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DOCUMENTO DE TRABAJO

Núm. V - 2010

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this version: September 2010

ABSTRACT

We analyze the participation and childcare decisions made by mothers in two-parent households with children aged 0-12 in the Netherlands, paying special attention to the role of attitudes regarding work and care. In a multinomial logit model we distinguish between not working, a small part-time job, and a larger job. For working mothers we consider no childcare, informal, and formal childcare. We account for potential endogeneity of attitudes. The results show that the role of the price of formal childcare in the decision-making process is negligible. A higher earnings capacity increases the take-up of larger jobs and formal childcare. Modern attitudes have a strong impact on the decisions to work and to use childcare.

Keywords: labor force participation, childcare use, attitudes about childcare, multinomial logit
JEL-Codes: J13, J22, C35, D13

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1. Introduction

Availability of childcare services is considered to be an important factor to increase women's labor force participation. Public policies aimed to achieve this objective generally focus on incentives generated by net wages and prices of childcare, as does the economic theory (Blau and Currie, 2004; Connelly, 1992; Ribar, 1995; Michalopoulos and Robins, 2000). An important prerequisite for such policies to be effective is that parents are sensitive to economic incentives. Parents must be willing to combine a job with the care for the children while leaving part of the care to other (professional or informal) caregivers. Monna and Gauthier (2008) argue that in decisions regarding the amount of time parents spend with their children, norms and values are important factors, next to socio-economic factors. Therefore, the role of attitudes and opinions regarding childcare should be taken into account in the modeling of the decision-making process (Hakim, 2000; Kremer, 2005). Our main hypothesis is that attitudes held by mothers regarding non-maternal childcare and working mothers are important factors when making decisions about care for children.

In addition to the incentives commonly used in the economics literature, that is, the mother's potential income, the other income in the household and the prices of formal childcare services (which highly depend on the prevailing subsidy system), in this paper we pay ample attention to the role of attitudes in decisions about work and childcare. The integration of socio-economic and psychological factors in one decision-making framework is rather novel in the literature. Joesch and Hiedemann (2002) hypothesize that external childcare is not acceptable for many parents but they do not have information to their avail to test this. An exception is Van Gameren and Ooms (2009), who show that individual attitudes and opinions regarding childcare and work are important factors in the labor force participation and childcare utilization decisions of mothers with pre-school age children. The paper at hand extends Van Gameren and Ooms (2009) by considering both pre-school and school-aged children, and by distinguishing the number of hours worked (part-time and full-time) and the chosen childcare mode (formal or informal).

The data in this paper are from a survey among mothers in the Netherlands with young children and contains information both on economic incentives and on attitudes held by the mothers. The mother's joint decision regarding labor force participation and childcare use is analyzed by means of a multinomial logit model, similar to *e.g.* Michalopoulos and Robins (2000), Powell (2002), Tekin (2007), and Borra and Palma (2009). We study which factors can explain the decision of mothers with children aged between 0 and 12 years to participate in the labor market, and, if they decide to participate, whether they accept a small part-time job or a large part-time or full-time job. For working mothers we analyze which childcare mode is chosen: only within-household care, informally organized external childcare, or a combination with formally organized and subsidized childcare. In the analysis the issue of endogeneity of the

attitudes is taken care of. Obviously we control for other individual and household characteristics such as the mother's age and the number of children.

Our main findings are that, in line with economic theory and the literature, the mother's earnings capacity and the general economic situation of the household are important factors in the mother's participation decision and in the use of non-maternal childcare. Inclusion of the attitudes as explanatory factors reduces the relevance of the income variables, and it appears that more positive attitudes towards childcare and work are crucial factors for participation and childcare use. In contrast with economic theory, but in line with the literature studying the Netherlands, childcare costs have a negligible effect.

The outline of the paper is as follows. The next section reviews of the recent literature, followed by a section that provides the theoretical background and defines more precisely the empirical strategy and the different choices that mothers can make. After the presentation of the data that are used, we continue with a section that discusses the endogeneity of the attitudes and presents the estimation results. The concluding section summarizes the main findings and gives some reflections.

2. Empirical literature

There is an extensive literature on labor force participation and childcare usage decisions. We work within the framework of the existing models, but emphasize that attitudes about work and childcare are an important aspect that is generally not included among the explanatory factors. Two main approaches can be observed in the literature, both derived within a utility-maximizing decision-making framework. One stream determines the optimal number of labor and childcare hours, accounting for endogenous selection into the observed sample in empirical applications. Connelly (1992) and Ribar (1995) are early examples of this approach, and also Van Gameren and Ooms (2009) fit in this line of research. The other stream models the mother's preferred alternative from a set of discrete combinations of work and childcare. It is more flexible in the sense that a wider variety of options can be considered without forcing them to be measured on a continuous scale. Also selection issues are avoided, because every mother is observed to make a choice. In this paper we opt for a discrete choice model, outlined in the next section.

We briefly discuss earlier research, with a focus on the literature that applies discrete choice processes. In addition to the literature focused on economic factors we review findings regarding attitudes, as it is our intention to disentangle the roles of income, childcare costs, and attitudes. A comprehensive review of the literature on childcare and labor decisions can be found in Blau and Currie (2004).

Economics research
A multinomial choice model that integrates the labor supply and childcare decisions is a frequently applied construction, but the precise definitions of the modeled alternatives differ. For

example, regarding employment, Tekin (2007) distinguishes between mothers who do not work, have a part-time job, or are in full-time employment. For working mothers he analyzes the childcare decision, distinguishing between unpaid childcare (including the mother's own care), paid but unsubsidized care, and subsidized paid care. Borra and Palma (2009) focus on the choice between five childcare modes (parents, relatives, sitter, daycare center, preschool care) without paying much attention to labor force participation. Michalopoulos and Robins (2000) consider 12 different choices, four childcare modes and three employment levels. Our choice set is similar to Tekin's (2007), but we separate within-household care from other (paid and unpaid) informal care.

The results in Tekin (2007) indicate that both a lower price for childcare and a higher (full-time) wage increase both the overall employment level and the use of paid childcare by single mothers in the USA. The price elasticity of full-time employment is estimated to be -0.139, while part-time employment is found to be less sensitive to the price of childcare (elasticity equal to -0.068), which gives an overall price elasticity of employment of -0.121. This estimate is in the same range as studies that use similar (multinomial choice) estimation methods for married mothers in the USA. For example Ribar (1995) found an elasticity of -0.09, and Michalopoulos and Robins (2000) report -0.156. Blau and Hagy (1998) and Blau and Robins (1988) find slightly higher elasticities of -0.20 and -0.38 respectively. The picture that emerges from these estimates and from the more exhaustive review in Blau and Currie (2004) is that the price elasticity is likely to be small.

The wage elasticity of employment is generally found to be larger than the price elasticity, and in general wages have a larger effect on full-time than part-time employment (Powell, 1998; Connelly and Kimmel, 2003). Tekin (2007) allows for different wage rates in part-time and full-time jobs, and finds that the full-time (hourly) wage has a much stronger effect on the employment decisions than the (hourly) wage that can be earned in a part-time job. Overall, the elasticity of (total) employment with respect to the full-time wage is 0.663, while it is 0.081 with respect to the part-time wage.

A meta-analysis by Evers et al. (2008) suggests that the wage elasticity of female labor supply in Western Europe is slightly higher than in the USA. On the other hand, the elasticity with respect to the price of childcare is often found to be (even) lower than in the USA. For France, Choné et al. (2003) report a price elasticity of hours worked equal to -0.02. Wrohlich (2004) reports price elasticity of hours worked for Germany between -0.04 and -0.09, which is corroborated in Wrohlich (2006) using a longer time-frame. Modeling preferences regarding labor supply and childcare in Norway, estimating the parameters of the utility function, Kornstad and Thoresen (2007) derive implied price elasticities of labor supply of -0.12 (participation) and -0.17 (hours worked). Their wage elasticities are 0.35 (participation) and 0.49 (hours). Lundin et al. (2008) show that in a market for childcare services where prices are already low (they use Swedish data), further price reductions have a negligible impact on female labor supply.

The price of childcare is generally found to have some effect on the demand for (paid/formal) childcare. Wrohlich (2006) finds an elasticity of -0.05 on the extensive margin and between -0.38 and -0.64 on the number of hours of childcare taken up. The range varies from a low of about -0.30 found for France (Choné *et al.* 2003) and the USA (Blau and Hagy, 1998), through values around -1.0 reported by Michalopoulos and Robins (2000) for the USA and Canada, up to elasticities as high as -2 for childcare centers and -4 for sitters in Canada (Powell, 2002). A strong price elasticity for daycare centers is reported also for Spain, while the cross-elasticity of the price of daycare for other kinds of childcare varies between +1.0 and +1.5 (Borra and Palma, 2009). Slightly lower own and cross-elasticities are reported for Australia (Doiron and Kalb, 2005), but also here it is established that other (unpaid, informal) childcare solutions are sought when the price of formal childcare is higher.

In summary, the literature suggests that potential income has an effect on the participation decision and the number of hours worked, while the effect of childcare costs on the labor decision is small. Costs mainly have an effect on the chosen childcare solution: higher costs for formal childcare induce a shift from formal to informal care solutions. In all these studies and reviews, the attention for preferences and attitudes regarding female participation and usage of childcare is at best small, and in most cases not present.

Importance of norms, values, and attitudes

In social sciences other than economics, the impact of norms, values and opinions on individual behavior is a much more common research topic, and often considered to be the driving force of decisions (Van Deth and Scarbrough, 1995; Pfau-Effinger, 1998; Hakim, 2000; Kremer, 2005). Monna and Gauthier (2008) review literature on socio-economic factors, and argue that also the parents' values, norms and ideologies are important in explanation of the time parents spend with their children. Evans and Kelley (2002) conclude that reservations about institutional day care for toddlers are mainly due to worries that the toddler receives insufficient affection in day care center and that there is no one-to-one relation with a teacher. More than half of the mothers (strongly) agree that toddlers 'really need the attention of a full-time mother', while the statement 'a pre-school child is likely to suffer if their mother works' receives more support than disagreement. People who consider institutional childcare as harmless more frequently approve day care and prefer longer work hours. On the other hand, 30% of all mothers prefer a part-time job and only a small minority (4%) of the Australian mothers prefers a full-time job (Evans and Kelley, 2002).

Fagnani (2002) argues that discrepancies between the desires to be in employment and the attitudes towards public (non-parental) childcare are the main cause for differences in fertility and employment rates between France and West-Germany, two countries with largely similar family policies. 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 it is among 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 they also state more frequently that they won't have a job as long as the child has not reached school age. Fagnani asserts that France has a much longer tradition of collective childcare then West Germany, which is reflected in the current opinions about the benefits of collective childcare compared to care by grandparents. More so than French mothers, German mothers feel that 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 take-up of childcare services. Kremer attributes the observed variation to differences in the ideals of care dominant in the various countries.

Joesch and Hiedemann (2002) link economic and psychological arguments and estimate that the effect of the price of childcare on the number of childcare hours is significantly negative but that the decision whether or not to use care is governed by different considerations. Their results suggest that 43% of the parents in the USA will never use childcare by non-relatives even when it is free of charge. They hypothesize – but cannot test – that non-relative care is unacceptable for many parents.

Research in the Netherlands
There are circumstances that make the situation in the Netherlands different from many other countries. Firstly, eligibility for subsidies is not an issue in the Netherlands, because the subsidies for formal care are available for all households. Paid but unsubsidized childcare in the Netherlands is informally arranged care, and most informal caregivers do not get paid at all. Secondly, due to the large availability of part-time jobs, the choice for within-household parental care along with a (small) part-time job is often made. In the Netherlands the structural differences between wages in part-time and full-time jobs are small because in essence every job can be done in part-time without repercussions for the hourly wage.

Graafland (2000) and Jongen (2010) calibrate applied general equilibrium models of the Dutch labor market and simulate the effects of changes in childcare subsidies on labor supply and formal childcare usage while maintaining overall budgetary restrictions. They conclude that the effect of subsidies on female labor supply is rather small. Higher subsidies stimulate the use of formal childcare, but for a large part the increase is due to replacement of informal care solutions by subsidized care. In a household production model, Maassen van den Brink and Groot (1997) estimate that the mother's wage elasticity of labor supply equals 0.45 while the fathers' income and non-labor household income have no significant effect on the mother's time allocation. The use of external childcare is not modeled, but they find that mothers of very young children usually spend less time on labor than mothers with older children. Groot and Maassen van den Brink (1992) conclude that the price elasticity of childcare is high in the decision to use childcare, but is much lower for the number of hours. The elasticity of the labor supply decision with respect to the childcare price is virtually zero. Maassen van den Brink (1994) states that the wage

elasticity of labor supply is much higher than the elasticity of labor supply with respect to the childcare price. Wetzels (2005) finds a large and strongly significant positive effect of predicted wage on labor force participation. The predicted price of childcare, however, is not significant (and with a counterintuitive positive sign). Wetzels argues that the childcare costs have an effect of substituting formal (expensive) care for informal (cheaper) care, but not on labor force participation.

Ooms *et al.* (2007) model the joint decision of labor force participation and the use of formal childcare by Dutch mothers, and pay attention to the role of the social environment in the decision-making process. Their main conclusions are that the mother's potential wage has a positive effect both on labor force participation and on the number of hours worked, while other household income has a negative effect. Similar effects are found for the use of formal childcare. The price of these services has no impact, neither on the labor choice nor on the childcare solution, but it is concluded that the opinions held in the mother's social environment are highly important. Also Van Dijk and Siegers (1996) find that modern norms of the husband and other network members have a positive effect on the labor supply of women with young children. Van Gameren and Ooms (2009) show that individual attitudes and opinions regarding childcare and work are important factors in the labor force participation and childcare utilization decisions of mothers with pre-school age children. However, they do not analyze variations in the number of hours worked by mothers nor in the type of childcare (formal or informal) that is used.

3. Analytical framework

Decisions by young mothers regarding labor force participation and use of childcare are presumed to be closely related. Discussions about policies aimed at stimulating female labor force participation therefore often contain a large chapter about childcare services. Childcare services are considered to be an important prerequisite for young mothers to remain active in the labor market. It is known that career interruptions and spells of part-time work at a young age are an important source of the worse labor market position of older women (Russo and Hassink, 2008; Albrecht *et al.*, 1999). Provision of subsidized childcare services can help to reduce the gap between men and women, but an increase in the availability or affordability of childcare will only lead to the desired effect if it really affects the mothers' choices.

Therefore, to predict the impact of public policies, it is highly relevant to have better insight in the factors that determine labor force participation and the use of childcare services. The literature review in the previous section reveals that childcare costs are often found to have small effects in participation decisions, while potentially important factors as attitudes are typically not considered concurrently.

Theoretical model

We start off from a utility maximization problem where the mother, the single decision-maker, derives utility from consumption (C), leisure or more generally, time spent at home (L) and child quality (Q) (Connelly, 1992; Ribar, 1995). This framework is extended with an explicit representation of the utility derived from hours cared by an unpaid or informal carer (H_{INF}) and with a direct effect of the choice (J) on the utility (Blau and Hagy, 1998; Tekin, 2007),

$$U = U(C, L, Q, H_{INF}, J; X_1, u_1),$$

where X_1 and u_1 are observed and unobserved determinants of preferences. The effect of the chosen solution J represents fixed utility costs of the choice, *e.g.* a disutility from using a formal childcare solution or being employed attributable to a negative stigma if the social environment disapproves working mothers. Child quality (Q) can be described by a production function,

$$Q = Q(L, H_{INF}, H_{FOR}, A; X_2, u_2),$$

and depends on the number of hours that the mother spends with the child (L), the hours cared by formal (H_{FOR}) and informal (H_{INF}) caregivers, and on the quality of the external care (A). Under the assumption that external childcare is only used during the mother's labor hours (H), and normalizing the total available time to one, the mother's time constraint can be written as

$$L + H = L + H_{INF} + H_{FOR} = 1.$$

The monetary budget constraint balances the total income from work (at an hourly wage W) and other sources (Y) unrelated to the mother's labor efforts, with the expenses on consumption (C) and formal childcare that is bought at a price per hour (P),

$$H W + Y = C + P H_{FOR}.$$

The costs of within-household and informal childcare are assumed to equal zero.

Attitudes are not explicitly represented in the model, but their relevance can be illustrated with several model variables. The quality of the external care (A) in the child quality production function is one of the factors where the attitudes can be brought in. First of all, quality of care is not unambiguously defined; measures such as the child-staff ratio, the educational level of the staff members or the facilities in the childcare center are inherently incomplete measures. Secondly, when deciding whether or not to bring a child to a childcare center, also the subjective impression or feeling about the quality of the care is relevant. Another variable where attitudes play a role is the direct disutility of the chosen care solution (J). Mothers who hold the attitude that childcare by others than themselves cannot be good for the child development will feel a larger disutility of the usage of external care than mothers who feel that interaction with other children in a childcare center contributes to a child's development. Further, mothers who live among people who believe that mothers of young children should not work will feel a disutility when they decide to work because that choice will be disapproved by their social environment. The third place where attitudes enter the model is via the preference shifters X_1 and u_1. It is likely that attitudes regarding childcare directly affect the preferences. Most often attitudes are unobservable, but we have data to our avail that contains information on these attitudes and we can therefore identify their role in the decision making process.

A growing attention for the role of attitudes can be observed among economists. Experimental research in laboratory settings has shown that psychological factors influence economic decisions (Rabin, 2002; Fehr and Falk, 2002). However, doubts about the meaning of survey questions that ask for attitudes or opinions remain, because the responses bear the risk that expressed opinions are influenced by the decisions taken. Acknowledging the claimed effects, it seems important to account for differences in attitudes when analyzing the effects of other aspects in the decisions regarding labor force participation and childcare use. Especially in the market for childcare services, one may expect that psychological factors can be decisive, since very few people will see their children purely as economic subjects.

Empirical model

For the labor force participation decision we make a distinction with regard to the number of hours worked instead of modeling it as yes-or-no decision, because the number of labor hours may be an important aspect for future career perspectives. We fold down the range of labor hours into three labor market states: non-working mothers, mothers with a small part-time job (1-16 hours), and mothers with a large part-time or a full-time job (see the data section for details). For employed mothers we analyze which childcare mode is chosen, differentiating between three modes (implying a total of seven alternative choices). The first state, work without external childcare, implies that in addition to the care provided by the mother the husband must provide a part of the care, or that the mother works only during school hours. The second category is typified by the use of informal care provided by grandparents, other relatives, friends or (paid or unpaid) informal sitters in addition to the parental care. The third alternative is to use formal childcare services. Formal (subsidized) childcare is provided by childcare centers and by sitters who work through a publicly certified agency (family day care). The government together with many employers pays a large part of the costs that households make for the use of formal childcare, while only a fraction is paid by the households themselves. Mothers who use both informal and formal childcare, for example because a grandmother cares for the children during some hours in addition to formal care, are included in the category of formal care users.

The decisions at hand are naturally modeled via a multinomial choice model (see *e.g.* Michalopoulos and Robins, 2000; Powell, 2002; Tekin, 2007; Borra and Palma, 2009), which is embedded in the utility-maximization framework outlined above. The utility V_{ij} that mother i gets if she decides for state j is given by:

$$V_{ij} = \beta'_{Xj} X_i + \beta_{Wj} W_i + \beta_{Pj} P_i + \beta'_{Aj} A_i + \varepsilon_{ij}, \qquad j=1, ..., 7, \qquad (1)$$

where W_i is the mother's hourly wage and P_i is the price of formal childcare. The attitudes are represented by the (vector) A_i, while X_i is the vector of other characteristics of mother (household) i, such as the mother's age, the number of children, and the father's income. These characteristics do not vary between the states.

Wages and childcare prices are only observed for working mothers and for users of formal childcare. For the empirical set-up we assume that the decisions with regard to work and

childcare are made while taking into consideration a potential hourly wage and a potential price per hour of formal childcare (see data section). We assume that the price of formal childcare P_i (varying between mothers) may affect the utility level of all alternatives j. This is plausible since a choice between childcare modes with different price levels will be made on the basis of a comparison of prices for formal and informal childcare. The price of informal childcare often equals zero, a large part of this type of childcare is given by grandparents or other relatives who generally remain unpaid; moreover, the variation in prices of paid informal sitters is large and does not have an obvious structure. Therefore we assume that the price of informal childcare is zero.[1]

Mother i will choose state j if this state gives the highest utility level, hence if $V_{ij} > V_{ik}$ for all other states $k \neq j$. The parameters that need to be estimated, for each state j, are the vector β_{Xj} along with β_{Wj}, β_{Pj} and β_{Aj}. Under the assumption that the error terms ε_{ij} are i.i.d. draws from a type 1 extreme value distribution we obtain the standard multinomial logit model where the probability Pr_{ij} that mother i chooses state j, i.e. the probability $\Pr(y_i = j) = \Pr(V_{ij} > V_{ik}$ for all $k \neq j)$, is given by

$$Pr_{ij} = \exp(\beta_{Xj}X_i + \beta_{Wj}W_i + \beta_{Pj}P_i + \beta_{Aj}A_i) / \{\textstyle\sum_{k=1}^{7} \exp(\beta_{Xk}X_i + \beta_{Wk}W_i + \beta_{Pk}P_i + \beta_{Ak}A_i)\}, \quad j = 1, ..., 7. \quad (2)$$

Identification requires that one alternative is used as the reference state (with its parameters β normalized to zero). We will use non-working mothers as the reference state.

4. Data

The data come from the survey '*Gebruik Kinderopvang*' (*Use of childcare*) organized by The Netherlands Institute of Social Research / SCP, which was held in March 2004 among women with children up to the age of 12, the age at which they finish primary education (Portegijs *et al.*, 2006). The survey was answered by 2003 mothers and contains information on working hours of both parents, childcare hours for different modes of care and prices paid for it, the net household income, mother's age and her level of education. Furthermore the survey contains a lot of questions on the mother's intentions and attitudes with respect to childcare and labor force participation. Because of the small number of single-parent households (about 6.5%) and because different factors may influence the choices made by single mothers, we focus on mothers in two-parent households. We thus have a sample of 1753 households, representative for the about 1.2 million two-parent households with children aged 0-12 in the Netherlands.

Table 1 gives an overview of the actual choices made by households, where we distinguish the seven states in which a household can be situated (as defined above). Almost one-third of the mothers are not employed, while about 30% have a job for 16 hours or less per week. The remaining 37% work at least 17 hours per week. Full-time working mothers are rare. Only

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[1] Tekin (2007) includes prices of all childcare modes, but only in their 'own' equation. We argue that a high price of formal care not only reduces the utility of formal care, but that we cannot rule out that it also has a direct positive effect on the utility of informal care.

3% of the mothers report a workweek of 36 or more hours (the group size would increase to 6.9% of all mothers if we reduce the threshold to 32 hours). Subdividing with respect to the chosen childcare solution results in very small groups that are nearly intractable by a multinomial choice model. Therefore we work with the categorization presented in table 1 and do not include full-time work as a separate state. The questionnaire asked only about childcare related to labor hours; hence for non-working mothers the childcare choice is not considered. We read from the table that 29.1% of the mothers do not use any external childcare. A smaller group of mothers (27.1%) exploit informal childcare solutions, while only 11.8% of all mothers with children aged between 0 and 12 use a formal solution (possibly in combination with informal care). This means that also among working mothers only a minority of 17.4% take advantage of subsidized childcare services.

Table 1 Observed choices of labor force participation and childcare solution

		%
1	mother is not employed	32.1
	mother works between 1 and 16 hours per week, and uses:	
2	no childcare	16.5
3	informal childcare	11.8
4	formal childcare	2.3
	mother works more than 17 hours per week, and uses:	
5	no childcare	12.6
6	informal childcare	15.3
7	formal childcare	9.5
	total	100% = 1753 obs.

Table 2 lists the explanatory variables that are used to estimate the multinomial logit model outlined in the previous section. We include all the commonly used individual and household characteristics. The average mother in the sample is 36.4 years old and has 0.5 children aged 0-3 and 1.3 children aged 4-12. We see that 42% of the households have one or more children aged 0-3, while in 80% at least one child in the primary school age (4-12 years) is present. In 22% of the households also older children are present. The average hourly wage earned by employed mothers equals 10.05 euro, while the other household income (which includes the father's labor earnings) is 1795 euro per month. The average number of hours worked by the father, 38 hours, essentially equals a full-time work week. The fathers' labor decision is taken as exogenous, given the fact that almost all fathers are observed to be in full-time employment. Informal 'network' childcare (care by the grandparents or other relatives) is available for about 80% of the households.[2] A variable that is not often available in empirical

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[2] Availability of a (paid or unpaid) informal sitter is not included as it highly depends on the effort put in finding one. The questions on the availability of formal services, which ask if providers are available within reasonable distance, are not used. About 90% of the mothers report that formal services are available in the vicinity. Nevertheless, a negative answer does not rule out the use of formal services, because the services will be available at a location that

research is the information about the mother's labor status before her first pregnancy, which may reveal something about her work preferences. Before the first pregnancy, 67% of the sampled mothers used to work at least 24 hours per week while 18% held a small part-time job.

Table 2 Descriptive statistics

	mean	st.dev.
age of the mother	36.4	5.8
number of children aged 0-3	0.52	0.67
number of children aged 4-12	1.27	0.89
presence of children aged 0-3[a]	0.422	0.494
presence of children aged 4-12[a]	0.795	0.404
presence of children aged 13 or older[a]	0.223	0.416
weekly hours worked by the mother	12.6	11.0
weekly hours worked by the partner	38.2	8.7
mother works non-standard office hours[a]	0.151	0.358
father works non-standard office hours[a]	0.129	0.335
hourly wage (for *working* mothers, in euro)	10.05	3.20
predicted hourly wage (for all mothers, in euro)	9.38	1.14
other income, including father's wage (euro per month)	1795	654
predicted out-of-pocket price per hour (for all mothers, in euro)	2.93	1.55
availability of network care (grandparents, other relatives)[a]	0.805	0.396
worked between 1 and 24 hours before first pregnancy[a]	0.177	0.382
worked 25 hours or more before first pregnancy[a]	0.671	0.470
father's employer contributes in childcare costs or services[a]	0.183	0.386

[a] Dummy variable

Hypothetical wages and prices

Wages are only observed for working mothers and prices paid for childcare are known only for users of formal childcare. For the empirical model we need a (potential) hourly wage and a (potential) price per hour of formal childcare for all mothers. We construct the hypothetical earnings capacity of each mother based on the relation between observed wages, the level of education and experience (see Appendix A). We assume that this potential wage is what mothers have in mind when deciding about work and care, instead of the (endogenous) observed wage. The predicted hypothetical wage is 9.38 euro per hour, thus slightly lower than the observed wages (table 2). The mothers with higher earnings potential apparently choose to work more often than mothers with lower earnings potential.

Formal childcare services are bought on a highly subsidized market where price variation between households is mainly driven by the subsidy system. For the construction of the hypothetical price of childcare we mimic the subsidy system and construct the out-of-pocket

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is not considered 'near'. We assume that both informal sitters and formal services are available for all parents; without this assumption we would have to restrict the choice set for mothers who say that informal or formal care is unavailable.

price per hour of formal childcare for each household (see Appendix B). The average predicted out-of-pocket price per hour of formal childcare equals 2.93 euro.

Identification of the multinomial logit model is guaranteed through the exclusion of the mother's level of education, one of the main wage predictors, from the model (similar to Connelly & Kimmel, 2003), thus avoiding perfect collinearity between the wage and its predictors. A collinearity problem does not arise for the childcare costs due to the highly nonlinear function of total household income and number of children that is used to construct hypothetical childcare prices.

Construction of attitudes

In the questionnaire mothers were asked to score their agreement or disagreement with 34 statements regarding the acceptability of childcare and working mothers. 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). The correlation between the statements is large, and it is not a priori clear which are the most relevant; therefore, we use factor analysis to summarize the information. Two sets of statements were analyzed, 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. In the multinomial logit model we include two constructed factors, one from each set of statements, as measures of the mothers' attitudes.[3] The first factor, *Care for children by others then the parents is OK*, is based on responses to statements about the acceptability to put a baby or toddler under the care of a professional sitter, a relative or an acquaintance, and on responses to questions about the importance of group playing for a child and the educational value of after-school care. The other factor measures the attitude 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', on a statement about the importance of being financially independent, and on statements regarding the necessity of a job for self-actualization, for contacts with others, and for playing an important role in society. The factors are normalized to have a mean 0 and a standard deviation 1. The higher the score on a factor, the more the responding mother agrees with the statements that define the factor.

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[3] For each set, two factors contribute substantially (more than 10%) to the explained variance (see Ooms *et al.*, 2007). 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 also consider the father's role important) are strongly correlated with the included factors and are not separately identifiable with the available instrumental variables.

5. Results

Endogeneity of attitudes

Answers to the survey questions regarding attitudes are suspected to be endogenously determined by the actually chosen alternative, resulting in bidirectional causality. An instrumental variable approach accounts for endogeneity. However, in a nonlinear setting such as the multinomial logit model, the application of instrumental variables is not straightforward. Mimicking the 2SLS model by replacing the endogenous variables by their predicted counterparts from the first stage gives inconsistent estimates (Terza *et al.*, 2008). A control function approach can be used when the endogenous explanatory variables are continuous (Imbens and Wooldridge, 2007; Terza *et al.*, 2008), which happens to be the case for the constructed attitude measures. Essentially the control function approach implies a two-stage procedure where in the first stage the endogenous attitudes are explained using all exogenous variables and a set of instrumental variables, similarly as in a 2SLS model. The residuals from the first stage are added as explanatory variables in the second stage in addition to the exogenous variables and the (endogenous) attitudes.

Good instruments are variables that have a strong relation with the endogenous variables (in our case, the attitudes) while not being affected by the model's dependent variable (the work-childcare choice). The set of instrumental variables that we propose contains information on the social environment of the mother; in particular on the prevailing habits in the mother's vicinity regarding working mothers and fathers. Also used is information on the work-history of the respondent's mother (see Appendix C). These variables are likely to influence the mother's attitudes while being 'given' for individual mothers: The social environment and the grandmother's behavior directly affect the attitudes of the interviewed mother. At the same time, the influence of an individual mother's choice on the habits in her social environment is small, and is non-existent with regard to decisions that the respondent's mother made during the respondent's childhood.

Tests reveal that the instruments have strong explanatory power for the attitudes. For the factor *Care for children by others then the parents is OK* the LR-statistic is 39.2 while for the *Intrinsic value of working* we find a value of 79.1 for the LR-statistic, which follows a $\chi^2(10)$ distribution in both cases and thus strongly rejects irrelevance of the instruments. The quality of the instruments is further analyzed in the framework of a series of binary probit models for each of the seven possible alternatives. In this framework we can perform formal overidentification tests, which check if exclusion of the instruments from the main equation is valid. For none of the alternatives the validity of the instruments is rejected; the highest value of the Amemiya-Lee-Newey minimum chi-square statistic, distributed $\chi^2(8)$, is 12.0, which gives a *p*-value of 0.153 and thus does not give reason to reject instrument validity. For most alternatives exogeneity of the attitudes is rejected, and therefore controlling for endogeneity is advisable.

Independence of irrelevant alternatives

An implicit assumption underlying the multinomial logit model is the independence of irrelevant alternatives (IIA), which dictates that the choice from a set of alternatives is not affected if non-chosen alternatives are made unavailable. The validity of this assumption can be tested by a Hausman test (Hausman and McFadden, 1984). Tests in the model presented in this section do not reject the null hypothesis that the choice between two alternatives is unaffected by the other choices, so we conclude that the IIA-assumption is supported by the data and that it is not necessary to use more complicated models such as a multinomial probit or a nested logit that do not impose this restriction. Further, a series of likelihood ratio tests is performed to see if alternatives can be combined. The tests indicate that there is no set of two alternatives that can be combined into one.

Estimation results

Table 3 presents the results of the multinomial logit model set up above, with the alternative 'mother does not work' as reference category. We see that a higher hourly out-of-pocket price of formal childcare has an insignifcant effect on all alternatives. An insignificant effect of childcare price on participation is in line with other studies in the Netherlands (Maassen van den Brink, 1994; Wetzels, 2005; Van Gameren and Ooms, 2009) while the counterintuitive positive (although insignificant) effect on the choice for a large part-time job combined with (in)formal care is also found by Wetzels (2005). Note that a large job with formal care does not imply a lot of childcare hours. With a large job it becomes easier to pay at least some hours of formal care, making it a more attractive option than a small part-time job combined with formal care, where a large negative (but still insignifcant) price effect is found. The higher the mother's hourly wage, the higher the probability that she is employed in a job with more labor hours, in line with economic theory and empirical research. A higher earnings potential stimulates to work more hours but does not imply that formal childcare services are used; however, it increases the probability of the alternatives with formal care more than the other choices. The effect of the other household income (which includes the partner's labor income) significantly stimulates the choice for a small part-time job with a formal childcare solution, and uniformly (although insignficantly) reduces the probability to work longer hours.

Despite the sometimes insignificant effects, we ease comparison with the literature by presenting the implied wage and price elasticities in table 4, both for the model with attitudes (*i.e.*, table 3) as well as for a model without attitudes.[4] In both cases the price elasticity of participation is small, similar to other research. The negative impact is slightly stronger for small part-time jobs, for which the total earnings are lower than for jobs with more hours and thus the same increase in the costs of childcare is conceived as a larger burden. The elasticity of labor force participation with respect to the hypothetical hourly wage is much larger than the price

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[4] The estimates of the multinomial logit model without attitudes are available upon request.

elasticity. The wage elasticity of 1.73 for the total participation rate is higher than the 0.5 that Evers *et al*. (2008) report for all women in the Netherlands. A higher elasticity for mothers with young children than for women in general may be due to the different consequences of the choice to participate. Accounting for attitudes results in a similar elasticity (0.40) as found for women in general. Without controlling for attitudes, a large increase of (formal) childcare is found when earning capacity increases, but only a fraction remains after we account for attitudes. The household's economic and financial situation appear of great importance for the mother's choice regarding labor force participation and childcare solutions, but the effects are much smaller after controlling for attitudes.

Overall, the attitudes are strongly significant, their inclusion improves the model's explanatory power (table 3; LR test of a model without attitudes: $\chi^2(12)=84.3$, $p=0.000$). Agreement with the attitude that care for children by others then the parents is alright unequivocally increases the probability that the mother is employed. These mothers are more likely to use external (informal or formal) childcare services, mainly with a small part-time job. Mothers who have a positive attitude towards working are indeed more likely to be employed, and are more likely to accept a job with longer hours. The stronger effects are found for the alternatives with external (formal or informal) care. The estimates suggest that the effect of a 'modernization' of the attitudes held by mothers, represented by more agreement with the constructs included in the analysis, will have a larger impact on choices regarding participation and childcare than a further increase in the subsidies for childcare.

Positive effects on all alternatives are found from employment before the first pregnancy, implying that mothers with an initially stronger attachment to the labor market are more likely to have a job after child-birth. However, the effect on the alternatives with formal childcare is small and insignificant, both for mothers who used to work in a small part-time job or in a larger job, while strongly significant positive effects on informal care solutions are found. The household composition is relevant; the more children aged 0-3 there are, the smaller the probability that the mother is working. With very young children the preferred choice seems to be the withdrawal from the labor market. The negative effect is significant only for the choices without external care; it is difficult to combine work with the care for babies and toddlers when there is no additional support. For children aged 4-12 it is easier to combine work and care without additional support because these children spent a large part of the day in school. Availability of network care, *i.e.* grandparents or other relatives, increases the probability that the mother is working, primarily with an informal childcare solution.

Table 3 Determinants of labor force participation and childcare use

	part-time, no care		part-time, informal		part-time, formal		full-time, no care		full-time, informal		full-time, formal	
predicted hourly costs (log)	-0.235	(0.415)	0.020	(0.590)	-1.469	(1.221)	-0.019	(0.461)	0.178	(0.614)	0.424	(0.532)
predicted hourly wage (log)	-0.014	(1.213)	-1.051	(1.364)	1.824	(2.790)	2.588*	(1.429)	2.770*	(1.471)	4.069**	(1.822)
other monthly income (including fathers' wage) (log)	-0.376	(0.564)	-0.553	(0.853)	2.629*	(1.583)	-0.788	(0.633)	-0.729	(0.867)	-0.456	(0.682)
number of children aged 0-3	-0.642**	(0.257)	-0.170	(0.289)	-0.701	(0.608)	-1.062***	(0.351)	-0.375	(0.299)	0.102	(0.336)
number of children aged 4-12	0.349*	(0.185)	0.411*	(0.233)	-0.540	(0.528)	-0.005	(0.215)	0.064	(0.239)	-0.346	(0.279)
presence of children aged 13 or older	0.641***	(0.236)	0.139	(0.368)	-0.043	(13.255)	0.641**	(0.286)	0.095	(0.343)	-1.449	(5.789)
age of the mother	0.001	(0.154)	-0.050	(0.194)	0.950**	(0.479)	0.396**	(0.197)	0.220	(0.178)	0.795***	(0.287)
age squared (x100)	-0.023	(0.202)	-0.071	(0.273)	-1.543**	(0.696)	-0.555**	(0.255)	-0.405*	(0.243)	-1.187***	(0.399)
worked between 1 and 24 hrs before first pregnancy	0.826***	(0.291)	1.947***	(0.554)	0.005	(7.009)	0.020	(0.384)	0.935**	(0.404)	0.274	(1.367)
worked 25 hrs or more before first pregnancy	0.449	(0.317)	1.549***	(0.566)	0.125	(6.335)	0.251	(0.362)	0.846**	(0.402)	0.486	(1.340)
weekly hours worked by the father	-0.057	(0.273)	0.871**	(0.424)	2.203	(1.527)	-0.640**	(0.266)	0.250	(0.410)	-0.049	(0.520)
father works non-standard office hours	0.076	(0.273)	-0.048	(0.314)	0.276	(3.916)	0.171	(0.290)	0.177	(0.290)	-0.430	(0.452)
availability of network care	0.068	(0.225)	1.639	(2.532)	-0.196	(1.113)	0.001	(0.289)	1.788*	(0.922)	-0.524	(0.405)
father's employer contributes in childcare costs	-0.903***	(0.338)	-0.553	(0.381)	0.930	(0.579)	-0.279	(0.391)	0.203	(0.336)	0.552	(0.422)
care for children by others then the parents is OK	1.222	(0.789)	1.639*	(0.911)	3.509**	(1.598)	1.066	(0.987)	0.905	(0.895)	1.894	(1.172)
intrinsic value of working	0.789	(0.545)	2.402***	(0.673)	2.119**	(0.997)	1.964***	(0.713)	3.169***	(0.638)	4.081***	(0.777)
Constant	2.463	(5.669)	1.529	(7.636)	-46.678**	(18.609)	-5.130	(6.404)	-7.370	(8.368)	-20.651	(8.040)

#observations	1753	
LogLikelihood	-2282.2	
Wald-test of constant-only model	822.1***	χ^2(108): p=0.000
Wald-test of attitudes and opinions	84.3***	χ^2(12): p=0.000
Wald-test of control function (exogeneity test)	33.9***	χ^2(12): p=0.001
pseudo-R^2	0.265	

Multinomial logit model, reference category: not employed. Bootstrapped standard errors in parentheses (500 replications, resampling with replacement, confidence intervals based on normal approximation). The residuals from the first stage regressions of the opinion measures are not listed apart from the Wald-test of their significance.
* p<0.10, ** p<0.05, *** p<0.01

Table 4 Elasticities of employment and childcare solutions

	model without attitudes			model with attitudes (table 3)		
	price of formal care	earnings capacity	other income	price of formal care	earnings capacity	other income
employment						
small part-time job (1-16 hours)	-0.204	-0.654	0.082	-0.146	-1.067	-0.023
large part-time or full-time job (17+ hours)	0.010	3.816	-0.372	0.134	2.049	-0.379
participation (overall)	-0.090	1.725	-0.159	-0.014	0.396	-0.190
childcare solution						
informal childcare	-0.024	2.533	-0.301	0.134	0.316	-0.295
formal childcare	-0.158	6.679	0.486	0.045	2.849	0.560
external childcare (overall)	-0.047	3.243	-0.166	0.125	0.583	-0.205

6. Conclusions

In a multinomial choice framework we have analyzed the determinants of the joint labor force participation and childcare use decision by mothers with one or more children aged between 0 and 12 in the Netherlands. Three labor market states are distinguished: non-working, working in a small part-time job, and working in a large part-time or full-time job. Full-time working mothers are rare and therefore not included as a separate category. For working mothers three childcare solutions are considered: within-household care by the parents, informal childcare by grandparents, relatives, friends or informal sitters, and formal (subsidized) childcare. In addition to the explanatory factors that are commonly included in similar models, we could benefit from quite detailed information about the mother's attitudes towards work and childcare. The focus of the paper is on the role of individually-held attitudes in the decision-making process. Their potential endogeneity is acknowledged through an instrumental variable procedure using information on the mother's social environment.

The inclusion of attitudes on childcare and work has a notable impact on the estimated income effects. The results show that, whether or not including the attitudes in the model, the mother's earnings capacity is relevant in the explanation of the observed decisions, as is, to a lesser extent, the general economic situation of the household. However, although the positive effects of the mother's earnings capacity on participation and childcare use appear large when we do not take into account the attitudes, they are much smaller when we control for them. Especially the effect on the use of formal childcare changes a lot. In contrast with economic theory, the price of formal childcare has a negligible effect on the decisions. The finding that the (potential) wage and other sources of income are more important than the price of childcare is in line with national and international research. The attitudes themselves are strongly significant, confirming the suggestion by Joesch and Hiedemann (2002) that attitudes are decisive factors in mother's labor force participation and childcare usage decisions.

Stimulation of the use of formal childcare services is a standing policy in the Netherlands, with the ultimate goal to maintain the attachment to the labor market of young mothers and let them use their economic capacities and qualities in a beneficial way, avoiding career interruptions with potentially long-lasting negative effects. Our results imply that the effects of economic incentives can be expected to be small if they are not supported by a change in the attitudes regarding childcare and the work attitudes. This finding is in line with a longitudinal analysis of Bosch *et al.* (2010) who conclude that the decision to work part-time is not very sensitive for tax incentives but more depends on (societal) preferences.[5] Of course the absence of a price effect does not mean that Dutch mothers are completely insensitive to the price of childcare, but it indicates that in the prevailing system of market prices and subsidies the price cannot explain the (non-) use of formal care. Under a different, less generous subsidy system, Maassen van den Brink (1994) found a price effect as predicted by economic theory. Since then, female labor force participation has increased and subsidies have been introduced with the intent to guarantee access to affordable childcare services. Over the years, the availability of professional childcare services has improved, and probably the continued attention and discussion about childcare in politics and in the news media has resulted in a shift of opinions on work and childcare (Jongen, 2010). Recent research in the Netherlands and other countries with accessible childcare often finds zero or negligible price effects. A limitation of our analysis is that the data do not provide objective quality measures of the childcare services. A review in Jongen (2010) shows that quality indicators in the Netherlands score good internationally, although there are signals that attention is required to maintain quality standards (Vermeer *et al.*, 2008). The scarce research in the Netherlands does not find significant positive or negative effects of extensive non-maternal childcare for the children's development (Van IJzendoorn *et al.*, 2004). Taken together, these findings suggest that objective quality differences between childcare centers are small and are not likely to be the main issue for decisions. Furthermore, objective differences will reflect in mothers' subjective opinions about quality.

It appears that availability of childcare at an affordable price has been achieved, but has not eliminated the importance of the attitudes regarding childcare and work for the decisions. Mother's preferences for leisure and maternal care for their children are important factors. Building a more positive attitude toward childcare and work seems to be of larger importance nowadays than pure economic factors. Modernization of attitudes regarding labor force participation and childcare services, in particular convincing mothers of the quality of available childcare services and of the potential benefits for their children, is of ultimate importance for the stimulation of labor force participation of mothers with young children. In the setting of the

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[5] The strong increase in the use of formal childcare services in 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 (Jongen, 2010). By officially paying them as 'family day carers', a formal childcare regulation, grandparents qualified for financial support.

Netherlands, policies aimed at attitudes may have a larger impact on participation and childcare usage than investments in infrastructure and higher subsidies.

Appendix A. Wage equation

Following Connelly (1992), Tekin (2007), and many others, a Mincerian wage equation explaining log wage by attained education and work experience is estimated in order to calculate the mothers' potential hourly labor income. Education is measured in four classes (primary or lower secondary, higher general secondary, higher professional secondary, tertiary). Work experience is proxied by age and age squared, because we have no information on the time spent outside the labor market. We include information on whether the woman was employed before her first pregnancy. Because the sample of observed incomes is an endogenous selection of all mothers, we estimate a model that accounts for this selectivity (table A1). We identify the selection by information on the number of children, the father's labor decision, and childcare availability, information that does not have a direct effect on the mother's earnings capacity. In line with the theory, we find that mothers with a higher level of education have higher wages. Age has a parabolic but insignificant effect on the wage, while experience obtained with work before pregnancy has a positive effect on the wage. The results are used to calculate the potential hourly wage for all the mothers in the sample.

Table A1 Wage equation with sample selection

	log hourly wage		selection equation	
education: higher general secondary	0.071**	(0.034)	0.088	(0.118)
education: higher professional secondary	0.117***	(0.024)	0.390***	(0.080)
education: tertiary	0.277***	(0.027)	0.688***	(0.107)
age of the mother	-0.017	(0.017)	0.178***	(0.058)
age squared (x100)	0.031	(0.023)	-0.225***	(0.079)
worked between 1 and 24 hours before first pregnancy[a]	0.087**	(0.042)	0.675***	(0.113)
worked 25 hours or more before first pregnancy[a]	0.144***	(0.038)	0.832***	(0.094)
other income (including fathers' wage) (log)			-0.363***	(0.103)
number of children aged 0-3			-0.276***	(0.070)
presence of children aged 4-12			-0.198***	(0.047)
presence of children aged 13 or older			0.040	(0.103)
weekly hours worked by the father			-0.008*	(0.004)
father works non-standard office hours			0.101	(0.101)
availability of network care			0.566***	(0.086)
father's employer contributes in childcare costs			0.523***	(0.099)
Constant	2.200***	(0.305)	-1.039	(1.231)
ρ	0.030	(0.089)		
#observations	1191		1753	
LogLikelihood	-1220.3			
Wald test of constant-only model	154.04***	$\chi^2(7)$: p=0.000		
Wald test of independent equations (ρ=0)	0.12	$\chi^2(1)$: p=0.733		

Heteroskedasticity-corrected standard errors in parentheses;* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Appendix B. Costs of childcare

The (publicly certified but privately owned and run) childcare providers charge a market price, but competition in this market is limited (Kok *et al.*, 2005) and price variation between households is mainly driven by the subsidy system. Total costs are partly paid by the parents while the employer(s) and the government pay the major part. The parental contribution is a percentage of total costs, found in the *adviestabel*, a table composed by the Ministry of Social Affairs and Employment (SZW, 2003). It depends on the before-tax household income (the higher the income, the higher the out-of-pocket contribution), and on the number of children that attend childcare services (the out-of-pocket contribution for the first child is much higher than the contribution for the other children). We approximate the official table by a simpler formula, and use that to simulate the households' hypothetical price of an hour of childcare.[6]

The before-tax household income is derived from a hypothetical net monthly household income. To guarantee that the childcare costs do not depend on the mother's actual labor choice, we construct the monthly net household income as the sum of the observed father's labor and other household income, and the income the mother would have if she would work 16 hours per week (on the edge between a small and a large part-time job) and gets paid her potential hourly wage (see Appendix A). Together with the observed number of children, this determines the household's percentage out-of-pocket contribution in the total childcare costs.

The parental contribution is translated into a price per hour of childcare. We use the median price per hour of childcare, which is slightly higher for school-aged children than for babies and toddlers, 5.52 vs. 5.24 euro per hour (Deloitte, 2004). We account for the fact that for a child aged 0-3 the number of hours of formal childcare is about 2.5 times higher than for a child aged 4-12, because the latter spend a large part of the day in school (Kok *et al.*, 2005; Jongen, 2010).[7] The total (hypothetical) costs for a household are obtained by multiplication of the number of children in each age group with the number of hours per child, the price per hour, and the percentages (for first resp. later children) from the *adviestabel*. Division of thus obtained total costs by the total number of childcare hours gives the hypothetical out-of-pocket price per hour of childcare that parents are faced with. The average of the hence calculated hypothetical price is in line with the parental contributions as reported in Kok *et al.* (2005) and the observations in our data.

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[6] The (percentage) out-of-pocket contribution for the first child in childcare of a household with a monthly taxable income y (x 1000 euro) is approximated by $oopc^1 = -10.51 + 11.42\,y + 1.245\,y^2 - 0.129\,y^3$ if $1.271 \leq y \leq 4.771$. The minimum contribution is $oopc^1 = 5$ if $y < 1.271$, and the maximum, $oopc^1 = 59.5$, is charged if $y > 4.771$. For households with more than one child in childcare, the minimum contribution for the other children is the same as for the first child ($oopc^2 = 5$ if $y < 1.271$), but the contributions for the other children are much lower at higher income level: $oopc^2 = 5.7$ if $1.271 \leq y \leq 2.264$, $oopc^2 = -2.050 + 2.417\,y + 0.662\,y^2 - 0.0653\,y^3$ if $2.264 < y \leq 4.771$, and $oopc^2 = 17.9$ if $y > 4.771$.

[7] The estimation results are rather insensitive for the assumption regarding the mother's labor hours and the difference in average number of hours of childcare for pre-school and school-aged children. An additional correction of the prices, accounting for the fact that most childcare centers charge per (half) day even if the client does not use all hours, has no consequences at all for the estimated (log) price effects but gives only a small change in the estimate of the constant term.

Appendix C. Social environment

Table A2 list the variables that describe the social environment used as instrumental variables.

Table A2 Descriptive statistics of the social environment variables

	mean	standard deviation
in my environment, it is common that mothers are working[q]	3.799	0.997
in my environment, it is common that fathers are working fulltime[q]	4.409	0.873
my mother did not have a job[b]	0.653	0.476
my mother had a job since I went to school[b]	0.114	0.317
my mother has always had a job[b]	0.132	0.338
when my mother was working, my father cared for me[c]	0.048	0.214
when my mother was working, older brothers/sisters cared for me[c]	0.012	0.109
when my mother was working, other relatives or sitters cared for me[c]	0.042	0.200
my mother worked at home[c]	0.069	0.254
my mother worked during school-hours[c]	0.165	0.371

[a] Five-point scale, ranging from strongly disagree (1) to strongly agree (5)
[b] Dummy variables, reference category: mother worked sometimes/no information available
[c] Dummy variables, only asked if mother replied to be working

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