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Childcare and labor force participation in the Netherlands: the importance of attitudes and opinions

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Abstract We analyze the joint decision of participating in the labor force and using paid childcare made by mothers in two-parent households with pre-school age children in the Netherlands. Both the choice to use paid childcare and the number of hours taken up are analyzed. The data, collected in 2004, contains information on economic factors and on attitudes and opinions on childcare and labor. While acknowledging potential endogenous selection effects and bidirectional causality implying problems of endogeneity with the attitudes and opinions, our results show that, in addition to economic factors, attitudes and opinions are important when explaining the decision to participate in the labor force and to use paid childcare services, but they are less important when it comes to the decision on the number of hours childcare is taken up.

Keywords Childcare use · Labor force participation · Attitudes and opinions · Endogeneity

JEL Classifications J13 · C34 · D10 · Z13

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1 Introduction

In the last decades the governments of many countries have taken action to stimulate women's participation in the labor market. Availability of childcare services is considered to be an important factor to achieve this objective. Public policies generally focus on economic incentives such as providing subsidies to the parents when formal childcare services are used, or reducing entry barriers to potential providers of childcare. An important prerequisite for these policies to succeed is that parents are sensitive to the incentives and that they are willing to combine a job with caring for their children while leaving part of this responsibility to other (professional or informal) carers. Econometric analysis of the factors that explain the mothers' choices on labor force participation and the use of childcare generally focuses on the economic incentives, in particular on the costs of childcare and the household's income.

A relatively unexplored area in econometric modeling of the labor participation-childcare combination is the impact of attitudes and opinions on childcare use and working mothers. This can be considered a lacuna, since labor market participation and the use of childcare facilities can only be stimulated *if* people are willing to participate and make use of childcare facilities. Households where traditional norms prevail are probably less easily stimulated and therefore it is relevant to account for attitudes and opinions in the analysis when investigating the potential effects of childcare stimulation programs.

We have a data set in which information both on economic variables and attitudes and opinions is available. We use a sample of married or cohabiting mothers in the Netherlands with pre-school age children (0–3 years), and analyze the joint decision of labor force participation and the use of childcare for reasons related to the mother's job. We model both the decision to use childcare (or not), as well as the weekly hours childcare is used for. We focus on the role of attitudes and opinions in the taking-up of childcare without ignoring economic reasons such as the (household) income and the price of the services. The latter implies that we model the use of *paid* childcare, and that we do not distinguish between formal (subsidized) and informal paid childcare. We obviously include the price-after-subsidies as the price that is taken into consideration by the household when making their decision.

Section 2 reviews recent literature and reveals the progress that has been made in econometric models of labor force participation and childcare, but it also shows that the importance of attitudes and opinions is rarely accounted for in the analyses.[1] In Sect. 3 we introduce the data which allows us to fill this lacuna, and Sect. 4 describes the set-up of the model. The results presented in Sect. 5 demonstrate that investing in this particular line of research has its merits. Finally, main findings are summarized in Sect. 6.

[1] In the remainder of the paper we treat 'attitudes' and 'opinions' as synonyms.

2 Literature

We discuss the factors that are found to influence the decision to work and use childcare within households with pre-school age children. We review the economic literature, which focuses on the effects of costs on the decisions, but we also pay ample attention to the role of attitudes in decision-making as concluded by researchers from other disciplines.

2.1 Importance of economic factors

Theoretical models underlying the estimated equations in empirical economic research are generally based on utility maximization by the mother. The framework defined by Connelly (1992) is frequently applied. In Connelly's model, mothers obtain utility from a composite consumption good, leisure time and 'child quality', where the latter is a function of the time the mother spends with her children. Equations for the mother's labor supply and the demand for childcare can be derived from this expression. In general, the father's labor supply is considered exogenous. Empirical models are sometimes limited to discrete choice processes, while others also estimate the hours of work and/or the hours of childcare. For some, the price of childcare is allowed to have an independent effect on the outcomes while others model it as a correction on the mother's wage. The latter ignores that childcare services are paid out of the total household income and not necessarily from the income earned by the woman. Comprehensive reviews of the economic literature on childcare and labor force decisions can be found in Blau and Currie (2004) and Doiron and Kalb (2005).

Powell (2002) and Tekin (2005) include separate variables for the (potential) wage and the (potential) price of childcare services, both predicted from auxiliary regressions. They use wage and price to explain the choice between different childcare services but model neither the amount of care nor the number of hours spent in the labor market. Powell (2002) finds that wages have a positive effect on choosing a working state while prices of centre, sitter and relative care have a negative effect on choosing the respective mode of care. Tekin (2005) concludes that childcare subsidies can contribute to an increased employment of single mothers and, as a consequence, to an increase in the use of centre care. For the USA, estimates of childcare price elasticity of employment range from −0.2 (Connelly 1992) to −0.69 (Kimmel 1998).

Joesch and Hiedemann (2002) estimate hurdle models explaining both the decision to use childcare and the number of hours the service is used for by mothers in the USA. In contrast with our approach, the decision to participate in the labor market is not included in their model (other than to estimate a predicted wage). The decision whether or not to use childcare is governed by other considerations than the consumption measured in hours. The effect of the price of childcare on the hours of use of the service is significantly negative while economic variables do not belong in the usage decision. The use of hurdle models allows them to calculate that 43% of the parents in the USA will never use childcare by nonrelatives even when it is free of charge. Apparently, disinterest in care by non-relatives is also a reason not to use

childcare services, but they cannot directly test this. Our data provides information that allows for investigation of this suggestion for the Netherlands.

Studies for the Netherlands suggest that childcare subsidies have a smaller effect on labor force participation then a wage increase, and sometimes the effect of the price of childcare is found to be insignificant for the decision to participate (Maassen van den Brink 1994; Graafland 2000; Wetzels 2005). On the other hand, Maassen van den Brink (1994) found that a higher price reduces the probability to use childcare, while Jongen and Van Vuuren (2004) conclude that childcare subsidies lead to more formal childcare and more hours of work. Maassen van den Brink and Groot (1997) find that the higher the other household income (the husband's income), the lower the probability that the mother is employed. Based on a meta-analysis, Evers et al. (2008) conclude that a labor supply elasticity with respect to the wage of 0.5 is a reasonable estimate for women in the Netherlands, a slightly stronger effect than in the USA.

Gustafsson and Stafford (1992) state that the response to price variations is small because of an insufficient supply of formal childcare services. They find that in Swedish regions without rationing the price mechanism applies, but not in regions with a lack of facilities. Chevalier and Viitanen (2002) conclude that in the UK a lack of childcare facilities limits female labor force participation. For Italy, Del Boca et al. (2005) find that the price of childcare induces substitution between different forms of care, while the use of public childcare in Italy can increase substantially when the availability grows to a level comparable with northern European countries. Until recently, rationing has been relevant in the Netherlands, but recent expansions in the sector have drastically reduced or even eliminated the waiting lists (Kok et al. 2005).

In our empirical analysis, guided by the framework of Connelly (1992), we allow different effects of wages and prices on the households' decisions, while we provide more information on the interest in care and can test the suggestion made by Joesch and Hiedemann (2002).[2]

2.2 Importance of attitudes and opinions

Even if research showed that childcare has only beneficial effects, it will not be the case that all mothers are convinced and will entrust their child to a childcare centre. Evans and Kelley (2002) conclude that the attitudes towards childcare held by Australian mothers affect the support for maternal employment. Reservations about institutional day care for toddlers are mainly related to worries on the toddler

[2] Economists have also shown that the quality of childcare solutions is a potentially important factor when taking decisions about work and childcare (Hofferth and Wissoker 1992; Ribar 1995; Blau and Hagy 1998) but there is no obvious answer to the question how to measure quality. Further, it is an ongoing debate whether maternal or informal childcare is better or worse than care by a professional day-care centre. The picture arising from the literature is that extensive non-maternal childcare is not harmful for the children's development, provided that the care is of a high quality (Lamb 1997; Huston 2000; Lee 2005; Averett et al. 2005; Gregg et al. 2005; Van IJzendoorn et al. 2004). Given the heat of the discussion and the often inconclusive findings, we may expect that the personal ideas and opinions of mothers about the pros and cons of childcare for their own children matter for the decision about work and care.

receiving insufficient attention in day-care centers and the concern that there is no one-to-one relation with a teacher. More than half of the mothers (strongly) agreed that toddlers 'really need the attention of a full-time mother'. The statement 'a pre-school child is likely to suffer if their mother works' received more support than opposition. Furthermore, Evans and Kelley conclude that socioeconomic factors such as age, education, family income and church attendance influence the approval of day-care and the beliefs on the number of hours a mother should work, but the largest impact is caused by perceptions on whether institutional care can provide enough individual attention and affection. People who consider institutional childcare as harmless are more willing to approve day-care and prefer to work more hours, although 30% of all mothers prefer a part-time job and only a small minority (4%) of the Australian mothers prefer a full-time job (Evans and Kelley 2002).

Public family policies in France and West Germany do not differ too much, but fertility and employment rates are very different. Fagnani (2002) argues that the discrepancy between the desire to be in employment and the attitudes towards public (non-parental) childcare are the main causes for these differences. For example, the believe that children under 3 years of age need to be with their mother is much more widespread among West German mothers than among East German and French mothers (Fagnani 2002). In Germany, more mothers agree with the expression that "a pre-school age child suffers if their mother is employed" and the statement that they won't have a job as long as the child is below school age is more frequent among German mothers than it is among French mothers. Fagnani states that France has a much older tradition of collective childcare than West Germany, which is reflected on the current opinions about the benefits of collective childcare and the care by e.g. grandparents. More so than French mothers, German mothers feel they have to make hard choices if they want to combine work and childcare. Also Kremer (2005) concludes that differences between welfare state regimes with regard to the financial incentives and the generosity of childcare leave facilities cannot explain differences in labor force participation and childcare services take-up. Kremer attributes the observed variation to differences in the ideals of care dominant in the various countries.

Lindbeck et al. (1999) emphasize the role of social norms in economic behavior, while Van Dijk (1994) directly includes social norms instead of individual opinions as explanatory variables. Her results suggest that norms held by the mothers' social network affect choices regarding labor supply and non-parental childcare hours, along with monetary constraints.

The importance of cultural factors, the opinions about the effects of childcare on the development of children and the attitudes with respect to work, are rarely included in the economic literature. In other social sciences the impact of norms, values, and opinions on individual behavior is a much more common research topic, and it is often considered to be the driving force in decision-making (Van Deth and Scarbrough 1995; Pfau-Effinger 1998; Hakim 2000). Given the apparent importance of attitudes found in other fields, it is surprising that economic research has paid such little attention to these factors. A growing attention on the role of attitudes can

be observed among economists,[3] although doubts about the meaning of survey questions used to measure opinions remain widespread. Bertrand and Mullainathan (2001, 67) write, "These doubts are, however, based on a priori skepticism rather than on evidence". Research performed in laboratory settings by experimental economists demonstrates that psychological factors influence economic decisions (Rabin 2002; Fehr and Falk 2002). Others emphasize the endogeneity of individuals' preferences, which also brings cultural factors into the economic models (Bowles 1998). These developments demonstrate an increasing interest in non-economic, often subjective factors in economic research. Especially in a market for childcare services, one may expect that such factors can be decisive, as very few people will see their children purely as economic subjects.

A simple explanation for the absence of information on opinions on childcare and work in empirical economics is that this is generally not available in the same data set as the information on prices and actual labor force behavior. An additional reason to refrain from analyzing the role of opinions is the doubt about the reliability of subjective data. Survey questions bear the risk that expressed opinions are influenced or formed by the decisions taken, instead of opinions causing the outcome. However, acknowledging the claimed effects, it seems important to account for differences in opinions when analyzing the effects of other aspects on the decisions regarding labor force participation and childcare use.[4]

3 Data and stylized facts

Our data come from the "*Use of childcare*" survey organized by The Netherlands Institute of Social Research (SCP) and held in March 2004. Approximately 2,000 mothers with children up to the age of 12 answered the survey, which contains information on number of working hours of both parents, number of childcare hours for different modes of care, prices paid for these different modes, net income of the household, mother's age and her level of education. Furthermore, the survey contains several questions on the mothers' intentions, attitudes and opinions with regard to childcare and labor force participation.

In the analysis we restrict ourselves to two-parent households with at least one pre-school age child (children up to and including 3 years old).[5] Children of 4 years of age or above are not included, since they attend school during the day and hence

[3] A recent example is Alesina and Giuliano (2007), who show that family relationships, measured by individual replies to questions on the role of family and the love and respect of children towards their parents, are important determinants of differences between countries in economic behavior and outcomes.

[4] An interesting use of attitudes can be found in Howie et al. (2006). They estimate a simultaneous model of the time mothers spend looking after their children and on market work, using attitudes about childcare to identify childcare hours and attitudes about work to identify market work hours. They conclude that attitudes are good instruments, and that more work hours only slightly reduces the time mothers spend with their children. More time with their children reduces the amount of market working less than proportionally, which suggests that other activities get less attention. No reference is made to potential endogeneity of attitudes themselves.

[5] We do not distinguish between married and co-habiting couples. 'Husband' can also refer to an unmarried father.

decisions with regard to childcare in their case are essentially different. Due to the small number of single-parent households (less than 10%) and because different factors may influence the choices made by single mothers, we decided to focus on mothers in two-parent households. We thus have a sample of 737 households. Comparison with information from other statistics shows that this dataset can be considered representative of our research population.

Before we present some observations and descriptive statistics on labor force participation and childcare use in the Netherlands, we provide insight on the institutional situation at hand in 2004, as it may explain some of the findings. The legally arranged maternity leave is 16 weeks only: 6 weeks before childbirth, and 10 weeks after it. After a relatively short period of time (especially in comparison with Nordic countries) the mother has to make the choice to return to her job and leave the baby under (professional or informal) childcare or to give up working. Most mothers return to work after their regular maternity leave. The choice to reduce labor hours and work part-time is also a viable one which is made frequently, as suggested by the numbers presented below. For fathers, legally allowed leave is limited to 2 days after childbirth. Further, both parents have the possibility to enjoy parental leave, which allows them to reduce working hours temporarily. For most employees this leave is unpaid. In our sample only 30 respondents are using parental leave, reducing their weekly working hours by 25% on average. Regulations for public sector employees are more favorable than for employees in the private sector, both regarding the timing and the payment of the hours' reduction. Thus, the need to make use of childcare provided by people other than themselves is likely to be necessary at some stage if both parents want to continue being active in the labor market. Formal, professional childcare services are made available via a system in which the government, the employers, and the employees share the costs. In 2004, formal childcare providers charged a market price for childcare, of which a part was paid by the parents who used the service while the other part was paid by the employer(s) or subsidized by the (local) government. The percentage that parents had to contribute (SZW 2003) was based on the total before-tax household income (the higher the taxable household income, the higher the out-of-pocket contribution), and on the number of children childcare services were provided for (the out-of-pocket contribution for the first child was much higher than the contribution for the other children in care). The precise individual payment schemes were often much more complicated; some households initially paid a larger part of the costs and were later reimbursed by their employer(s), while other employers did not contribute at all. Kok et al. (2005) report that about 70% of formal childcare users received financial support from their (husband's) employer. When households did not get full compensation from their employers or did not qualify for government subsidy, they could qualify for further tax deductions if their childcare expenses were high. Changes in 2005 and afterwards streamlined the contributions made by employers and governments and lowered the contribution made by parents, while the structure of the parental contribution scheme remained basically unchanged.

Table 1 gives an overview of mothers' participation in the labor force at different stages of their family life. At the moment of the interview, the mothers worked 13 h per week on average. Before the first pregnancy they worked 30 h per week on

Table 1 Labor market behavior

	Before first pregnancy	When the oldest child was 1 year old	At the time of the interview
Number of observations[a]	718	695	737
Weekly hours worked (including non-working mothers) (SD)	30.5 (11.9)	14.8 (12.0)	13.0 (11.4)
Weekly hours worked (excluding non-working mothers) (SD)	32.5 (9.0)	19.6 (10.3)	19.2 (9.2)
Weekly hours worked by the father (SD)	39.0 (7.0)	38.3 (7.2)	38.6 (5.8)
Percentage of working mothers (%)	92	70	68

[a] Due to non-response the number of observations in the first two columns is less than 737. Part of the non-response in the second column is because the sample includes mothers who have not yet reached that stage in their family life

average. Excluding the women who were not working at the moment of the interview, the average number of working hours before the first pregnancy was 32, while at the moment of the interview it was only 19. Not only did participation drop from 92% before first pregnancy to 68% at the moment of the interview, but also the number of working hours dropped to a much lower level than in many other countries, which is related to the part-time jobs opportunities available in the Netherlands (Jaumotte 2003). At all stages of life, the number of the father's average working hours varied between 38 and 39, which in the Netherlands equals to an average full-time working week.

The total number of two-parent households in the Netherlands with pre-school age children was approximately 487,000. Statistics on the childcare used by these households are given in Table 2. Both parents worked in two out of every three households; a large majority of these families used some form of childcare, about half of them used paid childcare. 61% of all hours of childcare used by the households with two working parents are paid hours. Use of childcare was much less frequent in households where only one parent was employed. In a minority of these households it was the mother who had a job; generally speaking, it is the father who works while the mother takes care of children. The mother's job was a reason to use (unpaid informal) childcare in only 0.4% of the households with one (or no) working parents.

Table 3 lists the other variables that are used in the model. On average, the households count 1.2 children aged between 0 and 3 years, while about half of the households also have primary school age children (4–12 years). Further, we use the information on the mother's age (average: 32 years), her hourly wage (if she is employed) and the other household income, consisting of the salary earned by the husband and the non-labor income. We have information on the availability of formal childcare providers and informal 'network' childcare (i.e. care provided by grandparents or other relatives). About three quarters of the total number of mothers used to work at least 25 h before their first pregnancy, while 15% had a small part-time job.

In addition to the variables commonly used in the literature, we have information on the attitudes towards working mothers and the acceptance of childcare. We

Table 2 Childcare use and hours worked

	Both parents working	One or none of the parents working	Total
Number of observations	491	246	737
Households using any form of childcare (%)	81.1	0.4	54.1
Households using paid childcare (%)	50.3	0.0	33.5
Paid childcare hours in total hours of childcare (%)	60.9	0.0	60.9
Weekly hours worked by the mother	19.1	0.8	13.0
Weekly hours worked by the father	38.6	38.5	38.6

include two constructed factors that measure the mothers' opinions.[6] The factor that measures opinions on child care is based on responses to statements about whether it is acceptable to put a young or older child under the care of a professional sitter, a relative or an acquaintance, and on the importance of group playing for the child's development (educational or fun). This can be labeled *Care for children by people other than the parents is OK*. The other factor included measures attitudes on working, and is labeled as the *Intrinsic value of working*. It is based on statements like "To me, working goes without saying" and "Working is necessary for a fulfilling life", and on statements regarding the importance of being financially independent and having a job in order to play an important role in society. The higher the score on the factors, the more the mother agrees with the statements that define that factor.

In a sensitivity analysis meant to address potential endogeneity of the attitudes and opinions, a block of 13 variables depicting the social environment of the mothers is included (Appendix 1). The survey contains questions in which the mother is asked if working mothers and working fathers are common in her environment, if formal and informal childcare are common, and if a paid job was considered important by her own parents. These five variables are measured on a scale from 1 to 5 (strongly disagree to strongly agree). Another question regards the labor force participation of the mother's mother, which was translated into five dummy variables: did not work, worked since I

[6] The survey contains 34 statements on childcare and labor participation. All mothers in the sample, regardless of their use of childcare and employment status, scored all statements on a scale of 1 (completely disagree) to 5 (completely agree). Of course the correlation between the statements is large, and it is not a priori clear which statements are the most relevant; therefore, we use factor analysis to summarize the information. We analyze two sets of opinions within the full data set including single parents and parents who have only 4–12-year-old children. The first set deals with 18 opinions on childcare, while the second deals with 16 opinions on employment and the combination of employment and childcare (see Ooms et al. 2007). We found two factors contribute substantially (more than 10%) to the explained variance for each set. In the further analysis we use only one factor for each set, since the others, which can be labeled *Children are best taken care of in their own environment* (determined by statements such as "Children should be taken care of by their own parents", "It is best for a toddler to be taken care of at his/her own home" and "After school a child needs individual attention") and *Redistribution of household tasks is important* (measuring the extent to which mothers think raising children is the task of the mother or consider the father's role is also important) are strongly correlated with the factors included and are not separately identifiable with the available instrumental variables. For all factors, we calculate the weighted scores and normalize them to have a mean 0 and a standard deviation 1 (see also footnote 10).

Table 3 Descriptive statistics

	Mean	Standard deviation
Number of children aged 0–3	1.23	0.43
Presence of children aged 4–12[a]	0.516	0.500
Presence of children aged 13 or older[a]	0.015	0.121
Hourly wage (for *working* mothers, in euro)	10.28	3.12
Weekly hours worked by the father	38.6	7.4
Father works non-standard office hours[a]	0.128	0.334
Fathers' income, euro per month	1,713	562
Father's employer contributes to childcare[a]	0.266	0.442
Non-labor income, euro per month	56	240
Age of the mother	32.3	4.4
Availability of network care[a,b]	0.858	0.350
Availability of formal care[a,c]	0.871	0.335
Worked between 1 and 24 h before first pregnancy[a]	0.156	0.363
Worked 25 h or more before first pregnancy[a]	0.746	0.435

[a] Dummy (0/1) variable

[b] Is there a grandparent or other relative who would be able to take care of the child(ren)?

[c] Is there a childcare centre or family day care within reasonable distance?

went to school, always, sometimes, not known. In case the mother had a job, a question was asked about who provided care when the mother was working. Possible answers: father, older brothers/sisters, other carers (relatives, sitter, childcare centre), mother worked at home, or mother worked during school-hours only.

4 Empirical model

We construct an empirical model that analyses three decisions: (1) the decision to work, (2) whether or not to make use of any of the different paid childcare facilities, and (3) the number of hours of paid childcare. The first choice in our model is the mother's decision whether or not to participate in the labor market. If she decides to work, then the decision to use childcare becomes relevant. Also here we restrict ourselves to a binary choice model: we model the choice between paid childcare and unpaid (informal) or no childcare. For those mothers who participate in the labor market and have decided to use paid childcare, we model the number of hours that the child(ren) spend(s) in the care facility. The three decisions are likely to be taken jointly, and in the empirical model we account for the implied correlations.

We observe labor force participation p_i for all mothers i in the sample. The choice is modeled by a dichotomous model,

$$p_i^* = \alpha_p z_i + \eta_i \tag{1}$$

where $p_i = 1$ (employed) if $p_i^* > 0$, and p_i equals zero otherwise. Use of paid childcare services c_i is only observed in the case of mothers who have a paid job

(i.e. $p_i = 1$). Since the set of working mothers might be a non-random sample selection, the equation explaining use of childcare,

$$c_i^* = \alpha_c w_i + \upsilon_i \tag{2}$$

where $c_i = 1$ (use of paid services) if $c_i^* > 0$, and zero otherwise, must account for the possible selection effect. The two equations together constitute a probit model with sample selection (Van de Ven and Van Praag 1981), since we only have information on employed mothers for the second equation.

In the case of mothers who are employed and use paid childcare ($p_i = c_i = 1$) we observe the number of hours their children stay with the care provider. Thus, the number of care hours h_i is only observed in a selective sample. Again we have to correct for this selection when estimating the model,

$$h_i^* = \beta x_i + \varepsilon_i \tag{3}$$

with $h_i = h_i^*$ if $c_i^* > 0$ and $p_i^* > 0$, and h_i unobserved otherwise. All in all, we have a double selection process.

Consistent estimates of the complete model can be obtained through maximum likelihood methods, where the observations on mothers who work and use childcare involve a trivariate normal distribution. We apply maximum simulated likelihood (MSL) methods (Train 2003) to simulate the trivariate normal distribution and estimate the parameters of the three model equations and the correlations between the error terms.[7] Standard errors are bootstrapped.

4.1 Identification

Identification requires that at least one of the variables in z_i does not occur in w_i, and, due to the (possible) correlation between the equations' error terms, it is also required that at least one of the variables in w_i is not included in z_i. Further, it is required that there are variables in z_i and w_i that are not part of x_i (Tunali 1986; Heitmueller 2006). We include the variables regarding the before-pregnancy participation in the participation equation (z_i) only, under the assumption that the labor market status before pregnancy foremost affects the participation decision but not the choice on childcare. The hours worked by the father (which are assumed to be exogenous) are included in the childcare decision but not in the participation decision, expecting that in the case of mother's participation it is mainly the income generated by the father and not the number of hours worked that is relevant, while the decision to take up childcare may also depend on whether the father is potentially available as a care-provider.

[7] The likelihood function is a direct extension of the single-selection model and can be specified as: £ = $\Pi_i(\Pr[p_i = 0])^{1-p_i}(\Pr[c_i = 0, p_i = 1)^{(1-c_i)p_i}\left(\Pr[c_i = 1, p_i = 1]\mathrm{f}[h_i^*|c_i = 1, p_i = 1]\right)^{c_i\, p_i}$. Exact optimization is possible, but cumbersome (Co et al. 2005) and the less efficient two-step approach has been applied more frequently (Tunali 1986; Ham 1982; Heitmueller 2006). Maximum likelihood estimation of the model while allowing for correlations between all equations is also possible by using simulation techniques. Given the recursive nature of our model we can use the Stata-command cmp (Roodman 2009), which applies MSL methods using the GHK simulator to calculate the trivariate normal integral and Halton draws (Roodman 2009; Train 2003).

Before we can estimate our model we have to solve issues concerning missing values for two variables. We need information on the potential wage, as we expect that the hourly wage that could be earned affects the decisions and not the endogenous observed wage. In Appendix 2 we describe how we predict the potential wages. In order to be able to model the effect of the price of care, we need variation in prices between the individuals. In Appendix 3 we discuss how we calculate the relevant price per childcare hour.

4.2 Endogeneity of attitudes and opinions

An important issue is whether attitudes can be included as exogenous explanatory variables that explain decisions regarding labor force participation, childcare use and the amount of time this is used for. Answers to survey questions regarding opinions are suspected to be influenced by the decisions that are actually taken, which implies that the opinions could be endogenous. In that case, instrumental variable techniques should be used in order to obtain unbiased estimates, although it is inefficient to use instruments if there is no endogeneity. The questions on childcare were posed before the details on the respondents' current situation were asked; thus, the mother had not yet reconsidered all the decisions that she made in the past, suggesting we could just assume exogeneity. Attitudes regarding work were posed later in the survey and after the details of the chosen work-childcare solution were asked, which implies a higher risk that the answers are selected so that they match the actually chosen solution. A more formal check for endogeneity would be useful.

We propose to use information on the social environment, i.e. the prevailing habits and norms in the vicinity of the mothers, as instruments for the individual opinions (see Appendix 1). Also information on the work-history of the mothers answering the survey is used to instrument opinions. The social environment and the other instruments are "given" for the individual mother.[8]

5 Results

The results of the estimations treating the attitudes as exogenous are presented in Table 4 while in a subsection we briefly compare the results on the main variables of three alternative models that account for endogeneity (Table 5): (a) excluding the opinions completely, (b) accounting directly for the variables describing the habits in the mother's environment, and (c) including the predicted values for the opinions. For most of the variables the results show a large overlap. Hence, we offer an expanded discussion of the model containing attitudes and focus on the differences with the other models.

[8] Morren (2006) extensively analyses the mothers' formation of preference and the choices and considerations that are relevant regarding the care for young children. In particular, she analyses the role of trust in childcare services, the norms held by the social environment and the self-interested economic considerations in the formation of personal opinions, preferences and choices.

Table 4 Labor force participation, childcare use and number of hours of paid childcare

	Labor force participation (Eq. 1)	Use of childcare (Eq. 2)	Log hours of childcare (Eq. 3)
Predicted hourly costs (log)	−0.110 (0.391)	0.018 (0.602)	0.369 (0.303)
Predicted hourly wage (log)	1.413* (0.775)	1.617** (0.731)	0.421 (0.628)
Fathers' income per month (log)	−0.224*** (0.081)	0.513* (0.278)	0.043 (0.214)
Non-labor income per month (log)	−0.190*** (0.035)	−0.089 (0.066)	0.071 (0.046)
Age of the mother	0.278 (0.183)	0.330 (0.234)	
Age squared (×100)	−0.444 (0.288)	−0.426 (0.352)	
Number of children aged 0–3	−0.079 (0.166)	−0.208 (0.189)	0.704*** (0.103)
Presence of children aged 4–12	−0.070 (0.103)	−0.418*** (0.153)	0.084 (0.109)
Presence of children aged 13 or older	0.219 (0.748)	0.088 (0.512)	−0.193 (0.189)
Weekly hours worked by the father (log)		−0.304 (0.446)	0.346 (0.271)
Father works non-standard office hours		0.078 (0.208)	
Availability of network care	0.754*** (0.189)	−0.466* (0.274)	
Availability of formal care	0.203 (0.209)	0.656** (0.315)	0.630 (0.396)
Husband's employer contributes to childcare	0.437** (0.171)	0.276 (0.200)	
Worked between 1 and 24 h before first pregnancy	0.260 (0.316)		
Worked 25 h or more before first pregnancy	0.579** (0.284)		
Care for children by people other than the parents is OK	0.097 (0.080)	0.517*** (0.092)	−0.155 (0.107)
Intrinsic value of working	0.766*** (0.083)	0.032 (0.133)	0.063 (0.096)
Constant	−6.251* (3.719)	−12.547** (5.318)	−1.293 (2.495)
σ_h (hours)	0.693*** (0.097)		

Table 4 continued

	Labor force participation (Eq. 1)	Use of childcare (Eq. 2)	Log hours of childcare (Eq. 3)
Cross-equation correlations			
ρ_{ch} (hours, care)	−0.823 (0.408)		
ρ_{ph} (hours, participation)	0.097 (1.665)		
ρ_{pc} (participation, care)	0.035 (0.497)		
Number of observations	737		
LogLikelihood	−748.0		
Wald test of constant-only model for hours of childcare	67.1*** $\chi^2(11)$: $p = 0.000$		

Bootstrapped standard errors (1,000 replications) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 Alternative models for labor force participation, childcare use and number of hours of paid childcare

	Labor force participation (Eq. 1)	Use of childcare (Eq. 2)	Weekly hours of childcare (Eq. 3)
(a) Model without attitudes			
Predicted hourly costs (log)	−0.241 (0.356)	−0.126 (0.575)	0.315 (0.328)
Predicted hourly wage (log)	1.759*** (0.679)	1.509* (0.829)	0.433 (0.696)
Fathers' income per month (log)	−0.237*** (0.088)	0.572** (0.257)	−0.036 (0.238)
Non-labor income per month (log)	−0.180*** (0.032)	−0.045 (0.065)	0.058 (0.044)
LogLikelihood	−844.7		
(b) Model without attitudes but with social environment			
Predicted hourly costs (log)	−0.383 (0.376)	−0.148 (0.688)	0.114 (0.309)
Predicted hourly wage (log)	1.448* (0.740)	1.313 (0.901)	0.354 (0.631)
Fathers' income per month (log)	−0.270*** (0.098)	0.531** (0.260)	−0.059 (0.188)
Non-labor income per month (log)	−0.195*** (0.033)	−0.043 (0.076)	0.057 (0.046)
Social and environmental variables (LR-test of joint significance)[a]	40.9*** $p = 0.001$	23.1** $p = 0.026$	22.4** $p = 0.033$
LogLikelihood	−801.3		
(c) Model with predicted ("instrumented") attitudes			
Predicted hourly costs (log)	−0.073 (0.417)	0.236 (0.537)	0.127 (0.321)
Predicted hourly wage (log)	0.983 (0.784)	0.963 (0.836)	0.514 (0.603)
Fathers' income per month (log)	−0.196** (0.095)	0.466* (0.281)	0.019 (0.223)
Non-labor income per month (log)	−0.174*** (0.033)	−0.079 (0.067)	0.079 (0.050)
Predicted care for children by people other than the parents is OK	0.094 (0.408)	1.122** (0.469)	−0.486 (0.360)
Predicted intrinsic value of working	0.818*** (0.182)	−0.215 (0.285)	0.200 (0.197)
LogLikelihood	−825.3		

Bootstrapped standard errors (1,000 replications) in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Apart from the attitudes, the same variables as in Table 4 have been included. See the note to Table 4 for the estimation strategy

[a] $\chi^2(18)$

In the labor force participation equation (Table 4; Eq. 1) we see that the potential hourly wage positively affects the probability that the mother enters the labor market, while the other household income has a negative effect. This is in line with the conclusion of Maassen van den Brink and Groot (1997). Mothers who have better chances for a well-paid job are more likely to work, but when the other household income (non-labor income and the husband's income) is high it turns out to be easier for the mothers to decide to leave the labor force. The effect of the price per childcare hour is negative but insignificant, which is in line with other studies in the Netherlands (Maassen van den Brink 1994; Graafland 2000; Wetzels 2005). Also important for the participation decision is the availability of informal care: when grandparents or other relatives are available for childcare it is more likely that the mother will be active in the labor market. Availability of formal care does not influence the work decision. Neither the number of children aged 0–3 nor the presence of older children have an effect on the decision to work. Mothers who have a positive attitude towards working are more likely to be employed, while the attitude towards childcare is not significant.

Also for the decision to use paid childcare (Table 4; Eq. 2) we find that the mother's potential wage is important. The husband's income, despite a negative effect on the decision to participate in the labor market, is found to have a positive effect on the decision to use childcare. Income from other sources is not relevant for this decision. We find that the probability of using paid childcare is higher when formal (subsidized) care facilities are available while availability of network care reduces the use of paid care. The work effort of the husband is irrelevant for the decision to use childcare. The price of the care facilities is not significant, which is in contrast with the findings of Maassen van den Brink (1994), who found that a higher price reduces the probability to use childcare. When the mother agrees that leaving children under the care of others is acceptable, the likelihood of using paid childcare is increased. The attitude towards work appears irrelevant for the decision to use childcare.

In the explanation of the number of paid childcare hours (Table 4; Eq. 3), only the number of 0–3-year-old children is found to be significant.[9] The more 0–3-year-old children there are, the longer childcare is used for. The effect of the mother's potential hourly wage is not significant in the decision on the number of hours, and neither are the other household income and the price of paid childcare. Surprisingly, also the opinions related to work and childcare have no significant effect on the number of hours childcare is used for.[10] The results suggests that the need for care is a more important determinant than the financial situation.

[9] Dropping the variables describing the presence of older children from the equation gives a (weak) significant parameter estimate for the availability of formal care. The mother's labor supply is an endogenous decision variable and is therefore not included in the model. Experiments with labor supply as an endogenous explanatory variable, which implies the extension of the model with an equation for hours of labor supplied, do not change much in the outcomes for the other equations including the childcare hours, where the effect of the mother's labor is found to be weak and insignificant.

[10] We performed the analyses also with dichotomized factors and with categorical constructions. In some occasions we find significant effects of the opinion that care provided by others is okay on the participation decision (positive) and in the amount of hours equation (negative). The latter suggests that unpaid childcare (e.g. provided by the grandparents) is preferred over paid childcare.

The small and insignificant estimate of ρ_{pc} indicates that the sample of employed mothers does not decide differently about childcare than the non-working mothers would have done if they were employed. The role of unpaid childcare as an alternative for the paid services apparently enables the independence of the decisions. Also ρ_{ph} is small but ρ_{ch}, the correlation between the errors of the childcare use and the hours decision, is large, suggesting that—despite its insignificance—there might be unobserved factors such as religion or ethnicity (Joesch and Hiedemann 2002) that have opposite effects on the propensity to use childcare and on the amount of hours that are used. Also the role of the quality of the care, which could not be included in our model due to lack of information, may affect the estimations.

5.1 Endogeneity of attitudes and opinions

In order to determine whether the opinions of the mother are correctly treated as exogenous, we performed exploratory analyses estimating the three equations separately, instrumenting individual opinions by the mother's social environment and further by the level of education and the degree of urbanization. The test results indicate that the instruments are validly excluded from the other equations and do identify the attitudes.[11] Exogeneity is not rejected except for the decision on whether or not childcare is used; this suggests that childcare users justify their usage by reporting a more positive opinion than they have in reality. The instruments, however, are weak, but the final test suggests that the opinions are (directly or via the instrumental variables) relevant in the explanation of the choices at hand. Given the relatively small sample, the use of (asymptotically consistent) instrumental variable techniques may lead to imprecise estimates instead of reducing the potential biases caused by endogeneity (Wooldridge 2002, 101–105). Nonetheless, we cannot completely ignore endogeneity and hence we briefly discuss the three alternative approaches to deal with the opinions.

5.2 Sensitivity analysis

The results regarding price and income effects are similar to the results in Table 4 when the model is estimated without taking into account the potentially endogenous attitudes (Table 5, panel a) or when the habits in the social environment of the mother are included (panel b).[12] In the labor force participation decision, the mother's potential income (positive) and the husband's and the other household income (both negative) keep the same effect. In the childcare decision the positive effects of the own potential wage and of the husband's income, and the insignificance of income from other sources, are maintained. Irrespective of the way in which we deal with endogeneity, income variables do not contribute to the explanation of the amount of childcare hours used. In the specification with

[11] The test results are available from the authors upon request.

[12] Complete results and a more extensive discussion of the alternative models are available from the authors upon request.

predicted opinions (panel c), the effect of the mother's own potential wage looses significance, but the effects of income from other sources remains unchanged. The effect of the price of an hour of childcare remains insignificant in all equations and specifications. When looking at the loglikelihoods we find the lowest value in the model without opinions.

We can thus conclude that, in one way or the other, opinions are important in the explanation of participation and childcare use decisions. The qualitative effect of attitudes in the model with predicted opinions (Table 5, panel c) does not change compared with the findings when opinions are included directly (Table 4). The effect that mothers who find it acceptable to leave their children under the care of others are more likely to use paid childcare is strengthened when we control for endogeneity by using predicted opinions, which is in line with the finding that the endogeneity problem shows up only in the childcare use decision. The size and significance of the other effects hardly change due to the inclusion or exclusion of opinions. Exception are the enabling factors such as availability or external financing, which are found to be more important when it comes to the decisions on labor force participation and childcare use when individual opinions are not included. There is some correlation between opinions about childcare and its availability, but it is not clear if this occurs because availability is less widespread when the dominant opinion is that maternal childcare is better, or because mothers adapt their opinions to what is available so that, for example, less availability of childcare is associated with opinions that maternal childcare is better.

5.3 Discussion

The findings in this paper suggest that the attitudes and opinions of mothers are relevant determinants in the labor force participation decision and in the decision whether or not to use paid childcare. In the decision regarding the hours of care, the attitudes have no significant contribution. The price of childcare is not important in any of the decisions. Both non-labor income and the father's income make it easier for the mother to decide not to work, while only a higher income earned by the husband is used to pay for more childcare services. The mother's own income potential is found to be important for the decisions to enter the labor force and use childcare, but only if endogeneity is not reckoned with. This is caused by the endogeneity of the attitudes with respect to the decisions that are made, but it is also due to a correlation between the income potential and the opinions. For example, in general, mothers with a higher education level have a higher potential income and have more 'modern' opinions about work and childcare. In general, endogeneity is not a big problem; the results are rather robust for various specifications with or without opinions.

The results confirm the suggestion of Joesch and Hiedemann (2002) that attitudes and opinions are important factors when deciding on labor force participation and childcare use; however, in contrast with their results for the USA, we find no effect of the price of childcare in the Netherlands. The unimportance of the price of childcare can be due to the subsidies that households receive for formal childcare. The variation of the prices between households is small and the prices are therefore less important

when making decisions on childcare arrangements. This could explain why our findings for the decision to use paid childcare are in contrast with the findings of Maassen van den Brink (1994), who find that a higher price reduces the probability of using childcare. Since she performed her research, labor force participation among women has grown and the system of subsidies has changed with the intention to make childcare affordable for everybody who wants to use it, implying a strong increase in demand and a reduced relevance of prices. During the time our data were collected rationing has been relevant in the Netherlands and choices available to mothers who needed childcare services were limited. The large reductions in waiting lists increase the options and may imply that in the future the price of childcare may become more relevant in the decisions taken by the households.[13]

6 Conclusions

We have estimated models of labor force participation and use of paid childcare of mothers in the Netherlands, as well as the consumption of hours of paid childcare. We limited our estimations to two-parent households with at least one pre-school age child (up to and including children aged 3). The novelty of the paper is that, in addition to the economic information, we have used quite detailed information on mothers' attitudes and opinions towards work and childcare solutions. Further we have information on the social environment of the mother, which allowed us to acknowledge the potential endogeneity of attitudes in the decisions made.

When we include the attitudes directly as well as after instrumenting, we find that the mothers' attitudes are important determinants both for the decision regarding labor force participation and the decision regarding use of paid childcare. Especially the attitude towards work (the intrinsic value of work) has a positive effect on participation, while the opinion that leaving children under the care of people other than the parents is acceptable increases the likelihood to use paid childcare. For the decision regarding the hours of childcare service use, attitudes have no statistically significant contribution, both with and without controlling for endogeneity.

A robust finding is that the price of childcare does not have a significant impact on any of the decisions. Income variables have an impact, though. If the husband brings home a higher salary, the estimates indicate a higher probability that childcare is used. Both a higher non-labor income and income earned by the husband reduce the chance that the mother decides to participate in the labor market. We find no strong indications that income from these sources is used to consume more childcare services. The mother's own income potential has a (positive) significant effect in the decisions to participate in the labor force and use childcare when we directly include attitudes in the model; however, when we

[13] The strong increase in the use of formal childcare services during 2006 and 2007 is not only caused by a further reduction of the parental contribution by about 50% but also by a formalization of grandparents' care (CPB 2008). By officially paying them as *gastouders* (family day carers), a formal childcare regulation, care service provided by grandparents qualified for financial support. Furthermore, the continued attention and discussion about childcare in politics and in the news media may have resulted in a shift of opinions on work and childcare.

acknowledge the endogeneity of opinions, we find no influence of the mother's potential wage rate.

The results show the expected influences for most of the other variables: we find the availability of network childcare has a positive influence on labor participation, while it has a negative effect on the probability to use paid childcare. Availability of formal childcare services does not affect labor force participation, but it has a positive effect on the chance to use paid childcare. The number of children in the household has little effect on the decisions to work and use childcare, but is important for the number of hours the service is taken up for.

We conclude that the mother's attitudes towards labor and childcare are relevant factors when decisions are made. Availability of high-quality childcare for a reasonable price is important, but cannot eliminate the importance of the opinions on childcare. This suggest that one way of stimulating labor force participation and childcare use is to effect changes in mothers' attitudes and opinions on the quality of available childcare services and of the potential benefits for their children. This may be more effective than changing the available infrastructure and subsidy system.

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Appendix 1

Social environment

Table 6 lists the variables that describe social environment as included in alternative model b; as explanatory variables and used as instruments in model c (Table 5).

Appendix 2

Wage equation

A Mincerian wage equation (Mincer 1974) is estimated in order to calculate the potential hourly labor income,

$$\begin{aligned}\ln(\text{Wage}_i) = \gamma_0 + \gamma_1 \text{Schooling}_i + \gamma_2 \text{Experience}_i \\ + \gamma_3 \text{Experience Squared}_i + \gamma_4 \text{Other Char}_i + u_i.\end{aligned} \quad (4)$$

We have information on the acquired level of education, measured in four classes (primary or lower secondary, higher general secondary, higher professional secondary, tertiary). We construct a dummy for whether the woman was employed before her first pregnancy. Further we include age and age squared in the wage equation. Because the sample of observed incomes is an endogenous selection of all mothers, we estimate a model that accounts for this selectivity (Heckman 1979). The maximum likelihood estimates of the model are presented in Table 7. In line

Table 6 Descriptive statistics of the social environment variables, education, and urbanization

	Mean	Standard deviation
In my environment, it is common that mothers are working[a]	3.809	1.052
In my environment, it is common that formal childcare is used[a]	3.096	1.217
In my environment, it is common that informal childcare is used[a]	3.621	1.024
In my environment, it is common that fathers are working fulltime[a]	4.399	0.896
While I grew up it was emphasized that paid work was important[a]	2.533	1.137
My mother did not have a job[b]	0.627	0.484
My mother had a job since I went to school[b]	0.128	0.334
My mother has always had a job[b]	0.138	0.346
When my mother was working, my father cared for me[c]	0.056	0.229
When my mother was working, others (then my parents) cared for me[c]	0.057	0.232
My mother worked at home[c]	0.065	0.247
My mother worked during school-hours[c]	0.180	0.385
Education: higher general secondary[d]	0.092	0.290
Education: higher professional secondary[d]	0.440	0.497
Education: tertiary[d]	0.258	0.438
Degree of urbanization: low[d]	0.239	0.427
Degree of urbanization: moderate[d]	0.251	0.434
Degree of urbanization: high[d]	0.243	0.243
Degree of urbanization: very high[d]	0.083	0.083

[a] Five-point scale, ranging from strongly disagree (1) to strongly agree (5)

[b] Dummy (0/1) variables, reference category: mother worked sometimes/no information available

[c] Dummy (0/1) variables, only asked if mother replied to be working

[d] Dummy variables. Education and degree of urbanization are not used in the estimations for Table 5b, because these variables are important determinants of the potential wage and price. Including them takes away significance of the wage without making education significant

with the theory, we find that mothers with a higher level of education have higher wages. The mother's age has a parabolic effect on the wage, where the lowest wage level is found for mothers aged 29.6 years, while experience due to work before pregnancy has a small positive effect on the wage.

The results are used to calculate the potential hourly wage for all the mothers in the sample. In order to avoid severe multicollinearity with the potential hourly wage, we do not include the mothers' education in the further analysis.

Appendix 3

Costs of childcare

As an explanatory variable for the decision model we need the price that reflects the costs that are relevant for the households under consideration. Theoretically, one

Table 7 Wage equation with sample selection

	Mean[a]	Log hourly wage	Selection equation
Education: higher general secondary	0.092	0.056 (0.063)	0.030 (0.203)
Education: higher professional secondary	0.440	0.124*** (0.039)	0.234* (0.137)
Education: tertiary	0.258	0.246*** (0.040)	0.506*** (0.169)
Age of the mother	32.3 (4.4)	−0.105*** (0.040)	0.225* (0.135)
Age squared (×100)	10.6 (2.9)	0.177*** (0.060)	−0.295 (0.208)
Worked between 1 and 24 h before first pregnancy	0.156	0.193 (0.119)	0.656*** (0.211)
Worked 25 h or more before first pregnancy	0.746	0.219* (0.116)	1.085*** (0.182)
Number of children aged 0–3	1.23 (0.43)		−0.123 (0.128)
Presence of children aged 4–12	0.704		−0.242*** (0.069)
Presence of children aged 13 or older	0.015		−0.326 (0.470)
Weekly hours worked by the father	38.6		−0.003 (0.009)
Father works non-standard office hours	0.128		0.148 (0.168)
Other income (including fathers' wage) (log)	7.39 (0.64)		−0.514*** (0.175)
Availability of network care	0.858		0.829*** (0.156)
Availability of formal care	0.871		0.365** (0.157)
Husband's employer contributes in childcare costs	0.266		0.682*** (0.137)
Constant		3.473*** (0.661)	−1.946 (2.372)
ρ		−0.181 (0.134)	
σ		0.294*** (0.014)	
Number of observations		498	737
LogLikelihood		−467.0	
Wald test of constant-only model		78.8*** $\chi^2(7)$: $p = 0.000$	
LR test of independent equations ($\rho = 0$)		1.77 $\chi^2(1)$: $p = 0.184$	

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[a] For dummy variables. For other variables, in parentheses the standard deviation is added

Table 8 Childcare cost equation with sample selection

	Mean[a]	Price per hour of care	Use of childcare	Labor force participation
Fathers' and non-labor income per month (log)	7.39 (0.64)		0.625*** (0.234)	−0.515*** (0.161)
Fathers' and non-labor income per month (×1,000)	1.77 (0.60)	0.755 (0.750)		
Fathers' and non-labor income per month squared	3.49 (2.84)	−0.190 (0.170)		
Two or more children aged 0–3	0.229	−0.577** (0.239)	−0.002 (0.150)	−0.174 (0.133)
One child aged 4–12	0.369	−0.521** (0.211)	−0.421*** (0.146)	−0.176 (0.125)
Two or more children aged 4–12	0.147	−0.762 (0.511)	−0.781*** (0.268)	−0.612*** (0.160)
Presence of children aged 13 or older	0.015		0.136 (0.626)	−0.282 (0.480)
Degree of urbanization: low	0.239	0.221 (0.318)	−0.124 (0.187)	−0.207 (0.163)
Degree of urbanization: moderate	0.251	0.819*** (0.283)	−0.273 (0.190)	−0.081 (0.167)
Degree of urbanization: high	0.243	0.659** (0.297)	−0.221 (0.190)	−0.133 (0.169)
Degree of urbanization: very high	0.083	1.106** (0.440)	−0.447* (0.263)	−0.007 (0.243)
Childcare used: grandparents	0.316	0.139 (0.192)		
Childcare used: other relatives	0.088	1.231*** (0.373)		
Childcare used: informally paid sitter	0.085	1.656*** (0.385)		
Childcare used: childcare centre	0.190	2.218*** (0.354)		
Childcare used: family day care	0.027	1.911*** (0.403)		
Husband's employer contributes to childcare	0.266	−0.243 (0.236)	0.372** (0.155)	0.693*** (0.139)
Childcare arrangements by employer: yes	0.286	−0.430* (0.248)		
Childcare arrangements by employer: unknown	0.098	−0.380 (0.283)		
Age of the mother	32.3 (4.4)		0.178 (0.188)	0.239* (0.137)
Age squared (×100)	10.6 (2.9)		−0.176 (0.282)	−0.322 (0.210)
Education: higher general secondary	0.092		0.214 (0.254)	0.041 (0.207)
Education: higher professional secondary	0.440		0.084 (0.173)	0.231* (0.138)
Education: tertiary	0.258		0.591*** (0.212)	0.483*** (0.184)

Table 8 continued

	Mean[a]	Price per hour of care	Use of childcare	Labor force participation
Weekly hours worked by the father	38.6 (7.4)		−0.006 (0.009)	
Father works non-standard office hours	0.128		0.126 (0.183)	
Availability of network care	0.858		−0.532** (0.237)	0.776*** (0.156)
Availability of formal care	0.871		0.801*** (0.271)	0.329** (0.158)
Worked between 1 and 24 h before first pregnancy	0.156			0.645*** (0.221)
Worked 25 h or more before first pregnancy	0.746			1.110*** (0.184)
Constant		0.731 (0.810)	−8.290** (3.464)	−1.935 (2.393)
σ_{price}		0.338*** (0.072)		
Cross-equation correlations				
$\rho_{care,\ price}$		−0.334* (0.186)		
$\rho_{participation,\ price}$		0.058 (0.257)		
$\rho_{participation,\ price}$		−0.463 (0.291)		
Number of observations		737		
LogLikelihood		−1,037.0		
Wald test of constant-only model for price of childcare		108.6*** $\chi^2(17)$: $p = 0.000$		

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[a] For dummy variables. For other variables, in parentheses the standard deviation is added

would expect that the price of care depended on the quality of childcare. Quality indicators and regional differences could be good variables to construct (potential) hourly costs of the average-quality childcare arrangement in regional markets (Blau and Hagy 1998; Joesch and Hiedemann 2002). However, we have no information on these variables. We follow Connelly (1992) and Kimmel and Connelly (2007), who model the hourly expenditure on childcare as a function of the number of children in the family and the age structure of the children, controlling for the selection into the sample of childcare users. With maximum simulated likelihood we estimate a double selection model for the price of childcare, where the selection processes are the participation in the labor market and use of childcare (similar as in the main model),[14] using the type of paid childcare and the degree of urbanization as the very imperfect but only available quality indicators, along with the information on the children. Furthermore, we include the total other income (including the husband's wage) and the mother's education, as a proxy for her earnings capacity. Through the inclusion of income we account for the fact that in the prevailing subsidy system the prices paid by parents do not only depend on the number of children but also on the (before-tax) total household income (SZW 2003). Table 8 shows that in more urbanized regions the prices of childcare are higher, and that non-relatives get paid more than grandparents or other relatives. The prices for an informally paid sitter and professional care are similar, which is in line with Kok et al. (2005).

The results are used to calculate the predicted costs per hour of childcare for all the mothers in the sample. For the predictions we assume that formal childcare in a childcare centre is used, and that the employers of both mother and father contribute to the childcare costs. The childcare subsidy system implies that there is a correlation between the number of children and the income variables on the one hand and the constructed price on the other; in practice, however, the largest correlation between number of children aged 0–3 and log of childcare price, is −0.26, which is not extreme.

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[14] We need to add a selection into employment in the main model, as well as in the income and price models. This seems a little overdone, but in doing this we act in accordance with the literature.

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