Dutch Women's Wages: Is There A Double Selection Into Motherhood And Type of Jobs?

Cécile Wetzels

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Abstract
To be written

Cécile Wetzels, PhD, is economist and senior researcher at TNO, Delft, The Netherlands. Correspondence Address:
Faculty of Economics and Econometrics, University of Amsterdam, Roetersstraat 11, 1018 WB Amsterdam, The Netherlands, tel. 0031 20 525 4346 E-mail: cwetzels@fee.uva.nl

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1. Introduction

An increasing number of studies analyse labour market consequences of the motherhood while the participation rate of women (in particular mothers) has increased in advanced countries. The tenor of these studies is whether working mothers earn lower wages than other women without children, expressed as the child gap in pay. Findings of these studies show a wide rage of child gap, which is motivated by both differences in institutional arrangements across countries and estimation strategies. A frequently mentioned issue in the literature is the selectivity problem that may lead to inconsistent estimations. The selectivity problem may occur when working mothers are not a random sample of potential female population having children or when job-choices of mothers are not a random process. Wetzels & Tijdens (2002) review 17 recent papers analysing wage differentials among women and note that some of these studies try to estimate wage differentials correcting for selection into employment (Datta Gupta and Smith 2001, Harkness and Waldfogel 1999, Waldfogel 1994, Waldfogel 1995), while others did not (Albrecht et al 1999, Budig and England 2001). Datta Gupta and Smith 2001 did find a selection effect.[1] Harkness & Waldfogel (1999)[2] found the selection correction term only significant, and positive, in United States, and not in the other 6 industrialised countries (the Netherlands not included) in their analyses. Waldfogel (1994, 1995[3]) did not find selection bias due to employment. Furthermore participation rates of young Dutch women have increased regardless of motherhood (Vlasblom and Schippers 2002)[4], which may make correction for selection into employment less needed.

This paper examines wage differentials between women without children and mothers in the Dutch labour market in 2001 focussing on possible selectivity bias with regard to two main underlying decision processes: the decision to have a child and the decision to have a paid job considering segregation into certain types of jobs. It is often argued that the job choices of women are strongly influenced by numerous factors associated with the role of women in the household, alternative household help opportunities and childcare facilities. It is considered not to be unrealistic that women are tended to choose certain types of jobs that are easy to combine with other family activities but provide a poor prospect in terms of wage and job promotion (Gronau 1988). To deal with this problem, we identify female dominated and less demanding jobs by factor analysis and model the double selection into having a child and the choice for being employed in a female dominated job or a less demanding job explicitly. Additionally, we examine whether the two decision procedures, i.e. having a child and employment, are simultaneous or one follows the other, called sequential (Maddala 1983).

Recently, Wetzels (2002) studies wage differences among female workers with and without child(ren) using the Women's Wage Indicator Survey (WWI-2001), a sample of only workers. She found, in contrast to most findings in other countries[5], no child gap but a child premium in wages of young Dutch mothers. Separate analyses of wages by motherhood and

[1] Datta Gupta & Smith (2001) used occupational categories in the wage function but not in the probit, estimating labor force participation. The probit includes household wealth, household non-wage income and ownership of house or apartment. Experiments with other exclusion restrictions showed that the results are fairly robust with the choice of excluded variables.

[2] The following variables were used for identification: age structure of children in household, the amount of other family members' earnings, and the amount of other family income.

[3] Probit estimation included marital status and partner's pay as identifying variables.

[4] Difference in participation rates between women with and women without children has become smaller during the nineties, with the exception of France (Vlasblom & Schippers 2002). More recent cohorts have on average higher participation rates. This holds for women with and women without children and for every age category reached by these recent cohorts.

[5] Exceptions are: A study on the United States using recent data did find a small positive independent effect of children on women's wages (Avellar 2001). Datta Gupta and Smith (2000) did not find an independent effect of children on women's wages in Denmark. In Wetzels (2001) we control for education, actual employment experience, a career break of at least one year, and job characteristics.

ten years birth cohorts revealed some interesting differences by comparing mothers and (still)[6] childless women. Tenure has a significant effect on mothers' wages but not on the wages of childless women. Return to higher education and actual employment experience is relative high for mothers, and mothers are also better off when they switch from fulltime work to part time work. Furthermore, for both mothers and childless women being responsible for domestic work has a negative effect on hourly wage, whereas having domestic help has a strong positive effect on hourly wage. For all women time out of the labour market of at least one year has a strong negative effect on hourly wage, which is stronger for childless women than for mothers. The wage effects of overtime hours, position and promotion did not vary in magnitude according to motherhood.

The analysis in Wetzels (2002) was based on the Women's Wage Indicator Survey (WWI-2001), a sample of only workers. Therefore we did not have the opportunity to correct for the selection bias from the employment decision. In this paper we will use another dataset collected in the same year called Work and ICT survey (W&ICT-2001) in addition to the WWI-2001 survey. These data sets are partly comparable and partly complementary allowing us to obtain more robust results by correcting for possible selectivity biases.

The selection process into motherhood in the Netherlands in 2002 involves a quite complicated decision, which relates to human capital theory, motherhood motivation, partnerships (hesitation towards forming and continuing relationships), welfare state typology but also, for example, to the open future ideology. We will discuss the decision of motherhood in section 2. In section 3 we explain the empirical model with double sample selection. Section 4 describes the datasets employed in this study. Furthermore we develop a bivariate indicator for less demanding jobs. The indicator makes use of several characteristics of the job such as working hours, commuting time, working time, respondents opinion on possibilities on combining work and family, particularly whether one can easily take leave for sick children or for other care tasks. Section 5 presents and interprets the empirical results. The paper ends with a conclusion in section 6.

2. Theoretical discussion

In previous work (Wetzels 2002) we estimated wage equations for mothers and childless women separately. The decision, whether or not to be a mother, is ignored and it is assumed that women, who become mothers, make their decision randomly. Such a random-motherhood assumption is unlikely to be true. In this paper we wish to understand first whether the motherhood decision is an underlying decision for employment. Secondly, for employed women, whether the decision to be employed in a certain type of job is underlying the employed motherhood decision. In the paper we define two types of jobs: female dominated jobs and jobs that are less demanding on time and career effort.

Determinants of selection into motherhood in the Netherlands

Fertility rates in the Netherlands show a quite stable pattern in the last decade, around 1.5. However the timing of children in a woman's life is later than before.[7] Table 1 shows descriptive statistics of postponement of giving birth and proportions of childlessness in the Netherlands during the 1990s and in 2000. Clearly most Dutch women give birth when they are older than 30, and the proportion of women remaining childless increases and is not a minor fraction of the female population.

The analysis of determinants of selection into motherhood in The Netherlands in 2000 can therefore be subdivided into the analysis of determinants of (delayed) maternity, determinants

[6] The birth cohorts born between 1950-1959 show in 2001 the results for completed fertility and ultimate infertility. The results for younger birth cohorts can not show yet the results for completed fertility and ultimate fertility.

[7] The mean age at maternity in the Netherlands started to increase in the 1970s from 24.3 years in 1970 to 29.1 years in 1998, where it remains in 2001 (Statistics Netherlands 1994, 2002).

of voluntary ultimate childlessness and of the determinants of the combination of paid work and motherhood. Hakim (1998) has put forward to distinguish between three groups of women in current welfare states. The first group is predominantly family and child oriented and will have at a fairly young age children (and a higher number of children). The second group includes women who hesitate on the timing of children decision because they cannot choose for motherhood or career. They make a decision as they go along and are successful in work or get divorced for example. They decide gradually that they do not want to give up the benefits of a childfree lifestyle to become a mother; Probably motherhood does not have the pull factors for them as much as having a childfree lifestyle. Although there is a vast majority of women who have some kind of maternal instinct, not all women have the absolute drive to have children. Therefore we distinguish a third group of women who refrain from children or have one child, which can be combined with a career. Roughly 20% of women in rich modern societies are now remaining childless by choice. Work centered women are most likely to remain voluntary childfree. About 50% of women in top managerial positions in Britain today remain childless. In the Netherlands according to Table 1 we may say that group 1 is a minor group of around 9.6%. Around 19.5% of women seem to be in category 3. The remaining category 2 is the largest group.

Table 1: Descriptive Statistics on Postponement of Giving Birth & Childlessness in the Netherlands

Postponement:
Mean age at giving first birth: in 1990: 27.5 years, in 1998, 1999 and 2000: 29.1 years (a).
The distribution of mothers' age at giving birth (all parities) in the Netherlands (a):

	1990	2000
% 35 years or older	11.7	20.3
% between 30-34 years	34.8	42.2
% between 25-29 years	38.9	27.8
% Younger than 25 years	14.8	9.6
% Of which younger than 20	1.7	1.2
% older than 30: fecundity declines	46.5	62.5

[parity 1 will be included]

Childlessness:
Proportion of childless women by age group in 1990 (b):
25-29 years: 61.4 per cent;
30-34 years: 30.3 per cent;
35-39 years 18.6 per cent.

The estimated proportion being ultimately childless is (b):
birth cohort 1950:14.7 per cent
birth cohort 1955:17.8 per cent
birth cohort 1958 19.5 per cent
The contribution of women who are 30 years of age or older to the period total fertility rate is 51.5 per cent in 1992 (b).

a) Calculated on CBS 2002; b) Bosveld 1996 unless otherwise indicated the data are from 1992.

Because of the postponement presented in Table 1 we consider age as an explanatory variable of motherhood. The choice of motherhood is restricted by biological limits of fertility. This limit is unknown to the decision making woman, and varies among the female population to a large extent. On average women's fertility starts to decline after the age of 30. Wijsen (2002) analyses Dutch women in 1993 who had a child when they were over 30, and shows that the biological limit does not seem to influence the timing of birth decision as we expect. Wijsen (2002) finds that most of the older mothers in her analysis do not consider themselves as 'old'. Rather less than half say they have consciously postponed having children and that a respondent's own advancing years does not often lead to a hastening of the process of family formation, but rather to a light further postponement of the first child. For them having children at an earlier stage had simply never been a topic worthy of serious thought. Most of

these mothers do not time their first birth because of the biological limit, but they seem to postpone as long as possible not having the perception that they grow too old biologically to give birth to the first child.
Part of the explanation may be the emergence of an individualised society that makes the motherhood-decision, both the decision to become a mother and the timing of birth in life, one in a range of decisions more than before. Because of the large range in options individuals currently have the result is often a late start in childbearing and possibly a reason for voluntary ultimate childlessness. Lesthaeghe & Verleye (1992) call this the open future ideology: individuals leave options for the future open as far as possible.
Reviewing the literature on determinants of motherhood makes clear that education plays a role in postponement and childlessness. Higher education contributes to the development of tastes that probably favour women's desire to have their own professional career and develop their personal talents, mostly as a professional but also as a mother. Higher education also stimulates the development of more modern norms concerning the combination of paid labour and unpaid care. The higher a woman's education the higher will also be her income foregone when she does not participate in the labour market. Blossfeld and Rohwer (1994) find that education and enrolment are responsible for postponement without necessarily causing a decline in the ultimate number of women entering parenthood. Beets (1998) presents figures which show that among high-educated Dutch women born between 1948 and 1953 as many as 43.2 per cent were still childless at age 35 and for the cohort born between 1953 and 1957 the proportion is 37.0 per cent. Also Gustafsson, Kenjoh and Wetzels (2001) using duration analysis find that more highly educated women remain childless at age 35 compared to lower levels of education. Furthermore the latter study finds that the effect of education in postponement and ultimate childlessness is especially large in Britain, former West-Germany and in the Netherlands.[8]

Probably related to the broader socio-economic and cultural development is the increased number of partnerships in a persons life, and the increased importance of managerial and organisational skills for example to arrange one's career, housing and childcare make the decision for motherhood different from the investment in a standardized publicly financed education. The increase of the average educational level of the fertile birth cohorts both makes this investment the longest in time, makes replacement of a partner with similar educational attainment or better educational attainment easier. The costs or investments per relationship decline, forgone investments in relationships decline, but dependency on the probability of replacement in the marriage market remains.[9] Athough separation rates are high and still growing, and therefore persons might already consider themselves as independent individuals (in temporary relationships) whatever the development of the family formation process will be, we nevertheless assume that a stable relationship is a condition for having a child.

Whether women do have opportunities to combine a career with children is dependent on the view on mother's proper role in society. This view differs historically between clusters of welfare states according to the typology of Esping-Andersen (1990), and according to the breadwinner thought in social policies (Sainsbury 1994, 1996). According to Esping Andersen typology we characterized the Dutch welfare state till 1990 as coming close to the Christian democratic welfare state with policies organised in order to induce women to work in the home fulltime caring for young children. However from 1990 social policies in the

[8] Gustafsson, Kenjoh and Wetzels 2001 use Kaplan Meier estimates of timing of first birth from age 15 and alternatively from leaving school age in Britain, Germany, the Netherlands and Sweden. Clearly more than 25 per cent of highly educated women in Britain and West Germany end up in ultimate childlessness, whereas for the Netherlands the corresponding estimate is below the 25 per cent line. In Sweden and East Germany the ultimate childlessness ends up at around 10 per cent with very small differences between educational groups.

[9] Whether the decline in public investments in education in proportion of the total public investments over the last decade makes the future of strong labour market careers, and individualised marriage markets less feasible, is not clear yet.

Netherlands have changed into including measures to facilitate the combination of work and family, which fits the social democratic model like f.e. Sweden.[10]

Determinants of selection into a female dominated job or into a less demanding job

In this paper we wish to analyse for female workers whether the decision for employed motherhood and the decision for being employed in a female dominated job or a less demanding job are related.[11] We define a female dominated job by the percentage of women working in the unit. In W&ICT-2001 data: we may define more than 60% of the persons working in the unit is female. In WWI-2000/2001 we have information on 50% or 75% of the persons working in the unit are female. We hypothesize that employed mothers are over represented in these jobs, because 1) more women have chosen these jobs which may indicate that these jobs are more easy to combine with household chores and children; 2) more colleagues have an understanding of the domestic situation and may help each other to combine paid work and domestic situation; and 3) more women on the job may limit the career progress of colleagues (the so called "crab syndrome").

We define a less demanding job as a job which is less demanding on time and career effort such as a job with less hours per week, which requires less commuting time, less additional hours spent on courses, a less stressful job (can you do the job in the time scheduled for it?). The indicator for less demanding jobs needs to distinguish between part time work and other indicators for less demanding jobs. In recent studies it has become clear that in the Dutch part time economy part time jobs are paid equally compared to full time jobs[12]. We expect more mothers in less demanding (on time and career effort) jobs because passive fathering styles are still the dominant pattern, childcare is still in short supply, and school hours do not fit fulltime career schedules or even long part time career schedules. Furthermore, Dutch mothers have a strong wish to care for their own children most of the week time resulting in paid child care for a maximum of 3 days a week. Therefore more employed mothers will seek employment in jobs that require less commuting, with fixed hours of work, with possibilities to take leave easily for reasons of care, f.e. when a child is ill and cannot be in formal child care centres. Furthermore, we expect more mothers in jobs that are less stressful, since mothers already experience stress from being responsible for arranging for the child care, after school care, care for sick children or parents, compared to childless women and men.

We expect career orientation and domestic situation to be the main explanatory factors for both employment in a female dominated job or less demanding job. More specific we expect that highest obtained education level, years of employment experience, a partner who has a long part time job and a domestic help will make it less likely for women and mothers to be employed in a female dominated or a less demanding job.

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[10] However different for Sweden the underlying policy model emphasis on sharing between employer, parents and government. For example, in the Netherlands the division of costs in the formal childcare sector is 42 per cent by firms (see, Dobbelsteen, Gustafsson and Wetzels 2000). See also Sainsbury 1994, 1996, Wetzels 2001 for comparative research on social policies.

[11] In the literature other definitions are chosen such as female dominated occupation (Sorensen…). Another possible indicator is: occupation in which the % of women continuously employed while having children is more than average, or an occupation in which the % of re-entering women is more than average. Other definitions that may be worthwhile to analyse are: 1) jobs in which women with care tasks continue to work while they have young children; 2) jobs in which women work who have heavy household chores (not necessarily restricted to children) indicated by: they do not have domestic help and their husband works many hours in paid work; 3) a job in which women re-enter after caring for the household fulltime. In future a plan to use an indicator for the job to be covered by collective labour agreement which is characterized as female friendly; This requires a merging of our data with a database providing detailed information on collective labour agreements.

[12] The analyses of employment in part time jobs reveals that the effect on wages is small. However it has been indicated lately that the results on the sign and significance are not unambiguous. This may be related to the measurement of part time work, is part time work indicated by a dichotomous variable or a continuous variable, and what is the lowest number of hours included. Using a dichotomous variable measuring part time work Gustafsson, Kenjoh and Wetzels (2002) did not find an effect on wages of working part time based on OSA-data 1998, whereas an effect of working part time was found in the Britian (negative effect), Germany and Sweden (positive effect) using similar datasets and measurement. Wetzels (2002) using WWI-2001 did not find an effect of working part time on Dutch women's wages. Zorlu using Statistics Netherlands data 1999 finds that part time compared to flexible jobs but also compared to full time jobs are better paid for both women and men, controlling for the number of hours worked per week. Dekker et al (2000) using SEP (Socio-Economic Panel data) found that Dutch women in short part time jobs are paid less.

The decision to enter employment in a female dominated job or less demanding job may be taken simultaneously or subsequently with the decision to become a mother. And if taken subsequently we will analyse whether women decide for female friendly jobs after becoming a mother or beforehand.

3. Empirical models with double sample selection

Career oriented mothers are expected to be in employment more than less or not career oriented women. Therefore the sample of employed mothers is expected to be biased upward. Also for employed women the decision for employment in a female dominated job or a less demanding job is not randomly taken. The sample of women employed in female dominated jobs or in less demanding jobs is expected to be biased for motherhood. Employed mothers seem more likely to be in these jobs than other employed women. We expect the sample of employed mothers to be biased downward by selection into female dominated or less demanding jobs.

We explicitly model the employment equation to analyse the selectivity of motherhood. We apply a bivariate probit model in which we assume the employment decision and motherhood decision simultaneously determined (case 1). Secondly we apply a bivariate probit model with sample selection (Heckman 1979; Van de Ven and Van Praag 1981; Abowd and Farber 1982, Maddala 1983, Tunali 1986), assuming that the employment and motherhood decsion are determined subsequently (case 2 & case 3).

Additionally, we explicitly model for workers, the employed motherhood equation to analyse selectivity by job type: female dominated job and less demanding job. Again we distinguish between Case1: simultaneous selection into female dominated or less demanding jobs, and motherhood, Case 2 and 3, subsequent selection into female dominated or less demanding jobs, and motherhood.

Case1: Decisions underlying the double selection model are taken simultaneous

The simultaneous double selection model analyses the following possible states of population:

Figure 1

$$Y_i = \begin{cases} Y_{1i} = 1 \begin{cases} Y_{2i} = 1 \\ Y_{2i} = 0 \end{cases} \\ Y_{1i} = 0 \begin{cases} Y_{2i} = 1 \\ Y_{2i} = 0 \end{cases} \end{cases}$$

where (Y_{1i} = 1) if the women is employed, and (Y_{1i} = 0) if the woman is not employed (each labour force status except having a paid job), and Y_{2i} is a dichotomous variable that equals one if individual i is a mother and zero otherwise.

The condition for employment inclination can be written as:

$$Y_{1i}^{*} = X_i b + u_{1i} \qquad (1)$$

where Y_{1i}^{*} is the employment inclination for a woman i, X_i is a vector of explanatory variables, b is a vector of parameters and u_{1i} is the normally distributed error term for individual i. The dependent variable Y_{1i} is a latent variable and is observable only as a dichotomous outcome whether an individual is employed.

The condition for motherhood inclination can be written as:

$$Y_{2i}^{*} = Z_i d + u_{2i} \qquad (2)$$

where Y_{2i}^{*} is the motherhood indicator for a woman i, and is observable only as a dichotomous outcome whether a woman has a child (Y_{2i}^{*} =1) and it is zero when otherwise

(Y_{2i}^{*} =0). Z_i is a vector of explanatory variables, d is a vector of parameters and u_{2i} is the error term for individual i that is normally distributed.

We assume that the error terms of latent equations have a bivariate standard normal distribution. The correlation between the error terms of the latent equations (1) and (2) is represented by rho (r) which determines the selectivity bias. The structure of error terms is formally given as

$$u_{1i} \sim N(0,1)$$
$$u_{2i} \sim N(0,1) \quad \text{and} \qquad ()$$
$$corr(u_{1i}, u_{2i}) = r$$

Rho captures the correlation between the omitted variables in addition to the correlation between the error terms (van Praag and van Ophem 1995).
Estimates of b, d and r are obtained by maximising likelihood estimation.

Cases2 and 3: Decisions underlying double selection are taken subsequently

The subsequent bivariate probit model is used to analyse the following possible states of the population:

Figure 2

$$Y_i = \begin{cases} Y_{1i} = 1 \begin{cases} Y_{2i} = 1 \\ Y_{2i} = 0 \end{cases} \\ Y_{1i} = 0 \end{cases}$$

The first equation in the subsequent selection model is similar to the simultaneous model in Case1 (equation (1)). However we (assume to) only observe the second decision for a woman i who is selected into in the first decision. In Case 2: the first decision is motherhood and we only observe the employment decision for mothers. In Case 3: the first decision is employment and the second decision is motherhood for employed women. The conditional second equation is given by:

The second equation:
$$\begin{cases} \Pr\left(Y_{2i} = 1 \middle| Y_{1i} = 1\right) = \Pr\left(Y_{2i}^{*} > 0 \middle| Y_{1i} = 1\right) \\ \qquad\qquad = \Pr\left(u_{2i} > -Z_i d \middle| Y_{1i} = 1\right) \end{cases} \qquad (3)$$

Where Y_{2i} is a dichotomous variable that equals one if individual i is a mother and zero otherwise. Y_{2i} is given by

$$Y_{2i} = \begin{cases} 1 & \text{if } Y_{2i}^{*} > 0 \\ 0 & \text{if } Y_{2i}^{*} \le 0 \end{cases} \qquad (4)$$

The underlying latent equation is similar to equation (2). Similar to the simultaneous model we assume that the error terms of latent equations have a bivariate standard normal distribution. The correlation between the error terms of the latent equations (1) and (2) is represented by rho (r) which determines the selectivity bias.

Maximum likelihood estimates of b, d and r can be obtained by maximising the likelihood function:

$$\log L = \sum_{\substack{i \in N \\ y_{2i} \neq 0}} \log[\Phi_2(X_i b, Z_i d, r)] + \sum_{\substack{i \in N \\ y_{2i} = 0}} \log[\Phi_2(X_i b, -Z_i d, -r)] + \sum_{i \in N} \log[1 - \Phi(X_i b)] \quad (5)$$

where N is the set of observations for which Y_{2i} is observed, $F_2(\,)$ is the cumulative normal bivariate distribution function and $F(\,)$ is the standard normal cumulative distribution function. In the right-hand-side of equation (), the first term covers employment conditional on motherhood, the second term covers non-employment conditional on motherhood and the last term covers childless women.

Probabilities of selection

Using the dichotomous variables D1 and D2 to indicate the outcomes of the two selection rules, we classify the individuals in the original sample as follows:

D1=1 if Y1>0
D1=0 if Y1<=0
D2=1 if Y2>0
D2=0 if Y2<=0

In Figure 3 the possible results of the selection process are expressed in the form of a 2X2 table, where Sj denotes the set of individuals falling into the jth subsample: j=1,2,3,4.

Figure 3. Possible outcomes of the selection processes

D1 \ D2	1	0
1	S_1	S_2
0	S_3	S_4

Where S_1 represents the state that a woman has given birth to at least one child and is employed, S_2 gives the state that a women is childless and employed, S_3 represents the state that a mother is not employed and S_4 shows the state that a childless woman is not employed. The probabilities of these sub-samples can be formally written as (Tunali 1986):

$$\begin{aligned}
S_1 &= \Pr(Y_{1i} = 1, Y_{2i} = 1) = \Pr(u_{1i} > -X_i b,\ u_{2i} > Z_i d) \\
&= \Phi_2(X_i b, Z_i d; r) \\
S_2 &= \Pr(Y_{1i} = 1, Y_{2i} = 0) = \Pr(u_{1i} > -X_i b, u_{2i} \leq Z_i d) \\
&= \Phi_2(X_i b, -Z_i d; -r) \\
S_3 &= \Pr(Y_{1i} = 0, Y_{2i} = 1) = \Pr(u_{1i} \leq -X_i b,\ u_{2i} > Z_i d) \\
&= \Phi_2(-X_i b, Z_i d; -r) \\
S_4 &= \Pr(Y_{1i} = 0, Y_{2i} = 0) = \Pr(u_{1i} \leq -X_i b,\ u_{2i} \leq Z_i d) \\
&= \Phi_2(-X_i b, -Z_i d; r)
\end{aligned}$$

4. Data

In this paper we make use of two data sets: WWI-2000/2001 and W&ICT 2001. The data WWI-2000/2001 do not come from a random sample, and great caution should be exercised in extrapolating the conclusions presented to the general population. Therefore we compare our results with a second data set W&ICT 2001, from a representative panel survey. Furthemore the latter data includes information on women who are employed and women who are not employed and not participating in the labor market.

WWI-Survey 2000/2001

The WWI-2000/2001 data set are derived from the Women's Wage Indicator Survey held from September 2000 until May 2001 (Tijdens, 2001). The survey was initiated by the largest trade union confederation FNV, by the publishing company of women's weeklies and related women's websites VNU, and by the University of Amsterdam. The project aimed at establishing a wage database, which could be accessed via the Internet to provide visitors with information about average earnings in given education, age, supervisory position, etceteras. It was distributed in three ways: (1) it was enclosed for the subscribers of the three largest women's magazines in the Netherlands; (2) it was enclosed in the trade unions magazines FNV Magazine and Horeca Info; (3) it could be accessed via the websites vrouwonline.nl and fnv.nl. This project generated free publicity in newspapers, radio and television programs. In total, 15,508 questionnaires have been returned, slightly more than via Internet.

To ascertain how representative the WWI-2000/2001 was, the distribution across areas of industry, number of hours worked, age and education for the women in employment for at least 12 hours per week were compared with those women in the Labour Force Survey (LFS) conducted by the CBS (Tijdens 2001). The distribution across areas of industry is a fair match: in each sector the deviation is at most three percentage points, with the exception of trade, in which according to LFS'99 16% of the women work and in the WWI-2000/2001 only 9%. As for educational level, the WWI-2000/2001 shows an over-representation of women with educated to intermediate secondary, higher secondary/ pre-university**,** higher vocational or higher education levels and an under-representation of women with only primary education or a lower or intermediate vocational education. The differences are never more than ten percentage points, except for women with an intermediate vocational education. According to the LFS'99, this accounts for 39% of the working women and according to the WWI-2000/2001, for 27%. As for the spread of age, each age group has a deviation of no more than three percentage points, with the exception of the 20-24 year olds. According to LFS'99, 11% of the working women fall into this group, while in the WWI-2000/2001 only 5% do. Finally, in the spread by number of hours worked, in the WWI-2000/2001 survey there is an under-representation by six percentage points of women with a working week of 12-19 hours and an over-representation by four percentage points of women with a working week of 35 hours or more. The average hourly wage of the women in the WWI-2000 amounts to NLG 28.03. This is the wage from 2000. A comparison with hourly wages as calculated by the CBS during 1999 comes out at NLG 25.62. The discrepancy has two sources: firstly there is an the interval of more than a year between the two calculations, during which time hourly wages will have risen by around one NLG; secondly, women with a low level of education are under-represented in the WWI-2000/2001 causing the average wage to rise somewhat.[13]

W&ICT-survey 2001

The data used for the analyses come from the Work&ICT-2001 survey (Wetzels & Tijdens, 2001). The questionnaire is hospitalized in the computerized Telepanel survey that is

[13] From the sample with information on education level (96.2 per cent) we keep all observations except for those indicating the education level as "something else" (1.5 per cent). We work with 14,742 persons observations for whom 13,394 person observations have information on hourly wage. Missing on employment; having children, percentage of women in the work unit.

regularly held among a representative sample of the Dutch population. Among others the questionnaire addressed organization and workplace characteristics. In total 739 working women responded.

Table 2 summarizes the variable definitions. Most of the variables are commonly used in this type of research, except one of the dependent variables: the less demanding job decision. This variable is defined by a binary clustered group variable indicative for a job to be less demanding on time and career effort. This binary clustered group variable separates demanding jobs from less demanding jobs in our sample by partition cluster analysis. [14] In our view less demanding jobs should not only be defined by part time contracts, since the Netherlands is a part time economy and part time jobs are equally paid per hour compared to fulltime jobs. Therefore we include in the cluster analyses: 1: binary variables indicating jobs with specified categories of work hours; 2: dichotomous variables indicating demand on (extra) time to work (such as commuting time), and 3:dichotomous variables indicating demand on career effort (courses, stress to do your job etc.).[15] We decide to apply cluster analysis by defined age groups to indicate what is less demanding on time and career effort in jobs by defined age-groups.

[14]: The STATA 7.0 cluster command to group jobs into less demanding en demanding we use is: cluster kmeans variables, k(2) Jaccard st(firstk) name (gr2).

[15] Future work could also analyse the effect on clustering of less demanding jobs of the work hours of partner, domestic help, volunteer work.

Table 2 Variable definitions

	W&ICT-2001; and WWI 2000/2001
Variable Name	Definition
Dependent variables	
Employment decision	1 if works for pay, zero otherwise.
Motherhood decision	1 if children at home or living independently, zero otherwise
Female dominated work decision	1 if percentage of women working in unit is 60% [50% and 75% in WWI] or more, zero otherwise
Less demanding (on time and career effort) job decision	1 if "clustered group variable"***** indicates less demanding job; zero otherwise
Ln wage	The natural log of hourly wage from current job in NLG of 2001, excludes overtime pay, shift premium, bonus, commission, or allowances, but includes 8 per cent holiday premium in case such a premium is reported.[16]
Explanatory variables	
Age, Age2	Age in years; Age squared
Education	Highest level completed (2: primary school, resp. 8: university)
Actual employment experience	number of working years minus career break (in calendar years)
Actual employment experience	Number of working years in fulltime full years equivalents
Tenure	Number of years worked for current employer
Partner	1 if married/cohabiting, zero otherwise
Partnernw	1 if partner works >=30 hours pw, zero otherwise (incl no partner)
Domhelp(p)	1 if (paid) domestic help, zero otherwise
City	1 if lives in a large city, zero otherwise
Wishchild	1 if wish for (another) child in the next 3 years, zero otherwise
Libelle2	1 if filled out questionnaire in women's magazine, zero otherwise
Volunteer work	1 if yes, zero otherwise
Career break	1 if had a career break of at least one year
***Clustered group variable uses the information on the following variables:**	
hours: fulltime	1 if >=35 hrs pw, zero otherwise
hours: long part time	1 if >=20<34 hrs pw, zero otherwise
hours: short part time	1 if >0&<20 hrs pw, zero otherwise
Commuting time	1 if travels more than 30 minutes to work; zero otherwise;
Overtime every week [number of hours in WWI]	1 if yes, zero otherwise [1:>= 3 hours overtime pw; zero otherwise WWI]
Can you do your work in the time planned for it?	1 if yes, zero otherwise
Do you wish to buy more days off?	1 if yes, zero otherwise
Do you wish to work less hours?	1 if yes, zero otherwise
Promoted with current employer?	1 if yes, zero otherwise
Discussed career opportunities w. employer?	1 if yes, zero otherwise
Courses with current employer?	1 if yes, zero otherwise
Worked at several departments?	1 if yes, zero otherwise
More than one job with current employer	1 if yes, zero otherwise
Bezetting in de groep te gering	1 if yes, zero otherwise
Regular conflicts within unit?	1 if yes, zero otherwise
Can you easily take a day off by tomorrow?	1 if yes, zero otherwise
Do you have a supervisory position?	1 if yes, zero otherwise
How many people do you supervise?	3 categories:0:0, 1:1-4 persons, 2:>=5 persons
Selection variables	
?1	Measures the possible selection bias from the employment decision for mothers in the labour market
?2	Measures the possible selection bias from the type of job decision for mothers in the labour market
?c2	Measures the correction for selectivity of motherhood (Sequence case2)
?c3	Measures the correction for selectivity of (type of) employment (Sequence case3)

[16] In order to compare wages, the wages have been converted into hourly rates based on the number of hours per week and corrected for the period covered by the payment, which is usually one month, but could be four weeks or one week. In case the reported contractual hours per week was zero or close to zero, the actual worked hours have been used for the calculations. Furthermore we exclude self-employed and freelancers. To obtain an accurate calculation of the hourly rate it is necessary to know whether the employer has calculated a tax-deductible mortgage into the wage. However, this affects only 1.5% of employed women. The average amount that is deducted is NLG 423. To avoid our wage estimations to be affected by outliers, we exclude the observations with 1 per cent of the lowest and 1 per cent of the highest wage distribution.

Table 3: Defining less demanding jobs by age categories: Mean values of variables used in cluster analysis

	Younger than 46				Younger than 36			
	Less demanding job				Less demanding job			
	Yes		No		Yes		No	
	W&ICT	WWI	W&ICT	WWI	W&ICT	WWI	W&ICT	WWI
hours : 1 if >=35 hrs pw, zero otherwise	.18	0	.61	.79	0	.65	.84	.57
hours: 1 if >=20<34 hrs pw, zero o.	.44	1	.33	0	.56	.24	.07	.39
hours: 1 if >0&<20 hrs pw, zero o.	.35	0	.07	.20	.44	.11	.35	.04
Commuting [1 if >=30 minutes to work]	.15		.41		.18		.35	
Overtime 1=every week, zero otherwise [number of hours in WWI]	.19	.22	.32	.38	.13		.37	
Hrs per week	23.1	26.6	32.3	33.4	20.9	32.8	34.5	33.4
Commuting time [minutes one way]	17.2		26.5		18.0		24.3	
Commuting distance [kilometres one way]	9.5		19.5		11.0		16.4	
Values of variables: 1=yes; zero o.								
Can you do your work in the time planned for it?	.25	.69	.29	.74	.21	.93	.20	.54
Do you wish to buy more days off?	.12		.20		.14		.11	
Do you wish to work fewer hours?	.10		.39		.11		.34	
Promoted with current employer? WWI promoted	.45	.36	.16	.39	.20	.27	.38	.47
Discussed career opportunities w. current employer?	.68		.68		.52		.76	
Courses with current employer?	.67		.65		.56		.64	
Worked at several departments?	.71		.04		.44		.37	
More than one job with current employer	.59		.10		.29		.41	
Our group is in short supply of personnel	.42		.39		.39		.40	
Regular conflicts within unit?	.18		.15		.20		.13	
Can you easily take a day off by tomorrow?	.18		.51		.11		.52	
Do you have a supervisory position?		.44		.35		.19		.75
How many people do you supervise [3 categories:0:0, 1:1-4, 2:>=5]		.37		.30		.05		.63
N	212	4125	119	2605	107	2163	104	1963

Pw:per week

5. Results and interpretation

Table 4 shows sign/direction and significance of the correlation coefficient (r) estimated by using bivariate probit models. The probit models are estimated by maximum likelihood estimation. The parameter vectors in the first and second equation are identified since at least one variable is included in one of the variable vectors (X or Z) but not in the other (Abowd and Farber 1982). All models have similar specification. We estimate the models for different age groups. The focus will be on women younger than 46, since these women are in the fertile age. Furthermore the labour force participation rates of women has risen tremendously in the last two decades, therefore it seems appropriate to distinguish between women younger and older than 46. Full models are presented in Tables 5,7 and 8.

Employment and motherhood

The correlation between the employment decision and motherhood decision in the simultaneous bivariate probit model is significantly negative. This implies that mothers who are employed have characteristics that make them more successful in finding a job than mothers who are not in paid work, and childless women (both in paid work and not in paid work).

The sequential model estimations do not show significant selection effects from motherhood on the employment decision for women younger than 46. This indicates that the motherhood and employment decisions are taken simultaneously. Table 5 presents the estimation results in this Case 1. The estimated effects of the explanatory variables are all as expected from theory and earlier empirical studies described in section 2. Human capital has a positive effect on employment and negative on motherhood. Education has a stronger effect on the motherhood decision than on the employment decision. The number of years of experience in the labor market has a stronger effect on the employment decision than on the motherhood decision. In the employment equation health is taken into account and affects the employment decision negatively. Inclusion of health in the motherhood decision did not have a significant effect (not presented here). In line with earlier research partner's number of hours of paid work is included in the employment equation, however no significant effect was found. Besides human capital the motherhood decision takes into account social norms (living in a city), which is not significant in the simultaneous bivariate model. In a probit model of motherhood this variable was significantly positive.[17] Furthermore the strongest explanatory variable in the motherhood equation is having a partner. In the simultaneous modeling of employment and motherhood the duration of the partnership becomes significantly positive too: if the partnership dates from before 1996 the probability of motherhood increases. Comparing the estimations of the separate probit models of explaining employment and motherhood, with the simultaneous bivariate probit model shows that the estimated effects of explanatory variables in motherhood decision are mostly changed by the bivariate probit estimation. However the sequential modeling of the decisions has not shown a significant sample selection effect of motherhood on the employment decision.

Predicted probabilities from the simultaneous model in Table 6 reveal that the probability of employment is much higher than the probability of motherhood for women younger than 46. For mothers the employment probability is lower than for all women. Furthermore, the probability of being a childless and employed for women younger than 36 is .45.

Type of job and motherhood

The correlation between type of job and motherhood is estimated by use of both data sets. Unfortunately our data sets do not give the opportunity to exactly similar definitions concerning the type of job. Therefore female dominated job is defined by 60% of women in the unit are female in the W&ICT data and 50% and 75% of the persons working in the unit

[17] See fourth column in Table 5.

are female in the WWI-2001. Also the less demanding job definitions are not exactly, but reasonably, comparable between data sets, which is indicated by Table 3.

Simultaneous models: Case 1

Table 4 clearly shows that simultaneous selection into motherhood and type of jobs (which we assume to be less favourable in hourly pay) is in almost all cases significantly positive in both data sets. Given their characteristics mothers are more likely to be in non- female dominated jobs than childless women, which is in line with human capital theory (if non-female dominated jobs are better paid jobs). Employed mothers are less probable to work in female dominated work units and have less risk to suffer from "the crab syndrome". Moreover given their characteristics employed mothers are less likely to be in a less demanding job than employed childless women, which is in line with human capital theory. However mothers who are younger than 36 are more likely to be employed in less demanding jobs. This implies that employed mothers who are younger than 36 with the characteristics for employed motherhood are in jobs that are less demanding but not female dominated. (Corresponding to the definition in Table 2 and characteristics of less demanding in Table 3). Estimation results of the bivariate probit models are presented in Tables 7 and 8.

Sequential models: Case 2

We do not find sample selection of mothers in employment in female dominated jobs by using WWI-2001, and neither in W&ICT-2001. The sample selection of mothers has not significantly different characteristics that make mothers more likely to be in work units with 50% female employees. The sequential bivariate models show that in the selection of mothers the probability of being employed in female dominated jobs is not significantly higher than for childless women. There is also no significant sample selection effect of mothers found for employment in less demanding jobs, except for women between 36 and 46 years old.

Sequential models: Case 3

We find sample selection of employment in a female dominated job or less demanding job on motherhood. Women younger than 46 employed in female dominated jobs are more likely to be mothers than women of similar age but employed in male dominated jobs. However women who are younger than 46 and employed in less demanding jobs are less likely to be mothers than women of similar age in demanding jobs. For women younger than 36 and employed in less demanding jobs the opposite effect is found. They are significantly more likely to be mothers.

Selectivity corrected wage regressions

Tables 9 and 10 show wage regressions for mothers corrected for selectivity of motherhood and (type of) employment. Table 9 type of job refers to female dominated job, in Table 10 type of jobs refers to less demanding job. We have done the calculations to explain the hourly wage with the help of regression analyses for mothers in employment who are younger than 46 of age. This shows that the highest obtained level of education has about 8% positive effect on mothers' gross hourly wage. It is the most significant explanatory variables in the wage regressions presented in Table 9. Also all other explanatory variables have the expected signs and are significant.

Our main interest is the selection variables. The correction for selection bias into employment and into motherhood is not significant (column 1 in Table 9). Although the correlation between the employment decision and the motherhood decision is significantly negative there is no bias from employed motherhood found in mother's gross hourly wage.

Table 9shows the wage regression models when the estimated selectivity models have significant correlation coefficients. In some age groups both the simultaneous model and a sequential model show significant correlation. In Table 9we show the wage regression fro mothers when a simultaneous bivariate selection is assumed and when a sequential selection model is assumed. It is clear that only the selection variables differ. In the wage regression for mothers younger than 46 with selectivity correction based on simultaneous selection only the

correction for motherhood conditional on female dominated job is significant and negative. The correction is quite strong in magnitude. This finding supports within this age group the hypothesis that mothers in female dominated jobs have better characteristics than childless women employed in these jobs. However the sequential model shows that correction for selectivity of employment in female dominated jobs is the correction that is needed. To choose between the two models we apply a Hausman test (Hausman (1978). The Hausman test rejects the bivariate probit model and supports the sequential bivariate model.
Wages of mothers who are younger than 36 do need negative correction of motherhood conditional on female dominated jobs. Mothers in female dominated jobs have better labor market productivity than childless women in these types of jobs.

In Table 10 we show selectivity corrected wage regression for mothers younger than 46, and for the sub samples of mothers between 36-46 and younger than 36. All age groups have significant correlation between the motherhood decision and the employment type decision in the simultaneous model and in a subsequent model. Again we apply Hausman tests in order to choose between the models. Is the selection in motherhood and less demanding jobs simultaneous or is the selection into a less demanding job taken first for women younger than 46? In the age groups 36-46 the question is whether the decisions are taken simultaneous or whether motherhood is chosen first and thereafter employment in a less demanding jobs. For women younger than 36 the sequential model only indicates a first selection into less demanding jobs and thereafter motherhood.
Hausman tests on the choice between the simultaneous and the sequential model reject the simultaneous model in the three cases we show in Table 10. This implies that wages of mothers younger than 46 need correction for selection into less demanding jobs. Wages of mothers between 36 and 46 years of age need correction for type of job conditional on motherhood and correction fro selection into motherhood. Wages of mothers younger than 36 need to be corrected for motherhood conditional on less demanding jobs. In general the bias is strong and negative. Implying that mothers with the best qualifications are active in the labor market. For mothers younger than 46 the bias due to selection into less demanding jobs is negative, whereas we find a positive (although not highly significant) effect on wages for mothers younger than 36. This indicates that less demanding jobs are not paid less and wage and other job characteristics are not in a trade-off but complementary.

Predicted probabilities

Tables 11 and 12 show predicted probability for selectivity in models that have been tested to fit the best.

Table 4: Bivariate Probit Models for Employment and Motherhood, and Type of Job and Motherhood: Sign and Significance of Correlation coefficients (*r*)

		W&ICT-2001					
Bivariate Probit Models		Case 1		Case 2		Case 3	
D1	D2	Simultaneous	N	Sequential (selec=D2)	N (cens.)	Sequential (selec=D1)	N (cens.)
All ages							
Employment	Motherhood	-	739	-	739 (235)	n.s.	739 (364)
Younger than 46							
Employment	Motherhood	-	487	n.s.		n.s.	
Younger than 36							
Employment	Motherhood	-	294	n.s	294	n.s.	
All ages							
Fem.dom.jb60	Motherhood	+		n.s		n.s.	
Less dem.job	Motherhood	-		n.s.		n.s.	
Younger than 46							
Fem.dom.jb60	Motherhood	+		n.s.		n.s.	
Less dem.job	Motherhood	+		n.s.		n.s.	
		WWI-2001 (only workers)					
All ages							
Fem.dom.jb50	Motherhood	+	10348	-	10348	-	10912
Less dem.job	Motherhood	+	7156	-	7551 (3551)	n.s	7439 (3482)
Older than 46							
Fem.dom.jb50	Motherhood	+	1758	n.s.	1798 (327)	n.s.	1822 (751)
Less dem.job	Motherhood	+	1924	n.s.	1940 (327)	n.s.	2008 (848)
Younger than 46							
Fem.dom.jb50	Motherhood	+	5124	n.s.	5542 (3171)	-	5435 (2912)
Less dem.job	Motherhood	+	5749	n.s.	5802 (3171)	+	6138 (3863)
Between 36-46							
Fem.dom.jb50	Motherhood	n.s	1889	n.s.	1973 (618)	n.s.	1983 (935)
Less dem.job	Motherhood	+	2102	-	2109 (618)	n.s.	2194 (973)
Younger than 36							
Fem.dom.jb50	Motherhood	+	3033	n.s.	3363 (2516)	n.s.	3241 (1900)
Less dem.job	Motherhood	-	3428	n.s.	3472 (2516)	-	3642 (1813)

D1, D2 correspond to Figure 3. n: number of observations, selec.: selection equation, cens.: number of observations that are censored. In W&ICT-2001 survey: female dominated jb60 is percentage of women working in the unit is 60; in WWI-Survey: female dominated jb50 means 50% of persons working in the unit is female respectively; less demanding job is a created binary variable from cluster analysis corresponding to the definition in Table 2. Significant at level. n.s.: not significant.

Table 5: Selection into employment and motherhood

	W&ICT-2001		Women younger than 46		
	Simultaneous Bivariate probit			Probit	Probit
	Employment		Motherhood	Employment	Motherhood
Age	-.060		.103	-.058	.049
	(-4.32)		(5.18)	(-4.21)	(3.15)
Partner			2.437		2.619
			(6.36)		(6.79)
Highest completed level	.152		-.242	.151	-.195
of Educ	(2.95)		(5.16)	(2.93)	(-3.94)
Actual Exp ft eq.	.080		-.059	.079	-.044
	(5.22)		(-3.23)	(5.16)	(-2.93)
Healthy	-1.02			-.973	
	(-4.68)			(-4.40)	
Expects (another) child			-.024		-.368
within 3 years			(.12)		(-1.91)
Partner's number of	-.006			-.006	
hours in paid work	(-1.21)			(-1.25)	
Partner since (1 if after			-.412		-.369
1996; 0 otherw)			(-2.01)		(-1.89)
City			.111		.135
			(1.53)		(2.11)
Volunteerwork	.377			.400	
	(2.38)			(2.51)	
Constant	2.292		-4.39	2.148	-2.526
	(3.33)		(-5.15)	(3.12)	(-3.56)
Rho, r[18]		-.341			
		(-2.59)			
Pseudo R2				.18	.42
N		443		443	487
Wald chi2 (13)		184.74			
LR chi2(6),(7)				77.70	273.23

Table 6 Predicted probabilities by age: employment and motherhood

	Case 1: Simultaneous	W&ICT-2001		
		All ages	Younger 46	Younger 36
1	Motherhood probability conditional on employment	.64	.73	.75
	Employment probability conditional on motherhood	.48	.58	.48
2	Employment probability		.79	
3	Pr (l^{emp}=1 and l^{moth}=1)	.34	.43	.39
4	Pr (l^{emp}=1 and l^{moth}=0)	.34	.36	.45
5	Pr (l^{emp}=0 and l^{moth}=1)	.17	.17	.11
6	Pr (l^{emp}=0 and l^{moth}=0)	.15	.04	.05
7	Motherhood probability		.58	
		739	443	294

1. $\frac{\Phi_2(X_i b, Z_i d, r)}{\Phi(Z_i d)}$
2. $\Phi(X_i b)$
3. $\Phi_2(X_i b, Z_i d, r)$ (=S_1)
4. $\Phi_2(X_i b, -Z_i d, -r)$ (=S_2)
5. $\Phi_2(-X_i b, Z_i d, -r)$ (=S_3)
6. $\Phi_2(-X_i b, -Z_i d, -r)$ (=S_4)
7. $\Phi(Z_i d)$

Where $\Phi(\ )$ and $\Phi_2(\ )$ are the standard normal distribution function and the bivariate normal distribution function respectively. X_i and Z_i are vectors of explanatory variables for the underlying latent variable for the probit function and the selection function, and b and d are corresponding parameters. r is the correlation coefficient. S1 to S4 correspond to Figure 3.

[18] Rho remains significant, negative, with several specifications. Rho is also significantly negative if we estimate a similar model for the total sample (all ages).

Table 7 Selectivity corrected probit estimations, motherhood and female dominated job: women younger than 46. Coeff (Z-value)

	W&ICT 2001		WWI-2001		WWI 2001		WWI 2001	
	Age<46		Age<46		Age <46		Age <= 36	
	Simultaneous Bivariate probit		Simultaneous Bivariate probit		Sequential Bivariate probit (selection job)		Simultaneous Bivariate probit	
	Motherhood decision	Fem.dom. job decision	Motherhood decision	Fem.dom. job decision	Motherhood decision	Fem.dom. job decision	Motherhood decision	Fem.dom. job decision
Age	.118	.006	.1561	.019	.094	.018	.198	-.015
	(5.08)	(.42)	(23.63)	(3.69)	(-8.42)	(3.76)	(15.72)	(-1.56)
Partner	2.289		1.006	.128	.747	.106	.98	.046
	(5.69)		(18.90)	(2.92)	(8.01)	(1.63)	(12.55)	(.48)
Level of Educ	-.131	-.050	-.1196	.020	-.091	.011	-.123	.027
	(-2.16)	(-1.08)	(-9.29)	(1.83)	(-6.16)	(1.05)	(-6.92)	(1.79)
Actual Exp ft eq.	-.063	.008	-.030	.004	-.023	.006	.009	.007
	(-3.00)	(.54)	(-5.13)	(0.77)	(-3.38)	(1.35)	(0.94)	(.84)
Healthy		.011						
		(.04)						
Expects (another) child within 3 years	-.072 (*) (-.32)							
Start partnership before 1996	-.417 (-1.89)							
Women's magazine				.372 (10.02)		.324 (8.73		.405 (8.10)
Volunteerwork		-.345 (-2.15)						
City	.052 (.66)		.000 (.53)		-.000 (-.08)		-.000 (-.28)	
Partner's works >=30hrs pw				-.015 (-.24)		-.235 (-.42)		.054 (.60)
Paid domestic help				-.220 (-4.66)		-.175 (-4.06)		-.250 (-3.69)
Constant	-4.645 (-4.99)	.300 (.44)	-5.255 (-28.98)	-.992 (-7.20)	-2.353 (-5.75)	-.998 (7.47)	-6.814 (-20.00)	-.066 (-.28)
N	351		5124		5435		3033	
Censored								
Rho	.257 (2.25)		.056 (2.15)		-1.33 (-5.33)		.130 (3.72)	
Wald chi2(*)	110.67		1665.3		104.75		702.37	

Female dominated: 60% (W&ICT -2001), 50% women in work unit (WWI-2001) (*) if the model excludes duration of partnership the dummy for expects a child in the next 3 years becomes significant negative. (**) If the specification includes the explanatory variables domestic help, enough personal time, and partner works more than 30 hours per week (nog significant) then Rho is not significant anymore (coeff -.372, z-value – 1.62). In the bivariate probit model adding similar explanatory variables does not affect the correlation between the motherhood decision and the female dominated job decision.

Table 8 Selectivity corrected probit estimations, motherhood and less demanding job: women younger than 46; Coeff (z-value)

	Age <46 Simultaneous Bivariate prob		Age <46 Sequential Bivariate probit (selection job)(^)		Age 36-46 Simultaneous Bivariate prob		Age 36-46 Sequential Bivariate probit (selection moterhood)		Age <36 Simultaneous Bivariate prob		Age <36 Sequential Bivariate probit (selection job)(^)	
	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision
Age	.148	.054	.110	.055	.102	.024	.104	-.032	-.188	-.008	.157	-.011
	(24.35)	(11.10)	(12.13)	(11.32)	(7.27)	(1.97)	(7.52)	(-2.38)	(-16.09)	(-0.94)	(7.38)	(-1.30)
Partner	.996	.435	.828	.482	1.070	.281	1.063	-.547	.970	-.001	.875	.007
	(20.13)	(6.38)	(11.94)	(7.55)	(14.82)	(2.61)	(14.78)	(-3.88)	(13.51)	(-.01)	(6.05)	(.08)
Level of	-.106	.015	-.025	.014	-.082	-.104	-.088	-.056	-.121	-.131	-.029	-.132
Educ	(-9.07)	(1.40)	(-1.72)	(1.40)	(-4.53)	(-6.16)	(-4.86)	(-3.00)	(-7.26)	(-0.58)	(-.88)	(-9.57)
Actual Exp ft eq.	-.026	-.002	-.016	-.001	-.056	-.038	-.056	-.008	.014	-.020	-.025	-.017
	(-4.76)	(-.49)	(-2.50)	(-.31)	(-7.13)	(-5.71)	(-7.14)	(-1.10)	(1.57)	(-2.54)	(-2.31)	(-2.33)
Partner's works		.096		.044		.406		.417		.062		.033
>=30hrs pw (WWI)		(1.61)		(.81)		(4.32)		(4.57)		(.73)		(.42)
City	0.000		0.00		.000		.000		-.000		-.00	
	(.97)		(.15)		(1.61)		(2.09)		-0.10)		(-.96)	
Womens'		.135		.162		.277		.171		.141		.159
Magazine		(3.85)		(5.09)		(4.88)		(2.91)		(2.97)		(3.67)
Paid domestic help		-.042		-.100		-.340		-.238		-.293		-.290
		(-.95)		(-2.55)		(-5.08)		(-3.49)		(-4.57)		(-4.88)
Constant	-5.132	-2.644	-4.695	-2.715	02.987	-.117	-3.08	2.531	-6.572	-1.168	-5.451	1.172
	(-30.45)	(18.98)	(-21.51)	(19.93)	(5.86)	(-.25)	(-6.14)	(4.73)	(-20.87)	(5.22)	(-7.75)	(5.38)
N	5749		6138		2101		2109		3428		3642	
Censored			3863				618				1813	
Rho	.410		1.230		.246		-1.29		-.077		-.910	
	(16.13)		(4.41)		(6.06)		(-2.73)		(-2.33)		(-3.33)	
Log likelihood	-6270.84		-4958.99		-2397.31		-2023.27		-3843.76		-3219.3	
Wald chi2(*)	1912.87		295.07		462.3		72.23		847.59		138.31	

Definition of less demanding job decision corresponds to Table 3.(*) number of explanatory variables in the model. (^) the model excluding partner remains fairly similar and significance, however the significance is lower. Furthermore the effect of education in the model exluding partner is -.08 z-value –3.6).

Table 9: Selectivity corrected OLS Wage regressions for mothers. Selections: motherhood and Employment (in Female dominated jobs). Coefficient(t-values)

Dependent var: ln gross hourly wage	W&ICT-2001	WWI-2001		
	Corrected for employment and motherhood	Corrected for female dominated job and motherhood		
	Age<46	Age<46	Age<46	Age:<36
	Simultaneous	Simultaneous	Seq. sel Job	Simultaneous
Level of Educ	.095	.078	.079	.069
	(3.00)	(23.43)	(23.54)	(11.44)
Actual Exp ft eq.	.041	.014	.013	.008
	(1.37)	(3.19)	(3.15)	(.78)
Actual Exp ft eq.sq.	-.0006	-.0002	-.0003	.0003
	(-.51)	(-2.01)	(-1.90)	(-.82)
Tenure		.015	.015	.012
		(5.46)	(5.40)	(1.60)
Tenure sq		-.0003	-.0003	-.0003
		(-2.59)	(-2.54)	(-.54)
Weekly hours		.005	.005	.004
		(6.70)	(6.80)	(3.04)
Partner's weekly hours		-.021	-.021	-.023
		(-5.81)	(-5.80)	(3.93)
Youngest child Age<4		.057	.054	.040
		(4.25)	(4.08)	(1.69)
Youngest child Age<12	.129	.050	.049	-.001
	(1.04)	(3.00)	(2.96)	(-.02)
Career break	-129			
	(-1.32)			
?1 correction for (type of) employment conditional on motherhood	.047	-.008		-.040
	(.17)	(-.18)		(-.59)
?2 correction for motherhood conditional on (type of) employment	.251	-.070	.015	-.088
	(1.40)	(-3.74)	(.28)	(-3.01)
$?_{c3}$ correction for selectivity of type of employment			-.069	
			(-3.54)	
Constant	2.261	3.379	3.356	3.728
	(6.77)	(23.85)	(.143)	(15.51)
R sq.	.200	.315	.315	.227
N	153	2245	2245	812
N predicted	265	5053	5081	2998
Predicted in e(sample)	3.192	3.335		3.297
(St.dev.)	(.224)	(.174)		(.141)
Predicted mean	3.132	3.286)	3.285	3.273
(st.dev.)	(.239)	(.171)	(.172)	(.135)

Table 10: Selectivity corrected OLS Wage regressions for mothers. Selections: motherhood and demanding jobs. Coefficients (t-values) All WWI-2001

Dependent var: ln gross hourly wage	Corrected for less demanding job and motherhood					
	Age<46	Age<46	Age:36-46	Age:36-46	Age:<36	Age:<36
	Simultaneous	Seq. sel Job	Simultaneous	Seq. sel M	Simultaneous	Seq. sel J
Level of Educ	.077	.077	.073	.073	.039	.060
	(18.47)	(23.15)	(14.23)	(14.13)	(3.46)	(6.98)
Actual Exp ft eq.	.013	.014	.023	.024	.003	.004
	(3.22)	(3.40)	(3.49)	(3.58)	(.030)	(.39)
Actual Exp ft eq.sq.	-.0002	-.0002	-.0005	-.0005	-.0003	-.0003
	(-2.12)	(-2.22)	(-2.62)	(-2.70)	(-.84)	(-.69)
Tenure	.016	.016	.019	.018	.015	.015
	(6.15)	(6.15)	(5.41)	(5.39)	(2.05)	(2.07)
Tenure sq	-.0004	-.0004	-.0005	-.0005	-.0005	-.0004
	(-3.11)	(-3.11)	(-3.28)	(-3.26)	(-.86)	(-.89)
Weekly hours	.005	.005	.005	.005	.003	.003
	(7.42)	(7.09)	(5.16)	(5.31)	(2.60)	(2.83)
Partner's weekly hours	-.020	-.020	-.017	-.017	.024	-.024
	(-5.89)	(-5.97)	(-3.64)	(-3.57)	(-4.34)	(-4.29)
Youngest child Age<4	.060	.061	.071	.072	.056	.053
	(4.71)	(4.79)	(4.07)	(4.10)	(2.51)	(2.38)
Youngest child Age<12	.050	.050	.056	.055	-.018	-.013
	(3.16)	(3.13)	(2.85)	(2.88)	(-.42)	(-.013)
?1 corr. for (type of) employment cond. on M	-.091		.141	-.137	.345	
	(-1.05)		(2.82)	(-3.66)	(3.44)	
?2 corr. for M cond.on (type of) employm.	-.070	-.010	-.174		-.103	-.112
	(-2.27)	(-.18)	(-3.95)		(-3.97)	(-4.09)
$?_{c2}$ corr. for select. of m				-.145		
				(-2.73)		
$?_{c3}$ corr. for select. of type of employment		-.104				.115
		(-2.18)				(1.91)
Constant	3.399	3.370	3.056	3.070	3.698	3.745
	(23.57)	(24.66)	(12.20)	(16.64)	(16.76)	(16.82)
R sq.	.322	.322	.354	.358	.252	.246
N	2487	2487	1340	1397	918	918
N predicted	5238	5701	1925	2065	3388	3388
Predicted in e(sample) (St.dev.)	3.335		3.362	3.355	3.300	3.300
	(.177)		(.189)	(.183)	(.151)	(.151)
Predicted mean (st.dev.)	3.286)		3.360	3.381	3.269	3.270
	(.172)		(.182)	(.310)	(.144)	(.143)

6. Predicted probabilities of selection

To be written

Table 11 Predicted probabilities by age: motherhood and female dominated job

	Simultaneous selection Case1			
	Female dom. emp.>=60%			
		All ages	Younger 46	Younger 36
1	Employment in female dominated job probability conditional on motherhood	.56	.50	.49
	Motherhood probability conditional on female dominated job	.56	.64	.47
2	Employment probability in female dominated job			
3	Pr (I^{moth}=1 and I^{femp}=1)	.29	.29	.21
4	Pr (I^{moth}=1 and I^{femp}=0)	.21	.15	.24
5	Pr (I^{moth}=0 and I^{femp} =1)	.23	.30	.20
6	Pr (I^{moth}=0 and I^{femp}=0)	.27	.25	.34
7	Motherhood probability			
	N	739	487	247

	WWI 2001			
	Simultaneous selection Case1			
	Female dom. emp.>=50%		Seq.model (sel.job)	Sim. Model
			Younger 46	Younger 36
1	Employment in female dominated job probability conditional on motherhood.		.48	.31
	Motherhood probability conditional on female dominated job		.53	.52
2				
3	Pr (I^{moth}=1 and I^{femp}=1)		.26	.14
4	Pr (I^{moth}=1 and I^{femp}=0)		.21	.14
5	Pr (I^{moth}=0 and I^{femp} =1)		.24	.31
6	Pr (I^{moth}=0 and I^{femp}=0)		.29	.41
7	Motherhood probability			
	N			4392

1. $\frac{\Phi_2(X_i b, Z_i d, r)}{\Phi(Z_i d)}$
2. $\Phi(X_i b)$
3. $\Phi_2(X_i b, Z_i d, r)$ (=S_1)
4. $\Phi_2(X_i b, -Z_i d, -r)$ (=S_2)
5. $\Phi_2(-X_i b, Z_i d, -r)$ (=S_3)
6. $\Phi_2(-X_i b, -Z_i d, -r)$ (=S_4)
7. $\Phi(Z_i d)$

Where $\Phi(\,)$ and $\Phi_2(\,)$ are the standard normal distribution function and the bivariate normal distribution function respectively. X_i and Z_i are a vector of explanatory variables for the underlying latent variable for the probit function and the selection function, and b and d are corresponding parameters. r is the correlation coefficient. S1 to S4 correspond to Figure 3.

Table 12 Predicted probabilities by age: motherhood and less demanding job
To be filled out

	Simultaneous selection Case1	W&ICT-2001		
		All ages	Younger 46	Younger 36
1	Employment in less demanding job probability conditional on motherhood Motherhood probability conditional on less demanding job			
2	Employment probability in less demanding job			
3	Pr (I^{moth}=1 and I^{femp}=1)			
4	Pr (I^{moth}=1 and I^{femp}=0)			
5	Pr (I^{moth}=0 and I^{femp} =1)			
6	Pr (I^{moth}=0 and I^{femp}=0)			
7	Motherhood probability			
	N			

		WWI-2000/2001				
			Sim.	Seq. sel J	Seq. Sel M	Seq. Sel J
		All ages	Older 46	Younger 46	Younger 36	36-46
1	Employment in less demanding job probability conditional on motherhood. Motherhood probability conditional on less demanding job					
2						
3	Pr (I^{moth}=1 and I^{femp}=1)					
4	Pr (I^{moth}=1 and I^{femp}=0)					
5	Pr (I^{moth}=0 and I^{femp} =1)					
6	Pr (I^{moth}=0 and I^{femp}=0)					
7	Motherhood probability					
	N					

	Simultaneous selection Case1	WWI_2000/2001				
		All ages	Older 46	Younger 46	Younger 36	36-46
1	Employment in less demanding job probability conditional on motherhood. Motherhood probability conditional on employment in less demanding job					
2						
3	Pr (I^{moth}=1 and I^{femp}=1)					
4	Pr (I^{moth}=1 and I^{femp}=0)					
5	Pr (I^{moth}=0 and I^{femp} =1)					
6	Pr (I^{moth}=0 and I^{femp}=0))					
7	Motherhood probability					

1. $\frac{\Phi_2(X_i b, Z_i d, r)}{\Phi(Z_i d)}$
2. $\Phi(X_i b)$
3. $\Phi_2(X_i b, Z_i d, r)$ (=S_1)
4. $\Phi_2(X_i b, -Z_i d, -r)$ (=S_2)
5. $\Phi_2(-X_i b, Z_i d, -r)$ (=S_3)
6. $\Phi_2(-X_i b, -Z_i d, -r)$ (=S_4)
7. $\Phi(Z_i d)$

Where $\Phi(\,)$ and $\Phi_2(\,)$ are the standard normal distribution function and the bivariate normal distribution function respectively. X_i and Z_i are a vector of explanatory variables for the underlying latent variable for the probit function and the selection function, and b and d are corresponding parameters. r is the correlation coefficient. S1 to S4 correspond to Figure 3.

Conclusions

To be written
Our results do not demand for correction for selectivity of employed motherhood. However correction of mother's wages for selection bias from less demanding jobs and motherhood is needed. Similar for employment in female dominated job

Constructed dichotomous variable to indicate less demanding.

Direction in double sample selection: Testing Simultaneous and subsequent bivariate models has revealed that in the case of double selection into motherhood and less demanding jobs that the simultaneous model has to be rejected.

Future work:

1. In future research we will match our information on whether a worker is covered by collective labour agreement and if so, with information on whether the collective labour agreement is characterised as mother friendly.
2. In our analyses we focus on the motherhood decision. The analysis may benefit from a focus on the decision for a second child. Another possible specialised analysis takes the age of maternity as decision: the decision of motherhood before age 30.
3. In 2002 another wage indicator survey has been held in the Netherlands in which both men and women are questioned. It is interesting to analyse the double selection into parenthood and less demanding jobs.

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Appendix Table Table 5: Selection into employment and motherhood

	W&ICT-2001	
	Women younger than 46	
	Case 1	
	Simultaneous Bivariate probit	
	Employment	Motherhood
Age	-.053	0.066
	(-4.61)	(5.06)
Partner		2.778
		(7.75)
Highest completed	.185	-0.242
level of Educ	(4.06)	(5.16)
Actual Exp ft eq.	.083	-0.041
	(5.61)	(2.81)
Healthy	-.925	
	(-4.50)	
Expects (another)		-.439
child within 3 years		(2.33)
Partner since		
City		
Volunteer work	.391	
	(2.57)	
Constant	1.566	-2.83
	(2.78)	(-5.19)
Rho, r[19]	-.336	
	(-2.79)	
N	487	
Wald chi2 (10)	180.38	

[19] Rho remains significant, negative, with several specifications. Rho is also significantly negative if we estimate a similar model for the total sample (all ages).

Table 8 Selectivity corrected probit estimations, motherhood and less demanding job: women younger than 46; Coeff (z-value)

	WWI-2001:age<36		WWI 2001 age 36-46		WWI-2001: age <36		WWI-2001: age 36-46	
	Simultaneous Bivariate prob		Simultaneous Bivariate probit		Sequential Bivariate probit (selection job)(^)		Sequential Bivariate probit (selection motherhood)	
	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision	Motherhood decision	Less dem. job decision
Age	-.188	-.008	.102	.024	.157	-.011	.104	-.032
	(-16.09)	(-0.94)	(7.27)	(1.97)	(7.38)	(-1.30)	(7.52)	(-2.38)
Partner	.970	-.001	1.070	.281	.875	.007	1.063	-.547
	(13.51)	(-.01)	(14.82)	(2.61)	(6.05)	(.08)	(14.78)	(-3.88)
Level of	-.121	-.131	-.082	-.104	-.029	-.132	-.088	-.056
Educ	(-7.26)	(-0.58)	(-4.53)	(-6.16)	(-.88)	(-9.57)	(-4.86)	(-3.00)
Actual	.014	-.020	-.056	-.038	-.025	-.017	-.056	-.008
Exp ft eq.	(1.57)	(-2.54)	(-7.13)	(-5.71)	(-2.31)	(-2.33)	(-7.14)	(-1.10)
Partner's works >=30hrs pw (WWI)		.062 (.73)		.406 (4.32)		.033 (.42)		.417 (4.57)
City	-.000 -0.10)		.000 (1.61)		-.00 (-.96)		.000 (2.09)	
Womens' Magazine		.141 (2.97)		.277 (4.88)		.159 (3.67)		.171 (2.91)
Paid domestic help		-.293 (-4.57)		-.340 (-5.08)		-.290 (-4.88)		-.238 (-3.49)
Constant	-6.572	-1.168	02.987	-.117	-5.451	1.172	-3.08	2.531
	(-20.87)	(5.22)	(5.86)	(-.25)	(-7.75)	(5.38)	(-6.14)	(4.73)
N	3428		2101		3642		2109	
Censored					1813		618	
Rho	-.077		.246		-.910		-1.29	
	(-2.33)		(6.06)		(-3.33)		(-2.73)	
Log likelihood	-3843.76		-2397.31		-3219.3		-2023.27	
Wald chi2(*)	847.59		462.3		138.31		72.23	

Definition of less demanding job decision corresponds to Table 3.(*) number of explanatory variables in the model. (^) the model excluding partner remains fairly similar and significance, however the significance is lower. Furthermore the effect of education in the model exluding partner is -.08 z-value –3.6).

Appendix Table Comparison of W&ICT2001 and WWI 2001: Simultaneous Bivariate probit models Women's age<46

	Motherhood		Less demanding	
	W&ICT 2001	WWI 2001	W&ICT	WWI2001
Age	.146	.148	.054	.054
	(6.10)	(24.35)	(3.01)	(11.10)
Partner	2.411	.996		.435
	(6.27)	(20.13)		(6.38)
Level of Educ	-.126	-.106	-.131	.015
	(-2.01)	(-9.07)	(-2.50)	(1.40)
Actual Exp ft eq.	-.087	-.026	-.046	-.002
	(-3.61)	(-4.76)	(-2.47)	(-.49)
Healthy			-.227	
			(-.80)	
Expects (another) child within 3 years	.110			
	(.44)			
Partner's number of hours in paid work (>=30hrs WWI)			.006	.096
			(1.50)	(1.61)
City		0.000		
		(.97)		
Womens' Magazine				.135
				(3.85)
Paid domestic help				-.042
				(-.95)
Volunteerwork				
Constant	-5.527	-5.132	-.281	-2.644
	(-6.77)	(-30.45)	(.45)	(18.98)
N	302	5749		
Censored				
Rho	.263	.410		
	(2.14)	(16.13)		
Log likelihood	-303.25	-6270.84		
Wald ch2()		1912.87		