows us to estimate the spouses' productivity as a single persons and thereby avoid problems of endogeneity between the two spouses' labor market performances. Productivity is approximated with residuals from estimates of pre-marriage earnings equations. Results indicate that there are negative effects of the spouse's productivity on individual earnings for both males and females, and that this effect appears to be enhanced by the duration of the marriage. However, closer examination shows that only the youngest groups of males and females experience this negative effect. In addition, there is some evidence for a positive effect of the husband's productivity on earnings in the case of older groups of females.

Keywords: Marriage, Assortative mating, Earnings, Specialization.

JEL Classification: D10, J12.

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1 Introduction

Specialization and division of labor between husbands and wives are common explanations of monetary gains realized from marriage. According to economic theory, the reasons for this are that there are differences in the comparative productivity of the spouses and that the productivities of the spouses act as substitutes. An alternative to the specialization hypothesis is that the productivity of one spouse will increase the other spouse's human capital and productivity. The spouses can assist each other in the labor market, and their productivities may be complements. In this paper, we will study how the spouse's productivity, as manifested in earnings in the labor market, affects one's own individual earnings. Will marrying someone who is successful in the labor market have a different effect on one's earnings than marrying someone less successful?

Marital matching has implications for the income distribution in society as a whole and plays a significant role in the persistence of economic status across generations (Chadwick and Solon, 2002). The matching of individuals may also have an effect on the distribution of incomes within a marriage as well as between males and females.

The degree of specialization depends on the market and domestic productivity of the spouses. Both the hours and effort directed towards market and domestic work are potentially outcomes of a bargaining and specialization process. Most previous studies typically rely on data on earnings and labor force attachment during marriage when studying specialization and the division of labor. Examples of the questions pursued are, how the earnings of the husband affect the wife's transitions in and out of work (Henz and Sundström, 2001) and the amount of time the wife spends at work affects the husband's earnings (Chun and Lee, 2001 and Loh, 1996). However, if the labor market performance of

the spouse is measured during marriage, it may represent an outcome of the specialization process and not a determinant. Findings in previous studies indicate that individuals tend to marry as well as be married to others who are similar to themselves in terms of earnings and education. (Smith, 1979; Lam, 1988, and Nakosteen et al., 2004). The former is assortative mating, i.e., the matching process of individuals into marriage, where high earners choose to marry other high earners. The latter is an outcome of interaction processes within a marriage. The question that arises is: If individuals marry others with similar earnings potential, will the two spouses reinforce or offset each other as a married couple? A test of this requires information on the spouses' productivities before they marry.

The main contribution of this paper is that we are able to control for the attributes and labor market performance of individuals before they marry, i.e., before the potential specialization process has begun. We will use a rich register data set, including yearly observations on the entire Swedish population over time. This longitudinal data makes it possible to observe the individuals and their spouses when they are single and also later on, when they are married. The premarital productivity of the spouse will be approximated by the differences between the spouse's actual earnings and the expected earnings, given a cross-sectional earnings regression based on observations from three years before the marriage. By using information on the individuals before they actually meet and form couples, we avoid the problem of endogeneity between the spouses' labor market performance and earnings.

Family life in Sweden, as in most developed countries, has, in the last few decades, undergone substantial change, and today women participate in the labor market al.,most to the same extent as men.[1] The increase in female labor

[1] In 2003, 78 percent of all women 20-64 years old were in the labor force, compared to 82 percent of all men (Statistics Sweden, Labor force Survey LFS).

force participation is an international phenomenon, but, for comparison, Sweden has among the highest female labor force participation rates in the world.[2] The high share of dual-earner households and the availability of rich longitudinal microdata makes Sweden an interesting case to study how the c*hoice* of partner, i.e., how the partner's premarital productivity (earnings), affects labor market outcomes for both men and women.

The remainder of the paper is organized as follows. The following section presents some theoretical considerations, and Section 3 reviews previous studies on marital matching and specialization within marriage. Sections 4 and 5 present the empirical model and data. The results are reported in Section 6, and Section 7 summarizes the findings and concludes.

2 Marital Matching and Gains from Marriage

Gains from marriage are in the literature typically attributed to specialization and division of labor within a marriage (Becker, 1981). This is based on assumptions that rely on differences in productivity and comparative advantage. A higher productivity of the spouse in the labor market (ceteris paribus) indicates greater advantages of specialization and the division of labor as a result of comparative advantage. The degree of specialization depends on the spouses' relative human capital and also on their preferences. As the couple begins to specialize, the benefits of specialization will increase, as they acquire more specific skills. Becker (1985) shows specialization can occur without affecting the working hours of the husband and wife. Housework and childcare are tiring compared to leisure and may lead to the individual with more housework responsibilities taking less demanding market work, which

[2] According to OECD statistics, only Iceland had a higher female labor force participation rate in the period 2000-2007.

would lead to lower earnings. If the characteristics of the male and female are substitutes in the household production function, and if the gains from specialization are greater when the difference in the productivity of the spouses is greater, then negative assortative mating will be optimal. A marriage market that maximizes the sum of marital output will match people with differing attributes. With respect to wages, Becker (1973) argues that negative matching is optimal. In other words, individuals with high labor market productivity will marry individuals with low labor market productivity.

Another possible source of gains from marriage is the sharing of household public goods[3]. Household public goods are jointly consumed by the spouses and can, for instance, be children, nice living spaces, heating, lighting, neat gardens and road trips. Lam (1988) extends Becker's model to include the joint consumption of public goods. In Lams model, the gains from marriage come from both the joint consumption of household public goods and possibly also specialization. If the spouses' wage elasticity of demand for the household public good has the same sign, positive assortative mating with respect to earnings is optimal. However, if these goods can be produced at home, gains from specialization can be realized and may result in negative assortative mating in the optimum. The size of these two effects depends on the elasticities of demand for the public good, the cross-wage elasticities of labor supply and the level of demand of the public good. If the gains from the family's consumption of the public good offset the gains from specialization, the model predicts that high earners will marry each other. Nonetheless, in this model, division of labor will still occur, the spouse with higher wage will specialize in market work and the spouse with lower wage will specialize in home production. Positive assortative mating will be optimal as long as the

[3] Other possible monetary gains to marriage are risk sharing and the coordination of investment activities (Weiss, 1997).

gain from sharing the public good is greater than the comparative advantage effect that would occur under negative assortative mating.

An alternative hypothesis is that both spouses can augment the other's productivity. In the workplace, the high productivity of one worker has been shown to have a positive effect on the productivity of his/her co-workers (Mas and Moretti, 2009). The productivity of the spouses may be complements in the labor market, and one or both spouses may be able to benefit from the other's human capital and productivity (See, e.g., Brynin and Francesconi 2004). Marrying someone who is successful in the labor market may benefit one's own career and increase one's own earnings. Possible mechanisms for this are, e.g., access to larger and more productive networks, the drive and ambition of one spouse's inspiring the other spouse with regard to his/her career. Married spouses are also likely to affect each other through values, attitudes and the ability/disability to provide inspiration for new ideas and opportunities (Benham, 1974). Moreover, it might be the case that a highly productive spouse counteracts the depreciation of the partner's human capital.

3 Previous studies

A number of papers examine the economic processes within marriage, the division of labor and specialization within marriage. One strand is the literature on the marriage premium, which analyzes whether the positive effect on male earnings from marriage arises due to selection or due to specialization. The results are mixed; Nakosteen and Zimmer (1987) find that the gain from marriage is no longer significant when accounting for the selection into marriage using an endogenous switching model. Chun and Lee (2001) also use switching regression, predicting marital status using the mother's country of origin and local marriage market conditions; they find no support for the

selection hypotheses. Korenman and Neumark (1991) use longitudinal data and show that the selection effect alone cannot explain the entire gain from marriage. More than half of the marriage premium remains after controlling for time-invariant unobservable individual attributes that affect both wages and marriage. Korenman and Neumark (1991) also show that the marriage premium is particularly large during the first five years of marriage. Bardesi and Taylor (2008) find large effects of selection on both observable and unobservable characteristics in estimates of a fixed-effects model. However, after including the time-invariant individual effects, they also find some evidence that supports the specialization hypothesis. Ginther et al., (2008) use a natural experiment, a reform in the widow pension system, to disentangle the marriage premium in Sweden. Their results indicate that the male marriage premium can be explained by positive selection into marriage.

For women, the results are more varied. Korenman and Neumark (1992) estimate both instrumental variables and fixed-effects models and find that marriage does not seem to affect female wages. Hewitt et al., (2002) use quantile regression and find no effect of marriage on female wages. Budig and England (2001) estimate fixed-effects models and report negative effects on female wages. Using a similar approach, Loughran and Zissimopoulos (2004) report positive results only for older women. For Swedish women, Ginther et al., (2008) find a marriage penalty that the authors argue is due to specialization.

If there is an effect of marriage on male and female earnings, it is likely to depend on who one marries. In numerous studies, the characteristics of the spouse are found to affect individual earnings. The amount of time the wife spends at home and the wife's education are two examples. The educational level of the spouse is found to have a positive effect on individual earnings; the explanations most often proposed are network effects or human capital

spillover. Among others, the results in Benham (1974) and Jepsen (2005) indicate that a higher education of a wife increases her husband's earnings. Rossetti and Tanda (2000), Groothius and Gabriel (2008) and Åström (2009) study the relationship between the spouse's educational level and own earnings for both men and women and find positive effects on earnings.

Some studies uses the wife's labor force attachment, i.e., working hours, as a measure of the division of labor and study the effects on the husband's earnings and thereby the degree of specialization. The labor supply and earnings during marriage may be affected by the division of labor within the couple, the behavior of the partner and the circumstances that characterize life as married as well as other exogenous factors that affect both spouses' earnings. Clearly, the wife's labor hours are endogenous to the husband's earnings.

A common solution to this problem is the use of instrumental variables. Instruments proposed include the wife's characteristics and children (Daniel, 1992) and the male's attitude to gender roles and children (Gray, 1997). Both of these studies find a negative effect of the wife's labor hours on the husband's earnings. Another strategy is to use the prediction of the wife's working hours as an instrument, where the wife's working hours are predicted with variables that are assumed to be exogenous to the husband's earnings. Jacobsen and Rayack (1996) employ this strategy and use children, the age of the youngest child, the age of the wife, and the wife's level of education as exogenous variables. They find no or little effect of the wife's working hours on the husband's earnings. However, the presence of children and the age of the children may have a direct effect on the husband's earnings, i.e., they might not be exogenous (see, e.g., Cornwell and Rupert, 1997). Chun and Lee (2001) use the presence of relatives in the household and the proportion of female employment in the state as exogenous variables in the prediction of the

wife's working hours. Their results are consistent with the specialization hypotheses. These studies all use the wife's attributes within marriage and try in different ways to model the endogeneity of the wife's labor supply, and the results rely on the validity of the instruments. The results in these previous studies are inconclusive regarding the occurrence of specialization within marriage. In the present study, an alternative strategy is used; we use a measure of the spouse's productivity that is observed before the potential specialization process has begun.

A few studies have used a similar approach of estimating the individuals' productivity. Brynin and Francesconi (2004) calculate the partner's, for both men and women, "unmeasured productivity" using the residuals from the couple's "education-matching" equation. The unmeasured productivity of the individual is approximated with the difference between the partner's actual and expected schooling, given a set of individual characteristics such as one's own education and family background. Brynin and Francesconi find a positive and significant effect on the individual's wage from the partner's unmeasured human capital. Their interpretation is that these unmeasured parts of the partner's human capital enhance the individual's own stock of human capital and thereby his/her wage. The data used only cover the individuals as couples, which makes it difficult to separate the estimated effect from selection effects. Behrman et al., (1995) also estimate the individual's unobserved human capital for subsequent implementation as a regressor in an earnings equation. They calculate the male's unobservable human capital as the difference between his wife's actual schooling, age and dowry, and her expected schooling, age and dowry given the man's characteristics. This unobserved human capital is used as an explanatory variable in his earnings equation, and the results indicate a positive and significant effect. The authors argue that the result shows that potential wives and employers value the same, for the researcher, unobservable attributes.

To sum up, Becker (1973) argues that an optimal matching of individuals on the marriage market is achieved if individuals who are highly productive in the labor market marry individuals who are highly productive in domestic work. This implies that the labor productivity of the spouse will negatively affect the individual's earnings. However, most empirical studies find that people marry or are married to individuals with similar economic attributes; i.e., they engage in positive assortative mating. There are also some studies that show that the labor market behavior and human capital of one spouse affects the other's earnings. An alternative to the specialization hypothesis is that the productivity of one's spouse in the labor market will increase one's own human capital and productivity. The spouses can assist each other in the labor market, and the spouses' productivity levels may be complements.

4 Empirical strategy

The earnings of an individual can be viewed as an approximation of productivity and a measure of human capital. Schooling, age and labor market characteristics are some of the factors that are reflected in earnings. Individuals marry others of a similar age and with similar education levels, which implies that the earnings of husbands' and wives' in married couples are likely to be correlated. The parts of the spouse's earnings that are attributed to these and other measured factors will be controlled for. In this study, the focus will be on how the unexplained part of the spouse's earnings, i.e., the difference between expected and actual earnings, affects one's own earnings. Having higher unexplained earnings implies that the individual is more efficient at exploiting his observed characteristics. The unmeasured factors can, for instance, be ambition, endurance, social skills, health, intelligence and beauty. Hereafter, these unmeasured attributes of the spouse will be referred to as the "spouse's

productivity" or the "spouse's premarital productivity" [4]. Previous studies that use the residuals from a Mincer-equation as a measure of an individual's productivity and ability include Juhn et al., (1993) and Beenstock (2007). At least part of these attributes is visible to the potential partners, and previous studies show that the characteristics that are attractive to the employer also are attractive to potential spouses (Ribar, 2004 and Behrman et al., 1995). Several studies on marital matching consider the correlation in earnings residuals as a measure of assortative mating (Becker,1981; Nakosteen et al., 2004 and Smith, 1979).

A crucial feature of this study is that the spouse's productivity is estimated using observations when the individuals are single, i.e., before the two individuals form a couple. The earnings during marriage may be affected by the division of labor within the couple, the behavior of the partner and of circumstances that characterize married life and other exogenous factors that affect both spouses' earnings. In other words; if the spouse's unexplained earnings and productivity are measured during the marriage, they will be endogenous to the individual's own earnings, since both attributes are decided simultaneously within the marriage. Productivity observed prior to the marriage should not be affected by the "to be" spouse's attributes or by the couple formation itself. To achieve an approximation of the spouse's premarital productivity, we estimate cross-section earnings equations prior to the marriage for males and females, respectively.

$$\ln Y_s = \alpha + \boldsymbol{\beta}'\mathbf{x}_s + \delta_s + \varepsilon_s \qquad \text{[Eq. 1]}$$

[4] This is a somewhat inadequate term and is rather a reflection of characteristics, unobservable to the researcher, that are hypothetically correlated with the productivity.

where $\boldsymbol{\beta}$ is a vector of unknown coefficients and $\mathbf{x}_s$ are explanatory variables that according to theory and empirical research are assumed to influence the individual's earnings. δ_s are the spouse's attributes that affect earnings and are unobservable to the researcher but are visible to the employer and the potential spouse. ε_s is the error term. The spouse's productivity that will be used in step two is a generated regressor, $\hat{\delta}_s$, and will be approximated with the difference between the actual earnings and the expected earnings given the observed characteristics and the estimated coefficients from Equation 1.

$$\hat{\delta}_s = \ln Y_s - \hat{\boldsymbol{\beta}}'\mathbf{x}_s$$

In a second step, we examine whether the spouse's premarital productivity is systematically correlated with the earnings of the individual in the subsequent years as married/cohabitants. The model to be estimated is

$$\ln Y_{it} = \varphi + \boldsymbol{\beta}_1'\mathbf{x}_{it} + \beta_2 M_{it} + \beta_3 M_{it}\hat{\delta}_{is} + \beta_4 M_{it}\hat{\delta}_{is} D_{it} + u_i + \gamma_t + \varepsilon_{it}, \qquad \text{[Eq. 2]}$$

where Y_{it} are the individual's *i:s* earnings at time *t*, $\mathbf{X}_{it}$ is a vector of explanatory variables for individual *i* at *t*. $\boldsymbol{\beta}_1$ is a vector of unknown coefficients. M_{it} is a dummy that takes the value 1 if the individual is married at time *t* and zero otherwise. $\hat{\delta}_{is}$ is individual i's spouse's productivity prior to marriage, estimated in the first step. The effect of spousal premarital productivity is expected to depend on the length of the marriage. The variable, D_{it}, indicating the years of marriage at *t,* is included as an interaction variable with spouse's premarital productivity to capture this potential effect. $\beta_{2\text{-}4}$ are parameters to be estimated. If specialization occurs, we expect the estimated parameters of β_3 and β_4 to be negative. Given a negative sign on β_3, a negative sign on β_4 indicates that the effect of specialization increases with the duration

of the marriage as the spouse acquires more and more specific skills. On the other hand, positive signs on β_3 and β_4 would indicate the opposite; the spouse's productivity has a positive effect on the individual's earnings, and the positive effect is enhanced with the duration of the marriage. This potential result would indicate positive externalities from the spouse's human capital. u_i is a time-invariant individual effect that accounts for the individual's own unobservable characteristics affecting productivity, such as intelligence and ability. Equation 2 is estimated using a fixed-effects model to account for unobservable time-invariant individual heterogeneity. γ_t is a time-specific effect, and ε_{it} is the error term.[5] The variance in the second step will be estimated using the Murphy-Topel[6] estimator to account for the spouse's premarital productivity, being a generated regressor that is measured with uncertainty.

5 Data

The data used in this study have been constructed from administrative registers kept by Statistics Sweden. Our sample includes individuals born between 1943 and 1969, who either got married or became cohabitants in 1997. This means that the individuals are at least 25 years old when the productivity is estimated in 1994. Cohabitating and having children without being married are very common and are socially accepted in Sweden.[7] In our data, unmarried cohabitant couples are only registered if they have a child in common. The empirical strategy in this study relies on the fact that the individuals are unmarried when the premarital productivity is measured; therefore, only

[5] For an introduction to panel data models see, e.g., Baltagi (2001) and Greene (2003).
[6] See Murphy and Topel (1985). How to incorporate the estimator to Stata software can be found in Hole (2006) and Hardin (2002).
[7] "Marriage" will throughout the study be used synonymously with both formal marriage and cohabitation.

couples where both spouses were single for the three years preceding the marriage are included. This gives a sample of 18,922 couples that were formed in 1997. Data is organized as a panel consisting of yearly observations from 1994 to 2003, i.e., three years prior to marriage and up to the first seven years of marriage.

The dependent variable is the logarithm of total annual earnings from employment and self-employment. Annual earnings rather than wage must be used, as the data do not include information about hours or weeks worked. The earnings are deflated using the Swedish Consumer Price Index and are expressed in constant year-2000 SEK. The independent variables include individual attributes; age, education[8], dummies indicating student status, self-employment, sector of employment and children present in the household. Age and age square are included to control for experience and life cycle effects that affect earnings. Education is a measure of the individual's highest educational attainment according to official registers. The dummies indicating the region of residence account for regional differences affecting earnings, e.g., labor market conditions and commuting options. A dummy indicating students is included as an additional control for labor supply. A set of dummy variables indicating the sector of employment is included to control for sectorial differences in the labor market. Marriage and cohabitation are closely related to having children; consequently, indicators for children and parental leave[9] are included in the set of explanatory variables. Parenthood has been shown to

[8] The levels of schooling as indicated in the registers of Statistics Sweden are transformed into years of schooling in the following way: 7 years for the old compulsory school, 9 years for the new compulsory school, 11 years for short upper-secondary school, 12 years for long upper-secondary school, 14 years for short university, 15.5 for long university and 19 years for a doctoral degree.

[9] Parental benefit is payable for 450 days for children born before 2002 for parents who stay away from work to be with a child. Both parents have equal entitlement to the parental benefit days, but one parent may give up part of their parental benefit to the other parent. The amount received is a function of annual income.

have an effect on both male (Cornwell and Rupert, 1997) and female (Budig and England, 2001) earnings.

Table 1. Descriptive statistics for females and males in 1994 and 1997.

	Females				Males			
	1994		1997		1994		1997	
Variable	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Total annual earnings (SEK 100)	1327.20	725.62	1266.29	946.71	1807.60	1291.23	2262.3	1455.65
Age	31.28	6.17	34.25	6.14	33.31	6.75	36.22	6.72
Education (in years)	12.42	1.99	12.50	2.20	12.41	2.15	12.28	2.41
Children	0.26		0.69		0.04		0.69	
Parental benefit	0.18		0.57		0.08		0.46	
Born in Sweden	0.91		0.91		0.92		0.92	
Self employed	0.01		0.01		0.04		0.04	
Student	0.13		0.06		0.07		0.04	
Farming	0.006		0.005		0.02		0.01	
Manufacturing	0.11		0.11		0.24		0.24	
Construction	0.01		0.01		0.11		0.10	
Retail	0.21		0.19		0.25		0.25	
Private sector	0.14		0.15		0.15		0.17	
Public sector	0.53		0.50		0.23		0.21	
Stockholm	0.29		0.29		0.28		0.28	
East Middle Sweden	0.16		0.15		0.15		0.15	
Smaland and the islands	0.05		0.06		0.06		0.06	
South Sweden	0.13		0.13		0.14		0.14	
West Sweden	0.19		0.19		0.20		0.19	
North Middle Sweden	0.08		0.08		0.08		0.08	
Middle Norrland	0.04		0.04		0.04		0.04	
Upper Norrland	0.05		0.05		0.05		0.05	
Number of obs.	16,986		16,447		16, 678		16,762	

Sample descriptives for males and females with nonzero earnings in 1994 (the year in which the premarital productivity is estimated) and 1997 (the first year of marriage) can be seen in Table 1. Comparing the means before marriage to the means in 1997 for females show that women have lower earnings when they are married compared to when they are single. This can partly be explained by the incidence of women staying home with young children. In

1997, 57 percent of the women collect parental benefits compared to 18 percent in 1994. The mean of earnings for the males demonstrate an opposite pattern; their earnings are higher when they are married compared to when they are single. This could possibly be a sign of the well-documented marriage premium; for a review on the marriage premium literature, see Ribar (2004). Noteworthy is that even though almost 50 percent of the males collect parental benefits in 1997, compared to only 8 percent in 1994, their earnings are still higher in 1997.

6 Results

The first step is to estimate the labor productivity of the spouses before marriage. The estimates of Equation 1 are given in Table A1 in the Appendix. The estimated residuals from the earnings equations for males and females are positively correlated (not reported in the table). In 1994 the correlation in earnings residuals between males and females is 0.0854[10] for the entire sample. This indicates that high earners tend to marry other high earners, i.e., the data show signs of positive assortative mating for earnings. The results of the second-step estimations are presented in the Tables 2 and 3. The Hausman specification tests are all highly significant in favor of the fixed-effects models over specifications with random effects.

Models 1 and 2 in Table 2 only include controls for education, region of residence and age. The estimated coefficient of *Husband's premarital productivity* is negative and significant. This indicates that higher levels of

[10] Nakosteen et al., (2004) also use Swedish data and estimates correlation in earnings residuals before marriage. They find a correlation of 0.09 three years prior to marriage for a sample of individuals marrying in 1995.

earnings generated by the husband, given his observable characteristics before marriage, lead to lower earnings generated by the wife during marriage.

Table 2. Estimates of the earnings equations for females.

	Model 1	Model 2	Model 3	Model 4
Married	-0.534*** (0.007)	-0.535*** (0.007)	-0.552*** (0.007)	-0.385*** (0.007)
Husband's premarital productivity	-0.037*** (0.006)	-0.018** (0.009)	-0.020** (0.009)	-0.010 (0.008)
*Husband's premarital productivity *Years married*		-0.006*** (0.002)	-0.005*** (0.002)	-0.004** (0.002)
Sector of employment, Student and Self-employed	No	No	Yes	Yes
Children and parental leave.	No	No	No	Yes
Hausman	900.78	929.87	1934.75	1710.32
Adj R^2	0.34	0.34	0.34	0.36
Number of observations	153,899	153,899	153,899	153,899

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

If the premarital productivity of the husband is one percent higher, ceteris paribus, the female's earnings will be 3.7 percent lower as married. The theory of household specialization implies that the specialization should increase over time as the partners acquire more specific skills. In model 2, the interaction effect between the husband's productivity and the length of the marriage is accounted for, and the estimated coefficient is negative and significant. A greater amount of time spent by the couple as a married couple leads to a larger negative effect of the husband's premarital productivity on the female's earnings.

Model 3 includes control variables for the sector of employment, one's status as a student and self-employment. These variables are related to the individual's labor market attachment and may be affected by the marriage or

the partner's characteristics. The estimated coefficients of *Husband's productivity* and *Husband's productivity*Years married* are still negative and significant. Model 4 includes indicators for children in the household and parental leave. This reduces the coefficients of *Husband's productivity* and of the interaction with *Years married*. This indicates that part of the estimated effects in models 1-3 comes from the effect of having children or from that of being on parental leave. However, the estimated coefficients are still negative, and the coefficient of *Husband's productivity*Years married* is significant. These estimates imply that there might not be an immediate effect of the husband's premarital productivity; rather, the negative effect evolves over years of marriage.

Table 3. Estimates of the earnings equations for males.

	Model 1	Model 2	Model 3	Model4
Married	-0.005 (0.005)	-0.016** (0.005)	-0,007* (0,004)	-0,002 (0,005)
Wife's premarital productivity	-0.012*** (0.004)	-0.004 (0.006)	-0,003 (0,005)	-0,004 (0,005)
*Wife's premarital productivity*Years married*		-0.003*** (0.001)	-0,002* (0,001)	-0,002* (0,001)
Sector of employment, Student and Self-employed	No	No	Yes	Yes
Children and parental leave.	No	No	No	Yes
Hausman	818.49	962.38	2656.75	2538.2
Adj R^2	0.54	0.54	0.55	0.55
Number of observations	158,897	158,897	158,897	158,897

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Table 3 gives the estimated coefficients for the males. In model 1, the estimated coefficient of the *Wife's premarital productivity* in 1994 is negative and significant. This suggests that the higher level of unexplained earnings generated by the wife before marriage implies lower earnings generated by the male during marriage. A one percent increase in the wife's productivity before

marriage lowers the husband's earnings by 1.2 percent. Model 2 includes an interaction between the wife's productivity before marriage and the length of marriage in years. The estimated coefficient of the interaction variable is negative and significant. This implies that the negative effect of the wife's productivity becomes stronger with the duration of the marriage[11]. In models 3 and 4, which include more control variables, the coefficients of *Wife's productivity* are still negative but are now only significant at the ten percent level.

The dynamics within marriage and the division of labor might differ with regard to the spouses' age. It could possibly depend on different preferences between cohorts, life cycle effects such as labor force participation and employment. Loughran and Zissimopoulos (2004) find that there are gains to delaying marriage for women; women who marry later have higher wages. They further show that the timing of marriage does not seem to affect the wages of men. To analyze the heterogeneity with respect to different positions in the life cycle, we have estimated the effect of spousal productivity for different age groups. The sample is partitioned by the individual's age in 1994 into three groups, and the estimations include the full set of independent variables.[12] The premarital productivity of the spouse is, however, based on specifications including the entire sample.

Table 4 presents the results for females. The estimated coefficients for the youngest group of women, aged 25-34, shows a similar pattern as the results presented in Table 2. The coefficient of *Husband's productivity* is negative and significant in both models. The estimated coefficient of the interaction variable

[11] Alternative specifications including controls for the spouse's characteristics (education, age, sector and self-employment) are associated with only marginal changes in results.
[12] The results are robust with respect to using the alternative approach of dividing the sample into five-year cohorts.

with years married is also negative, and the parameter estimate is twice as large as the estimate for the entire sample.

Table 4. Estimates of the earnings equations for females, conditional on age group.

	Age 25-34		Age 35-44		Age 45-51	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Married	-0.417 *** (0.009)	-0.418 *** (0.009)	-0.224 *** (0.014)	-0.224 ** (0.014)	0.007 (0.025)	0.006 (0.025)
Husband's productivity	-0.033 *** (0.007)	-0.005 (0.010)	-0.004 (0.012)	-0.021 (0.017)	0.036 ** (0.017)	-0.026 (0.024)
*Husband's prod.*Years married*		-0.008 *** (0.002)		0.005 (0.004)		0.019 *** (0.005)
Sector of employment, Student and Self-employed	Yes	Yes	Yes	Yes	Yes	Yes
Children and Parental leave.	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	1499.91	1537.84	225.69	226.72	155.06	152.98
Adj R^2	0.34	0.34	0.45	0.45	0.56	0.56
Number of obs.	119,132		26,467		8,300	

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Women aged 35-44 do not seem to be affected by the premarital productivity of their husband. The estimated coefficient of *Husband's productivity* is not significant; neither is the interaction with *Years married*. Results for women over 45 years old show a different pattern; the coefficient of *Husband's productivity* is now positive and significant. This suggests that for this group of women, higher earnings of the husband before marriage is associated with higher earnings of the wife during marriage. When including the interaction variable, the estimated coefficient is positive and significant, indicating that the positive effect increases over the years. A possible interpretation is labor augmentation.

Table 5. Estimates of the earnings equations for males, conditional on age group.

	Age 25-34		Age 35-44		Age 45-51	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Married	-0.008	-0.008	-0.015	-0.015	-0.001	-0.001
	(0.006)	(0.006)	(0.010)	(0.010)	(0.016)	(0.016)
Wife's productivity	-0.014 ***	-0.006	-0.0002	0.001	-0.009	-0.005
	(0.004)	(0.006)	(0.008)	(0.011)	(0.012)	(0.017)
*Wife's prod.*Years married*		-0.002 *		-0.0003		-0.001
		(0.001)		(0.002)		(0.004)
Sector of employment, Student and Self-employed	Yes	Yes	Yes	Yes	Yes	Yes
Children and Parental leave.	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	1541.70	1544.98	614.94	442.52	309.25	281.58
Adj R^2	0.53	0.53	0.58	0.58	0.62	0.62
Number of obs.	105,872		38,197		14,828	

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Table 5 gives the results for males conditioned on age group. For the youngest group of men aged 25-34, the estimated coefficients of *Wife's productivity* and *Wife's productivity*Years married* are very close to the estimates for the entire sample (Table 3). The estimated parameters for the two older age groups are not significant, indicating the lack of effect of the wife's premarital productivity.

Robustness checks

Two additional robustness checks will be carried out. First, the results will be tested with regard to the year of estimating the spouse's premarital productivity. Hitherto, the premarital productivity is estimated using observations in 1994, i.e., three years preceding the marriage. In an alternative specification, the premarital productivity is instead calculated in 1995. See Table A2 for estimation results for equation 1 using observations from 1995.

The results from using the spouse's estimated premarital productivity in 1995 are presented in Tables A3-A6 in the Appendix. Table A3 gives the estimated parameters for the entire sample of females, and the results are similar to those presented in Table 2 above. On average, there seems to be a negative effect from the husband's productivity on the female's earnings. Stratifying the sample by age group (Table A4) gives estimates in accordance with the previous results. Only the youngest group of women seems to experience a negative effect from the premarital productivity of the husband. Furthermore, the estimated coefficient of the husband's productivity for the oldest group of women is positive and significant, implying that there may be a positive effect.

The estimated effect of the wife's productivity in 1995 on the male's earnings, presented in Table A5, is similar to the results in Table 3. The coefficients of the *Wife's productivity 1995*Years married* are negative and significant. However, when adding more control variables, the coefficients of *Wife's productivity 1995* become insignificant. The results conditioned on the males' age are also comparable to those above; the negative coefficient of *Wife's productivity* is only significant for the youngest age group.

It is not possible to observe cohabiting couples without children in common in our data. This means that we may, in some cases, fail to observe when the couples actually became cohabitants. This could pose a problem, as the empirical strategy relies on the individuals being single at the time when the premarital productivity is observed. If they are in fact cohabiting, the estimation of the spouse's premarital earnings will be endogenous to the individual earnings. To ensure that individuals without children are not already cohabiting when we observe them as singles prior to marriage, the sample is restricted to couples where the individuals had a registered place of residence in different areas three years before marriage. In this case, a geographical division of Sweden into squares with an area of 500 * 500 m is used. This

gives a restricted sample of 10,313 couples; the descriptive statistics for this smaller sample can be found in Table A7 the Appendix. Compared to the full sample, people not residing in the same geographical area prior to marriage on average are older, have lower education and have lower earnings. The correlation in earnings residuals for the smaller restricted sample is 0.0794 in 1994.

The estimated coefficients for the restricted sample of women (Table A8) give results very similar to those presented for the full sample. There seem to be negative effects for younger women and some signs of positive effects for the older age groups. For males, the results are in line with those presented above for the full sample; negative effects are only found for the youngest group of males.

Overall, the results are fairly robust to changes in sample restrictions and the choice of the year of the observation of the premarital productivity of the spouse.

7 Conclusion

In this paper, the effect of the spouse's premarital productivity, or the unobserved traits assumed to be positively correlated with productivity, on individual earnings in marriage is studied. Using longitudinal data from Swedish population registers allows the observation of males and females before they marry, which is essential in order to identify the effect of premarital productivity on earnings in marriage. Theoretically, the productivities may be substitutes in the household production function, and specialization will occur. Another possibility is that the productivities of

spouses are complements in the labor market, which means that the high productivity of the spouse will yield positive effects on one's own earnings.

Generally, the results indicate a negative effect of the spouse's premarital productivity on earnings. In other words, a higher premarital labor market productivity of one of the spouses translates to lower earnings of the other spouse in marriage. This result holds for both males and females on average. Even though the marriage market matches individuals with similar economic attributes together, i.e., positive assortative mating on earnings, there is evidence of specialization within the marriage. There are also results indicating that the negative effect is enhanced by the years spent in marriage. This is in line with the specialization hypothesis that predicts that the effect will increase as the partners obtain increasingly specific skills.

However, closer examination shows that it is the sample of young men and women that are driving the results. Males and females over 35 years of age do not seem to be affected negatively by their spouse's premarital productivity. For the women over 45, the results even indicate a positive effect of the husband's productivity. Males over 35 years of age do not seem to be affected by their wives' premarital productivities. The negative results for the younger groups of males and females are stable to changes in sample restrictions. A possible explanation for differences in results between age groups may be that the demands for household work are greater for young couples when starting a family and rearing small children. The positive effect of husband's productivity on earnings for women over 45 years old is consistent with the hypotheses of human capital spillover effects.

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Appendix

Table A1. Definitions of variables.

Variable name	Description
Married	Dummy variable, equal to one if the individual is married in year t; zero otherwise.
Years as married	Number of years married in year t.
Total annual earnings	Total gross wage earnings from employment and self-employment. Deflated by the consumer price index to the year-2000 price level.
Age	In years.
Education	The levels of schooling as indicated in the registers of Statistics Sweden are transformed into years of schooling in the following way: 7 years for the old compulsory school, 9 years for the new compulsory school, 11 years for short upper-secondary school, 12 years for long upper-secondary school, 14 years for short university, 15.5 for long university and 19 years for a doctoral degree.
Children	Dummy equal to one if the individual has children, zero otherwise.
Parental benefit	Dummy variable, equal to one if the individual receives any parental benefit, zero otherwise. Parental benefit is payable for 450 days for children born before 2002 to parents who stay away from work to be with a child. The parental benefit days are always shared equally between both parents, but one parent may give up the parental benefits to the other parent. The amount you receive is a function of your annual income.
Sweden	Dummy variable, equal to one if the individual is born in Sweden, zero otherwise.
Self employed	Dummy variable, equal to one if the individual is self-employed, zero otherwise.
Farming	Dummy variable, equal to one if the individual is employed in farming, zero otherwise. Classification is by SNI 92.
Manufacturing	Dummy variable, equal to one if the individual is employed in manufacturing, zero otherwise. Classification is by SNI 92.
Construction	Dummy variable, equal to one if the individual is employed in construction, zero otherwise.Classification is by SNI 92.
Retail	Dummy variable, equal to one if the individual is employed in retailing, zero otherwise. Classification is by SNI 92.
Private sector	Dummy variable, equal to one if the individual is employed in the private service sector, zero otherwise. Classification is by SNI 92.

To be continued

Table A1 continued

Variable name	Description
Public sector	Dummy variable, equal to one if the individual is employed in the public sector, zero otherwise. Classification is by SNI 92.
Stockholm	Dummy variable, equal to one if the individual lives in Stockholm, zero otherwise. Classification according to NUTS-2.
East Middle Sweden	Dummy variable, equal to one if the individual residence in East Middle Sweden, zero otherwise. Classification according to NUTS-2.
Smaland and the islands	Dummy variable, equal to one if the individual lives in Smaland and the islands, zero otherwise. Classification according to NUTS-2.
South Sweden	Dummy variable, equal to one if the individual lives in South Sweden, zero otherwise. Classification according to NUTS-2.
West Sweden	Dummy variable, equal to one if the individual lives in West Sweden, zero otherwise. Classification according to NUTS-2.
North Middle Sweden	Dummy variable, equal to one if the individual lives in North Middle Sweden, zero otherwise. Classification according to NUTS-2.
Middle Norrland	Dummy variable, equal to one if the individual lives in Middle Norrland, zero otherwise. Classification according to NUTS-2.
Upper Norrland	Dummy variable, equal to one if the individual lives in Upper Norrland, zero otherwise. Classification according to NUTS-2.

Table A2. OLS of the spouse's pre marital earnings equation.

	Females		Males	
	1994	1995 Robustness check	1994	1995 Robustness check
Variable				
Age	0.071*** (0.004)	0.065*** (0.005)	0.050*** (0.013)	0.032*** (0.003)
Age square	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.0003*** (0.000)
Education	0.076*** (0.001)	0.079*** (0.001)	0.081*** (0.001)	0.077*** (0.001)
Children	-0.528*** (0.011)	-0.506*** (0.010)	-0.039*** (0.013)	-0.087*** (0.012)
Parental benefit	0.118*** (0.011)	0.145*** (0.011)	0.082*** (0.007)	0.059*** (0.007)
Self employed	-0.224*** (0.020)	-0.309*** (0.019)	-0.250*** (0.011)	-0.266*** (0.010)
Student	-1.195*** (0.009)	-1.184*** (0.010)	-1.361*** (0.012)	-1.358*** (0.013)
Farming	0.493*** (0.053)	0.241*** (0.041)	0.421*** (0.033)	0.387*** (0.027)
Manufacturing	0.942*** 0.042)	0.839*** (0.021)	0.898*** (0.030)	0.942*** (0.021)
Construction	(0.892*** (0.042)	0.833*** (0.024)	0.731*** (0.030)	0.816*** (0.021)
Retail	0.750*** (0.042)	0.678*** (0.021)	0.723*** (0.030)	0.777*** (0.021)
Private sector	0.799*** (0.042)	0.706*** (0.021)	0.754*** (0.030)	0.810*** (0.021)
Public sector	0.714*** (0.042)	0.615*** (0.021)	0.508*** (0.030)	0.606*** (0.021)
East Middle Sweden	-0.167*** (0.007)	-0.126*** (0.007)	-0.172*** (0.007)	-0.162*** (0.012)
Smaland and the islands	-0.199*** (0.010)	-0.095*** (0.008)	-0.144*** (0.009)	-0.100*** (0.008)
South Sweden	-0.167*** (0.007)	-0.132*** (0.007)	-0.180*** (0.007)	-0.164*** (0.007)
West Sweden	-0.115*** (0.006)	-0.092*** (0.006)	-0.167*** (0.006)	-0.130*** (0.006)
North Middle Sweden	-0.194*** (0.009)	-0.135*** (0.009)	-0.230*** (0.009)	-0.165*** (0.008)

To be continued

Table A2 continued

Variable	1994	1995	1994	1995
Middle Norrland	-0.103*** (0.011)	-0.076*** (0.011)	-0.200*** (0.011)	-0.165*** (0.012)
Upper Norrland	-0.19*** (0.011)	-0.098*** (0.009)	-0.285*** (0.012)	-0.227*** (0.012)
R^2	0.25	0.25	0.22	0.21
Number of observations	16,986	17,067	16,678	16,786

Note I: Also included are dummy variables indicating the country of birth. Note II: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Tabell A3. Estimates of the earnings equations for females

	Model 1	Model 2	Model 3	Model 4
Married	-0.536 *** (0.007)	-0.537 *** (0.007)	-0.554 *** (0.007)	-0.388 *** (0.007)
Husband's premarital productivity 1995	-0.041 *** (0.007)	-0.009 (0.010)	-0.009 (0.009)	0.004 (0.009)
*Husband's productivity *Years married*		-0.009 *** (0.002)	-0.008 *** (0.002)	-0.008 *** (0.002)
Sector of employment, Student and Self-employed	No	No	Yes	Yes
Children and parental leave.	No	No	No	Yes
Hausman	957.32	968.28	1933.91	1711.64
AdjR^2	0.34	0.34	0.35	0.37
Number of observations	155,536	155,536	155,536	155,536

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Table A4. Estimates of the earnings equations for females, conditional on age group.

	Age 25-34		Age 35-44		Age 45-51	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model2
Married	-0.419 ***	-0.420 ***	-0.223	-0.223	0.0032	0.0033
	(0.009)	(0.009)	(0.014)	(0.014)	(0.025)	(0.025)
Husband's productivity 1995	-0.032 ***	0.008	-0.006	-0.012	0.0497	0.0245
	(0.008)	(0.011)	(0.012)	(0.018)	(0.019)	(0.028)
*Husband's prod.*Years married*		-0.011 ***		0.002		0.0076
		(0.002)		(0.004)		(0.006)
Sector of employment, Student and Self-employed	Yes	Yes	Yes	Yes	Yes	Yes
Children and parental leave.	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	1534.17	1552.27	232.67	232.75	156.23	156.58
Adj R^2	0.34	0.34	0.46	0.46	0.56	0.56
Number of observations	120,803		26,449		8,284	

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Table A5. Estimates of the earnings equations for males.

	Model 1	Model 2	Model 3	Model4
Married	0.001	-0.011 **	-0.002	0.002
	(0.005)	(0.005)	(0.004)	(0.005)
Wife's premarital productivity 1995	-0.014 ***	0.038 ***	-0.009	-0.010
	(0.004)	(0.004)	(0.006)	(0.006)
*Wife's productivity 1995*Years married*		-0.012 **	0.0003	0.0004
		(0.006)	(0.001)	(0.001)
Sector of employment Student and Self-employed	No	No	Yes	Yes
Children and parental leave.	No	No	No	Yes
Hausman	875.110	1019.270	2768.530	2602.060
Adj R^2	0.54	0.54	0.55	0.55
Number of observations	159,941	159,941	159,941	159,941

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Table A6. Estimates of the earnings equations for males, conditional on age group

	Ágе 25-34		Age 35-44		Age 45-51	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model2
Married	-0.004	-0.004	-0.007	-0.007	-0.004	-0.004
	(0.006)	(0.006)	(0.010)	(0.010)	(0.016)	(0.016)
Wife's productivity 1995	-0.019 ***	-0.022 ***	-0.006	-0.001	0.020	0.035
	(0.005)	(0.007)	(0.008)	(0.012)	(0.013)	(0.019)
*Wife's prod.*Years married*		0.001		-0.001		-0.005
		(0.001)		(0.002)		(0.004)
Sector of employment, Student and Self-employed	Yes	Yes	Yes	Yes	Yes	Yes
Children and Parental leave.	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	1667.06	1673.07	602.02	716.66	467.90	472.20
Adj R^2	0.53	0.53	0.58	0.58	0.62	0.62
Number of	106,634		38,410		14,897	

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Table A7. Descriptive statistics for females and males in 1994 and 1997, restricted sample.

	Females				Males			
	1994		1997		1994		1997	
Variable	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Total annual earnings (SEK 100)	1282.7	764.9	1236.3	987.1	1808.5	1427.5	2219.9	1652.0
Age	32.22	6.32	35.23	6.29	34.30	6.89	37.19	6.86
Education (in years)	12.26	2.03	12.31	2.23	12.29	2.18	12.07	2.43
Children	0.39		0.71		0.06		0.72	
Parental benefit	0.28		0.57		0.12		0.44	
Born in Sweden	0.90		0.90		0.90		0.90	
Self employed	0.01		0.01		0.04		0.05	
Student	0.13		0.07		0.05		0.04	
Farming	0.01		0.005		0.01		0.01	
Manufacturing	0.09		0.10		0.22		0.23	
Construction	0.01		0.01		0.11		0.10	
Retail	0.21		0.19		0.26		0.26	
Private sector	0.13		0.14		0.15		0.16	
Public sector	0.55		0.52		0.24		0.21	
Stockholm	0.32		0.32		0.31		0.31	
East Middle Sweden	0.15		0.15		0.15		0.15	
Smaland and the islands	0.05		0.05		0.05		0.05	
South Sweden	0.12		0.12		0.13		0.13	
West Sweden	0.18		0.18		0.18		0.18	
North Middle Sweden	0.08		0.08		0.08		0.08	
Middle Norrland	0.04		0.04		0.04		0.04	
Upper Norrland	0.05		0.05		0.05		0.05	
Number of obs.	8,929		8,579		8,807		8,821	

Table A8. Estimates of the earnings equations for females, conditional on age group. Restricted sample

	Age 25-34		Age 35-44		Age 45-51	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Married	-0.452 ***	-0.452 ***	-0.225 ***	-0.226	-0.019	-0.020
	(0.013)	(0.013)	(0.018)	(0.018)	(0.030)	(0.030)
Husband's productivity	-0.043 ***	-0.021	0.009	-0.028	0.007 **	-0.007
	(0.010)	(0.015)	(0.015)	(0.021)	(0.020)	(0.029)
*Husband's prod..*Years married*		-0.006 **		0.012 **		0.004
		(0.003)		(0.005)		(0.007)
Sector of employment, Student and Self-employed	Yes	Yes	Yes	Yes	Yes	Yes
Children and parental leave.	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	810.720	833.770	162.620	162.470	-62.20	-66.62
Adj R^2	0.34	0.34	0.46	0.46	0.59	0.59
Number of observations	57,158		16,960		4,878	

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.

Table A9. Estimates of the earnings equations for males, conditional on age group. Restricted sample

	Age 25-34		Age 35-44		Age 45-51	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Married	-0.018 *	-0.018 *	-0.016	-0.016	0.008	0.007
	(0.009)	(0.009)	(0.013)	(0.013)	(0.021)	(0.021)
Wife's productivity	-0.014 **	0.0005	0.005	-0.011	-0.015	-0.002
	(0.007)	(0.009)	(0.010)	(0.014)	(0.016)	(0.022)
*Wife's prod.*Years married*		-0.004 **		0.005		-0.004
		(0.002)		(0.003)		(0.005)
Sector of employment, Student and Self-employed	Yes	Yes	Yes	Yes	Yes	Yes
Children and parental leave.	Yes	Yes	Yes	Yes	Yes	Yes
Hausman	866.590	868.610	396.780	504.530	309.20	303.42
Adj R^2	0.53	0.53	0.58	0.58	0.61	0.61
Number of observations	49,096		23,658		9,057	

Note: Standard errors in parentheses. */**/*** denotes that the coefficients are significant on a 10/5/1 percent level, respectively.