

Women, work and whining children; the 2005 childcare reform and its indirect effect on female labor force participation in the Netherlands.

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## 1. Introduction

In the Netherlands, recently the discussion about childcare subsidies revived. As the economy slowly recovers from the financial crisis, the Dutch government needs to cut public expenditure to restore government finances. Childcare regulation is one of the fields in which the government tries to save money. Only a few years ago, in 2005, Dutch authorities intensified childcare regulations by introducing the new Childcare Act. This Act aimed at sharing costs of childcare between parents, the employers of parents and the government, and simultaneously regulated the quality of the care.

Childcare became a hot issue around 1990, when female labor force participation increased heavily in the Netherlands. This increase is especially due to the employment growth of mothers with young children, which put pressure on childcare capacity (Wetzels, 2005). But do changes in childcare regulations affect female labor force participation? To examine this question, the impact of the new Childcare Act of 2005 is evaluated. According to Jongen (2010), the share of childcare costs borne by parents dropped from 37 percent on average in 2005 to 19 percent in 2007. The results of Jongsma (2006), reporting for the Ministry of Social Affairs, indicate that for low-income households the costs of formal childcare decreased due to the act, while for high-income households the costs increased. As more households fall in a low-income group than in a high-income group, on average the costs for parents decreased. This is expected to increase female labor force participation because it lowers the indirect costs of working.

The Netherlands is world champion in part-time work, and not only for women. The number of fathers having a daddy-day with the children is increasing, but men still work much more than women. In 2009, 36.7 percent of total Dutch employment is part-time, a large part compared to the OECD average of 16.2 percent. The labor force participation of women in the Netherlands is high in comparison with other countries: 74.2 percent of all women aged 15 till 64, while the OECD average is only 63.2 percent. But of all employed females, only a tight 30 percent works more than 35 hours a week. Among Dutch men, the participation rate is 81.3 percent, and more than 80 percent of employed males works more than 35 hours per week in 2009. Surprisingly, the percentage of mothers participating in the labor market is higher than the percentage for women in general, namely 79.4 percent in 2009. But mothers

work fewer hours than other women, 62.7 percent works 12 till 28 hours per week and only 15.5 percent works more than 35 hours (Statistics Netherlands<sup>1</sup>, OECD).

An explanation for these figures could probably be found in social norms and values. Evidence for the influence of social norms on labor force participation can for instance be found in Van der Lippe and Siegers (1994). In the Netherlands, among both men and women the preference exists that men should combine fatherhood with fulltime work, while mothers should work part-time. Also, more women than men think that women should stop working temporarily when children are young (Beets, Esveldt and Van Nimwegen, 2003). How this relates to beliefs in other countries is not known, but it could be possible that Dutch norms are more traditional, or that Dutch people are more sensitive to what other people are thinking than residents of other countries.

Female labor force participation is an important issue for several reasons. In the Netherlands, especially the aging society asks for a large workforce to limit negative effects on public finance and material living standards. But female participation also supports gender equity and can reduce poverty. Jeaumotte (2003) argues that many women prefer to work more than they actually do, which means that a higher female participation could increase welfare. In the Netherlands in 2009, almost 10 percent of employed females wanted to work more hours than they actually did (Statistics Netherlands).

The figures indicate that still enough room exists for increasing Dutch female labor force participation. The question is whether this is affected by childcare regulations. This effect is studied in some other countries, like the USA, Canada, Sweden and the UK. Whether these results hold for the Netherlands is questionable, keeping in mind the unusual numbers for labor force participation and working hours.

In this paper the impact of the Childcare Act of January 1, 2005, on the labor force participation of women is evaluated by using a linear regression model, which compares female participation in 2004 and 2006. Data from the DNB<sup>2</sup> Household Survey available at CentERdata are used, which is a dataset that captures various economical and psychological characteristics of its panel members. The estimation sample consists of women in 2004 and 2006, aged 20 to 55, not being the main wage earner of the household and not being a child living at home or a housemate. The panel data are treated as a cross-section. By controlling

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<sup>1</sup> Figures are from StatLine, the electronic databank of Statistics Netherlands (CBS).

<sup>2</sup> The DNB, 'De Nederlandsche Bank', is the Dutch Central Bank.

for other variables that may influence employment status, such as age, working experience, education, partner's income, presence of children etc., the true effect of the policy change is expected to be measured. The reform should have its effect on women with children in 2006, so an interaction term between a year indicator and a child indicator represents the reform effect. Although the sign is positive as was expected, the variable is not significant. There has been a search for heterogeneous effects for different income groups as well. The sign of the reform variable is positive for a low-income subsample and negative for a high-income subsample, but the variables turn out not to be significant. The difference between coefficients is also not significant.

The paper is structured as follows. Section 2 starts with a review of the most relevant studies in the field of childcare regulation and female labor force participation. Section 3 gives some more information about the childcare reform and its theoretical effects. Section 4 describes the data that are used for the empirical research, and section 5 provides the results. Section 6 concludes.

## 2. Literature review

A lot of research has been done in the field of childcare programs and its effect on female labor force participation. This section provides an overview of the most important articles.

In the pioneering US study of Heckman (1974), the effects of work-related childcare programs on women's work effort are examined for the first time. He uses theory of indifference curves to answer certain policy questions; by estimating the marginal rate of substitution between leisure and wage income and comparing this with the market wage a woman can earn, he finds whether a woman decides to work or not. The marginal rate of substitution is determined by the price per unit quality of childcare, the no-work level of income or consumption, the hours of work and a vector of constraints, including the presence of children of different ages and the availability of low-cost sources of childcare like older children or a relative living in the household. Heckman uses data from the National Longitudinal Survey, wave 1966 for women aged 30 to 44. By applying maximum-likelihood estimation, he finds that the marginal rate of substitution increases with the quality-adjusted price of childcare, exogenous income and hours of work. The presence of children also raises the marginal rate of substitution, with children aged 0-3 having the largest effect. These factors, by increasing the slope of a woman's indifference curve, tend to lower her work effort. Heckman also estimates a model for the quality-adjusted price of childcare. He finds that older children or relatives living in the household, and length of residence in the community have negative effects on the price paid, while husband's hours of work per week is not significant.

After Heckman (1974), the importance of the subject became clearer as female labor force participation was increasing, and a whole lot of economists started to do research in the field of female labor force participation and its determinants. Rachel Connelly (1992) examines the effect of child care costs on the probability that married women with children will participate in the labor market, using a tobit specification for the costs of childcare and a structural probit model of labor force participation. Most theories about the labor force participation decision in later papers are based on Connelly's theoretical model; a mother with young children maximizes her utility over market goods (or total income), child quality and leisure, subject to a child quality production function, a money budget constraint, the mother's time constraint and the child's time constraint. For the empirical part she uses the 1984 Survey of Income and

Program Participation data (SIPP). A significant negative effect of the costs of childcare on the probability of labor force participation is found. Controlling for these costs, the presence of children aged 0-2 has no significant effect on participation; whereas children aged 3-5 have a significant positive effect. Sensitivity analysis shows that if universal childcare were available at zero-costs, 68.7% of all women would be employed instead of 56.5% in the sample. This corresponds to an elasticity of the probability of participation due to a change in average cost of childcare of -0.20.

Blau and Robins (1988) developed a model of family labor supply incorporating both formal and informal childcare. Their theoretical framework is basically the same as Connelly's, except for the introduction of an 'other potential childcare provider' in the household next to the mother. They identify five solutions in which the mother works or not, the 'other' works or not, one or both of them provide childcare or childcare is bought in the market. Using data of the Employment Opportunity Pilot Projects (1980), multinomial logit is used to estimate the state choice model. They find a negative effect of childcare costs on the probability that a state is chosen in which the mother works, and even stronger for the states in which market care is used. Given that the mother is working and some market care is used, childcare costs have a negative effect on the probability that the 'other' works. The mother's wage increases the probability she works and the probability that she uses purchased care. Blau and Robins also estimate a price elasticity of employment over a range of childcare costs, which they find to be -0.38. The price elasticity of purchased care with respect to childcare costs is about -0.34.

Ribar (1992), using the same dataset as Connelly (1992) empirically analyzes family demands for market and non-market childcare, and the impact of these demands on married women's labor supply. The underlying theoretical model is the same, and is supported by the results of the estimated three equations; a probit equation for the labor force participation and tobit equations for the demands for formal and informal childcare. The results indicate that nonmarket care is an inferior good unlike market care, because indirect costs and income have a strong negative effect on demand for informal care. Ribar also estimates a price elasticity of labor supply (-0.74) and paid care utilization (-1.86) with respect to childcare costs. These estimates are stronger than those of Blau and Robins (1988) and Connelly (1992), probably because Ribar uses the price of childcare per hour of care per child, while Blau and Robins

and Connelly use the costs per hour of work of the mother. As older children are in school part of the day, for one hour of work of the mother, less than one hour of childcare is needed.

Powell (1997) and Cleveland, Gunderson and Hyatt (1996) studied the effect of childcare costs on female labor force participation in Canada. Powell (1997) estimates structural labor force participation and hours of work equations, using the same theoretical framework and empirical estimation procedure as Connelly (1992). The data sources are the 1988 Canadian National Child Care Survey (CNCCS) and the Labour Market Activity Survey. Wages have a significant positive effect on both labor force participation and hours of work, while the hourly cost of childcare has a negative effect on both variables. Even when controlling for the costs of childcare, the number of children aged 0-2 has a negative effect on the probability of participating in the labor force, which is in contradiction with Connelly (1992). Hours of work are not influenced by the presence of children aged 0-2 or 3-5. Powell finds a childcare cost elasticity for labor force participation of -0.38, which is in line with other measures reported by American studies. She also estimates a childcare cost elasticity for hours of work, which she finds to be -0.32.

Cleveland *et al* (1996) also use 1988 CNCCS data together with the Labour Force Survey. Bivariate probits on the probability of engaging in paid employment and the probability of purchasing market childcare are estimated. They find that the expected price of childcare has a significant negative impact on both labor force participation and the decision to purchase market forms of care. The elasticity of employment with respect to the price of market care is -0.388 and the elasticity of the use of market care with respect to its price is -1.056. The probability of having a paid job and the probability of paying for market care are positively influenced by the mother's wage rate. Wage elasticities are stated to be 0.808 for employment and 0.18 for purchasing market care.

Research has also been done in Sweden, by Gustafson and Stafford (1992). They use data from a 1984 Swedish Household Survey in combination with data on public childcare fees and spaces per child provided by community. The estimation method is a logit choice model on the joint decision of substantial market work and non-parental childcare. Because for most communities childcare spaces are rationed, a clear price effect can only be found for non-rationed communities. For these communities, the public price of childcare has a negative effect on the probability of a work and use of public childcare state. The elasticity of full-time employment with respect to the price of non-rationed childcare is -1.88. To determine the

impact of childcare costs on the level of labor market activity, Gustafson and Stafford (1992) also do an ordered probit analysis. The price of childcare has a negative effect on the level of market work.

Evidence from the Netherlands can be found in Wetzels (2005). She uses AVO data to estimate the determinants of Dutch women's decisions to participate in the labor market and to make use of paid childcare in 1995. She uses the same behavioral decision model as Connelly (1992) and Ribar (1992), and follows Connelly's estimation procedure. Eventually, the structural probit on labor force participation shows that wage has a significant positive effect on the probability of participating in the labor force, just like the presence of a husband. Number of children aged 0-11 has a negative effect. In contrast with other results, the predicted costs of childcare per hour worked of the mother is not significant and has a positive sign. An explanation could be that no distinction is made between the costs per type of childcare used, or it may be more likely to observe switches between formal and informal care rather than changes in labor supply.



### 3. The Dutch childcare reform

In the 1960s, childcare became an issue for the first time in the Netherlands because of tight labor markets. Firms installed day-care to attract working mothers. But in 1973, the oil crisis made that the labor shortage disappeared and firms lost their interest in providing childcare. In the 1980s, under the pressure of the welfare state, policies aimed at increasing the labor supply (and thereby the tax base), which resulted in the Child Care Stimulation Act of 1990. This Act increased the capacity from 20,000 childcare places in 1990 to 68,000 in 1993. In subsequent years, the number of childcare spaces kept on increasing as well as the demand for them due to increasing labor force participation of mothers (Tijdens *et al*, 2000).

Several motives for government intervention in the childcare market exist. Information asymmetry about the quality of the care, and the anticipated increase of the female labor force participation may be two reasons to be interfering. Distributional concerns, or more specifically the idea that childcare should be available to and affordable for everyone also plays a role (Noailly, Visser and Grout, 2007).

Childcare policies are aimed at children of preschool age (0 to 3) and children in primary school (4 to 12). Various types of childcare facilities exist. In 2001, 57 percent of all 0 to 12 year old children used some kind of childcare. The most commonly used types of childcare were child-minding at home or elsewhere (which is often done by grandparents) and staying in school for lunch. Subsidies only apply to formal childcare, which consists of daycare centers for children aged 0 to 3, before and after school care for children in primary school and childcare provided by a registered child-minder agency (age 0-12). Childcare for preschool aged children is slightly more expensive than for older children (Statistics Netherlands).

The biggest difference in the organization of childcare before and after the introduction of the Childcare Act in January 2005 can be found in the funding system. Before 2005, the government placed their financing mainly on the supply side of the childcare market, while after 2005, subsidies were placed on the demand side.

Until 2005, three types of formal childcare places existed: subsidized places, which were purchased by local municipalities, company places, which were purchased by the employers of the parents, and private places, which were purchased by the parents themselves.<sup>3</sup>

For the subsidized places, the municipalities acted as an intermediary. They bought the childcare places and made them available to parents. The parents usually had to pay an income-related fee, based on a recommended national fee scale, while the other part of the costs was borne by the municipality.

The company places were bought by firms, which could subtract 30 percent of the costs from their payroll taxes. In this case parents also paid an income-related fee based on the national scale. Parents who purchased private childcare places paid the actual price, but they could deduct a certain income related fraction of the costs from their taxable income. The company and private places were consequently subsidized through the tax system. In 2004, 64 percent of all available places were subsidized by firms, 12 percent by municipalities and 24 percent by parents (Noailly *et al*, 2007). According to Jongsma (2006), no direct relationship existed between the charges of the childcare provider and the parental fee.

The reform places the subsidies solely on the demand side, which is at the parents. Starting point of the Childcare Act is that childcare should be a case in which parents, the government and the employers of the parents should be involved. Furthermore, some quality requirements are set, which should guarantee the safety and health of the children.

The Act again only applies to formal childcare. In 2005, about 14 percent of Dutch households used formal care as their main type of childcare. Many households also make use of more than one childcare facility (Statistics Netherlands).

The sharing of the costs between the three parties works as follows. The parents choose a childcare institution, close a contract and pay the price, and after that, they ask their employer(s) and the government for a cost reimbursement. Initially, the employer's contribution was voluntarily, but it became mandatory in 2007. The employer(s) may

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<sup>3</sup> A fourth type of childcare places were the KOA-places. Single parents receiving welfare could make use of this KOA-regulation. This meant that for single parents who absolutely needed childcare to get out of their position (like to be able to work or follow a training program), childcare was fully subsidized by the Ministry of Social Affairs. However, a small minority (less than 5 percent) of all childcare places were KOA-places so they are often ignored (Jongsma, 2006).

compensate one third of the total childcare costs tax-free which is intended to be one-sixth per parent. If they want to contribute more, this is seen (and taxed) as wage income for the parent. The government allowance depends on family income, number of children and the total costs of childcare. The allowance is calculated on a maximum hourly rate, and for up to 230 hours of childcare per child per month. If parents choose for childcare that is more expensive, they have to pay the difference themselves.

To be eligible for compensation from the government, certain conditions must be met, such as that both parents work. If one of them does not work, he or she must be studying fulltime, or he or she does an integration course or a reintegration program to enhance job opportunities. If the employer's total compensation is less than one third, parents can apply for an additional subsidy from the government until the total amount is one third, something that may occur for single parents or if they are self-employed.

The main result of the 2005 reform is that the provision of childcare will now be market driven, because parents can choose freely between providers. Naturally they will choose a provider with a good price quality ratio. This should increase competition and efficiency in the childcare market, which was basically the purpose of the Act. Due to the minimum quality standards that were set together with the Childcare Act, the quality of the children's care is assured. In addition to that, the playing field is leveled for nonprofit and for-profit childcare providers, while before the reform it was presumed that the municipalities preferred to subsidize nonprofit organizations, although no evidence exists (Noailly *et al*, 2007).

For the parents, the reform has an effect on three aspects of childcare: namely on childcare costs, on the effort needed to receive compensation from employers and the government, and on their financial liability. According to Jongsma (2006), 15.2 percent of formal childcare users in 2004 stopped or reduced the use of formal childcare because of the reform, which is because of one of these three reasons. These parents had to find another solution for their children. Firstly, they reduced the number of hours that children should be taken care of because of work or study by approximately 4.2 hours per week. This could be done by changing working hours, but also by increasing hours worked from home or arranging a different distribution between the working times of both parents. Secondly, they increased the use of informal childcare.

The number of respondents in the research of Jongsma (2006) not having a paid job increased by 2.7 percent, but this is largely because of other reasons than the Childcare Act. 2.0 percent

says to have reduced work effort because of the cost change after the introduction of the Act, 0.2 percent has started working more hours for this reason. She finds that no difference in changes in use exists between the types of childcare places people used in 2004. Significant differences exist between income groups; in lower income groups relatively more people are found who increased childcare use because of the Act, in middle income groups many people stopped the use of formal childcare for this reason. Higher income groups did not change the use of formal childcare or they reduced the number of hours using formal childcare (highest income group).

The average parental contribution for daycare is lower after the introduction of the Childcare Act; the mean contribution per hour decreased with €0.07 and the median with €0.27, which indicates that the spread has increased. For after school care the cost effect is not clear. The median hourly rate has increased with €0.10, while the mean rate decreased with €0.10. The average parental contribution per hour of formal childcare in general has decreased in 2005 according to both the mean and median; these decreased with €0.21 and €0.25 respectively. In tables A1 and A2, the parental contribution for daycare and afterschool care in December 2004 and September 2005 are given for different income groups. For daycare, €56,500 is the margin; households earning more pay a higher parental contribution in 2005, households earning less pay a lower amount. For afterschool care, the results are less clear: parents earning less than €45,000 pay less than in 2004, between €45,000 and €56,500 they pay more, between €56,500 and €89,250 they pay less again and for the highest income group the parental contribution increased (Jongsma, 2006).

The question is what the effect of these changes in costs for parents is on the labor force participation of women. To examine this question, a standard micro-economic decision model is discussed. In this model, a mother maximizes her utility over consumption and leisure, subject to her budget constraint (leisure includes taking care of children). The budget constraint consists of ‘other household income’, which could be husband’s income, non-work income or income of another household member, and the mother’s wage. The mother’s preferences are represented by indifference curves.

The results of Jongsma (2006) indicate that for lower income groups, the costs for parents have decreased on average while for high-income groups the costs increased. These cases are therefore considered separately.

Figure A1 represents the labor supply decision of a mother in a low-income household. The y-axis represents consumption of other goods than childcare and the x-axis represents the

mother's time, which she has to divide between work and leisure.  $T$  is the maximum available time. The black line represents 'other household income', the dark blue line gives the actual budget constraint the mother faces before the introduction of the Childcare Act: the slope of the line is equal to her hourly wage rate minus hourly childcare costs (assuming that per hour of work of the mother, one hour of childcare is needed.)

A mother with these particular preferences doesn't work before the introduction of the childcare act because the slope of her indifference curve (red) at zero hours of work, which is the reservation wage (Heckman, 1974), is higher than her market wage; she chooses maximum leisure  $L_1=T$  and consumption level  $C_1$ . After the reform, for a low-income family the hourly costs of formal childcare decreased which means that per working hour, childcare costs are lower and more wage income is left for consumption of other goods. The effect is similar to an increase in the hourly wage rate and leads to an outward rotation of the budget constraint; the light blue line. The mother in figure 1 can now reach a higher utility level by choosing leisure  $L_2$  and working  $L_1-L_2$  hours, and being able to consume  $C_2$ .

In this case, the introduction of the Childcare Act has a positive effect on the mother's labor force participation. The real effect however depends on a mother's preferences and the magnitude of the cost change. A mother with a flat indifference curve is more eager to work than a mother with a steep one, which indicates that only a small decrease of parental childcare costs may lead her to the labor market, while a major cost reduction may not be enough to get mothers with steep indifference curves to work. As the parental contribution decreased with something in the range of €0.25, and minimum gross wages for 20 year olds were about €4.50 per hour in 2006, the change may be too small to have an effect on the labor force participation of most mothers (jurofoon.nl). Moreover, many households make use of informal childcare that is not affected by the reform.

In figure A2, the situation for a high-income household is represented. For higher income families, the hourly costs of childcare increased on average after introduction of the reform, which rotates the budget constraint inwards (similar to a wage decrease). This mother worked  $T-L_1$  hours before the reform, corresponding to consumption level  $C_1$ . After the introduction of the Childcare Act, her costs of childcare increase and she reduces her working hours to  $T-L_2$ . The Act thus lowers her utility level. Again, the true impact of the reform is not the same for every high-income mother, but depends on the mother's preferences, her wage and the exact change in childcare costs. Some mothers may stop working because of the reform; while for others there may not be a major effect on working hours.

Women can of course change their employment statuses for other reasons than the costs of childcare. This means that the budget constraint shifts or rotates, because of a change in wage or other income, or the shape of the indifference curve changes because preferences may not be constant over time. Heckman (1974) defines some factors influencing the marginal rate of substitution, which were already mentioned in section 2.

## **4. Data**

The data that have been used for the research are from CentERdata's DNB Household Survey (DHS). CentERdata is an institute for data collection and research located at the campus of Tilburg University, which collects data mainly through online survey research and manages several panels. The CentERpanel is one of them. It consists of more than 2000 households filling in a questionnaire every week, and is representative for the Dutch-speaking population. For households without Internet, other arrangements are made. People answer questionnaires at a moment that suits them without intervention of an interviewer.

The DNB Household Survey uses the CentERpanel to collect data on personal characteristics, work, income, assets and liabilities, mortgages etcetera. The DHS has been launched in 1993, consists of six questionnaires and the collected data are stored in separate databases. For this research, data of four questionnaires are used: those with general information on the household, information about household and work, health and income, and economic and psychological factors. The database with aggregated information on income is used as well.

### **4.1 Sample selection**

The new Childcare Act entered into force on January 1 2005. To analyze the impact of the Act on the female labor force participation, a comparison must be made between the working statuses of women before and after the reform, controlling for other factors that may influence the participation decision. The year 2004 is taken as the before state, and as people need some time to adjust to a new situation, 2006 is taken as the after state. To be able to use a regression model, women in 2004 and 2006 are put together and treated as a cross-section in which the women in 2004 form the control group, while the women in 2006 form the 'treatment' group that could be affected by the reform.

In order to obtain a sample consisting of women for whom the introduction of the Childcare Act may be important, firstly all males are removed. No data on the age of children were available, so only women aged 20 until 55 are selected, because older women are not likely to have children of an age at which they need childcare. Furthermore, the labor force participation decision is approached as a joint decision of a couple. Single women will usually have to work to make ends meet, being a mother or not, so there is no decision to be made. It is assumed that the partner who can earn the highest market wage will work anyway, and after

that they decide if the other partner will work too. To translate this into the sample, only women who are not the main wage earner of the household are included.

The remaining sample could still contain women that are not interested in childcare regulations; namely housemates or adult children living at home. These are excluded using a household position variable. This leaves 824 women in 2004 and 800 in 2006.

#### **4.2 Estimation sample**

Because not all variables are observed for all women only 289 observations are included in the estimation sample for 2004 and 251 for 2006, which brings the total to 540 observations.

The variable of interest is working status, which serves as the dependent variable in the analysis. It takes value 1 if the woman is doing paid work at the moment and value 0 if she doesn't. In the sample, 347 women are doing paid work. As control variables are included all factors that may influence a woman's employment status. These are age, presence of one or more children in the household, working experience, education, degree of urbanization, region, other household income and a year indicator. Table A3 provides more summary statistics for the sample.

The women's wage, or in general work related income, is not included because for non-working women the wage is not observed. Some previous studies estimate a predicted wage equation, using age, working experience, education, regional unemployment rate and the like as explanatory variables. Usually, most explanatory variables for the wage equation are omitted from the labor supply equation, except education (Blau and Robins 1988, Cleveland *et al* 1996, Connelly 1992, Heckman 1974, Kimmel 1998, Powell 1997). The results of Ribar (1992) show that when including only the predicted wage's explanatory variables in the employment status model, the effect of these explanatory variables (age, education, working experience) is larger than if both wage and its explanatory variables are included. This indicates that if wage is left out of the equation, its effect is (partly) captured by the other variables. For simplicity, in this research it is assumed that the wage effect will be captured by the other variables, so no predicted wage equation will be estimated.

The reason not to take number of children in the household as an explanatory variable is that the difference between no children and one child is expected to have bigger impact on the employment status of a woman than the difference between one or two and two or three children. Therefore the variable 'child present' is created, which takes value 1 if there are any children in the household and value 0 if not. About 68 percent of the women in the sample



have one or more children living at home. The information about the number of children in the household is lost, which precludes analysis of effects for different numbers of children. An even more important shortcoming in the data is that no information is available about the age of the children. As a result, the child indicator cannot distinguish between infants aged 0 to 3, for whom childcare is usually more expensive, and primary school children aged 4 to 12. Moreover, no distinction exists between mothers of children under 13 and mothers of older teenagers that are not affected by the Childcare Act.

Working experience is calculated as the sum of the years the woman has worked fulltime and part-time. Years are rounded off to a whole number separately for fulltime and part-time work. The average working experience in the sample is around 14 years, with a mean age of 41. Education is measured as an ordinal variable, consisting of seven categories indicating the highest degree of education completed, where category 1 is the lowest and 7 the highest possible education level. Another ordinal variable is degree of urbanization. Category 1 is a very high and category 5 a very low degree of urbanization.

Four dummy variables are made for the regions. The reference category is 'living in one of the three biggest cities in the Netherlands' (these are Amsterdam, Rotterdam and The Hague). The other regions are 'other West' (excluding these three cities), 'North', 'East' and 'South'. The next variable is 'gross other household income', which is gross household income minus the gross wage income of the woman, if any. If this other income is high, this may lower the probability that the woman works because no extra money is needed in the household. To create the variable, net work-related income of the woman is calculated using her gross wage (or profit if she is self-employed) and calculated income tax. This is subtracted from net household income. Using the income tax system in the corresponding year (table A4 and A5), gross other household income is calculated. This means that other household income is treated as being earned by one person (which is usually the case).

Gross other household income is then divided in six categories. Dummies are made for each separate category as well as for combinations of two or three categories (table A6).

To control for changes between 2004 and 2006 other than the introduction of the Childcare Act that may affect female labor force participation, a year indicator variable is created which takes value 0 in 2004 and value 1 in 2006. The Childcare Act is expected to affect only mothers, so the variable measuring the real effect of the reform is an interaction term between the year indicator and the child indicator.

To gain a little more insight in the changes in labor force participation between 2004 and 2006, two cross tables are constructed. In table A7.1, the changes in working statuses of the 235 women that filled in their working status in both years are shown. Of the 154 women having a paid job in 2004, 14 had stopped working in 2006 which is equal to 9.1 percent, while 13 of 81 women started working between 2004 and 2006 (16 percent). This might indicate a positive labor force participation effect of the reform. For mothers, the figures are even stronger, which is shown in table A7.2. Of 111 mothers being employed in 2004, 8.1 percent had quitted in 2006 (9 persons). 12 of the 61 mothers who were not working in 2004 have a paid job in 2006, equaling 19.7 percent.

## 5. Results

For performing the analysis, a linear regression model (ordinary least squares) on labor force participation is used, although in most other papers the analysis is done by using a probit model. The standard labor force participation model takes the following form:

$$LFP = \alpha + \beta_1 X_1 + \dots + \beta_n X_n + \varepsilon \quad (1)$$

In which  $LFP$  takes value 0 for non-working and 1 for working women,  $\alpha$  is the constant term and  $X_1$  till  $X_n$  are explaining variables such as age, working experience, education, presence of children, degree of urbanization, other household income etcetera. To evaluate the impact of the introduction of the Childcare Act, implementation of a year indicator dummy is required to be able to compare the labor force participation of women in 2004 and 2006. However, this variable does not necessarily capture the impact of the reform, because the Childcare Act is probably not the only thing that has changed between those years. The year indicator controls for any changes taking place that affect all women in the same way.

To measure the effect of the reform, it is considered on who the reform mainly has its impact; the reform affects women with children of an age at which they need childcare, and of course only women being part of the 2006 sample. Therefore, an interaction term between the year indicator and the child indicator is created and included in the regression model. The model that is expected to be able to measure the pure effect of the reform looks as follows:

$$LFP = \alpha + \beta_1 X_1 + \dots + \beta_n X_n + \tau_1 T + \tau_2 TC + \varepsilon \quad (2)$$

In this equation,  $T$  is the year indicator and  $TC$  is the child-year interaction. The effect of the childcare reform is equal to the estimated coefficient of  $\tau_2$ . This approach comes down to comparing a treatment group and a control group, which is commonly used in medicine testing. The control group consists of all women in 2004 plus the women without children living at home in 2006. The treatment group that might be affected by the Childcare Act consists of mothers in 2006, where  $\tau_2$  is the treatment effect. This also illustrates why the inclusion of women without children is important; if a comparison is made only between mothers in 2004 and 2006, other changing factors than the reform could incorrectly be seen as a treatment effect. The year indicator can now control for other changing factors in the 2004-2006 period that affect women with and without children in the same fashion, and the child-year interaction should be a good measure of the reform effect.

Equation (2) is estimated for the whole sample in Table 1, Column 1. As the outcome variable takes value 0 or 1, robust standard errors are used to control for heteroskedasticity. The results of Jongsma (2006) indicate that the cost change due to the Childcare Act varies between different income groups, so the labor force participation effect of the reform is expected to vary between income groups as well (see also section 3). To investigate this, the LFP equation will also be estimated for subsamples of different income groups.

The results in Column 1 are largely in line with the expectations. Working experience and education level have a positive effect on the probability of doing paid work, while the presence of one or more children in the household has a strong negative effect. Similar results have been found by Cleveland *et al* (1996), Connelly (1992), Gustafson and Stafford (1992), Powell (1997), Ribar (1992) and Wetzels (2005). Age also has a small negative effect, which is a bit surprising as in the literature often a positive effect is found (Cleveland *et al*, 1996, Wetzels, 2005). And usually, wage rates increase with age, which is expected to have a positive effect on the labor force participation decision.

The sign of the urbanization variable is positive, which would mean that women living in rural areas are somewhat more likely to be employed than women in more urban areas, but the effect is not significant. Also no variation exists between different regions in the Netherlands. The probability of a woman being employed depends significantly on the level of other household income, but not in the way that was expected; Blau and Robins (1988), Cleveland *et al* (1996), Powell (1997) and Ribar (1992) find a negative effect of unearned income, but in Column 1 no clear pattern can be identified. Being in income category 2 or 5 lowers the probability of being employed compared to women being in category 1, while being in category 3 or 4 raises this probability. No significant difference exists between income category 1 and 6.

The year indicator is not significant and has a negative sign, while the child-year interaction variable is positive but also not significant (p-value 0.727). Otherwise it would have been an indication that the childcare reform has had a positive effect on the labor force participation of mothers, while overall, the female labor force participation decreased between 2004 and 2006. The positive sign for the treatment effect was expected as the results of Jongen (2010) and Jongsma (2006) indicate that the childcare costs for parents decreased on average as a result of the childcare reform, which could lead some women to work as is shown in the decision model discussed in section 3.

Table 1

Linear regression on labor force participation, full sample and subsample.

Dependent variable: Now paid work

Independent Variables	(1) Full sample	(2) Subsample Low + High Income
Constant	0.381*** (0.133)	-0.019 (0.170)
Age	-0.008*** (0.002)	-0.011*** (0.003)
Child present	-0.111** (0.045)	-0.096 (0.062)
Working experience	0.025*** (0.006)	0.039*** (0.009)
Working experience squared	-0.000*** (0.000)	-0.000*** (0.000)
Education	0.067** (0.013)	0.096*** (0.016)
Income category2	-0.245*** (0.064)	
Income category3	0.278*** (0.047)	
Income category4	0.343*** (0.051)	
Income category5	-0.318*** (0.059)	
Income category6	0.049 (0.061)	
Year indicator	-0.050 (0.057)	-0.030 (0.077)
Child X Year	0.024 (0.068)	0.044 (0.106)
Income High X Child X Year		-0.101 (0.097)
Income High		-0.007 (0.053)
N	540	380
R Squared	0.480	0.301
F-value	52.78	18.51

Notes: Robust standard errors in parentheses. \* Significant at 0.10 level, \*\* significant at 0.05 level, \*\*\*significant at 0.01 level. Controlled for regional and urbanization effects, estimates not in table.

Source: DNB Household Survey

According to the results of Jongsma (2006), the change in costs between September 2004 and December 2005 varies between income groups (see section 3). The costs for lower income groups decreased on average while the costs for higher income groups increased, which suggests that there may be heterogeneous treatment effects; a different impact of the reform for different income groups. To check this, the sample is divided in subsamples for low, middle and high income based on the other household income variable (Table A6). For the middle income group, surprisingly all women were doing paid work at the moment of questioning, so the study of heterogeneous effects is limited to the low and high income subsample. Firstly, equation (2) is estimated for both subsamples. Basically the same regression is done as for the full sample; only the income dummies are dropped since there should be little income variation in the subsamples. The results of both regressions can be found in Table A8.

For most variables the results for the subsamples are quite the same as for the full sample, but the reform variable is of most interest. The sign of the reform variable is different in both subsamples. As was expected on the basis of the theory, in the low-income subsample the sign is positive (0.057) while there is a negative sign in the high-income group (-0.050). In both samples however the reform did not have significant impact. More interesting to know is if the difference between the two coefficients is significant, as this would be enough to conclude that the treatment effect is not the same for both income groups. To test this, the low and high-income subsamples are put together, and the standard regression is run again. Additional variables are a dummy for the high-income group to control for variation in income, and an interaction between high-income, the year indicator and the child indicator (or briefly between high-income and the treatment indicator). Other income dummies are dropped again. The last interaction should show the difference between the effects of the reform in the high- and low-income sample.

The results of the model are presented in Table 1, Column 2. The child-year indicator is again insignificant (p-value 0.678) and the value of the coefficient is 0.044, which comes close to the estimated coefficient for the low-income subsample. The interaction between the treatment indicator and the high-income indicator has a coefficient of -0.101, which leads to an estimated treatment effect of -0.057 for the higher income group, but the variable is not significant (p-value 0.297). This means that no evidence for heterogeneous treatment effects is found.

Although the effect of the reform is not found significant for this sample of women, it cannot be concluded that the Childcare Act did not have any effect on female labor force participation. The results are largely based on the number of employment status switchers between 2004 and 2006, which is very small as is seen in the cross tables. A larger sample of the population could lead to more significant results. Other data issues could also play a role. For example, the age of the women's children was not available, so mothers of teenagers living at home are included in the sample while the childcare reform does not apply to them. Furthermore, the time period is quite short. It may take some time to make a decision about something drastic as picking up paid work after a period of working in the household and taking care of children. And once that decision is made, it could also take a while until one has actually found a job. This means that more time expires before the full impact of the reform becomes visible, and a longer evaluation period is needed to capture the effect. The problem with this is the rapid development in this field; regulations are introduced and adjusted in quick succession, which makes it hard to extend the evaluation period because already a new reform could be introduced in that period.

## 6. Conclusion

In this paper, the Childcare Act of January 1, 2005 and its effects on female labor force participation have been evaluated. After a discussion of other research in the field of childcare subsidies and female labor supply, some light has been shed on a few important aspects of the reform. Average hourly childcare costs appeared to be lower after the reform, which could in theory lead to an increase in female labor force participation. To check this, a linear regression model has been developed to compare the working statuses of women between 2004 and 2006, but no significant female labor force participation effect is found in the results of the analysis. The results of most control variables are in line with the expectations.

As indications exist that the cost for higher income groups increased after the Childcare Act while they decreased for low-income groups, there might exist heterogeneous effects of the reform. The sign of the reform variable in a low- and high-income subsample supports this, but the variable is not significant in both subsamples. The difference between the estimated coefficients in the subsamples also turns out to be insignificant, which leads to the rejection of heterogeneous effects of the reform.

Although no significant impact on female labor force participation is found, this does not allow concluding that the childcare reform of 2005 has had no effect. Insignificant coefficients could result from data restrictions and the limited size of the sample.

It is also possible that the Childcare Act had an effect on hours worked by women. How this works in theory is already shown in section 3. Women who are already participating in the labor market may be more aware of these kinds of changes taking place because it concerns them. The time of adaptation could therefore be shorter than for non-working women, as it is also easier to increase working hours than to find a job. It might be possible to measure the effect of the reform on hours worked in such a short period of two years, while the effect on working status may take more time to appear. Further research could give more clarity on this topic. It should be possible to do this with the same dataset as is used in this research. Information about weekly working hours is available, for contracted employees as well as for women working in own business, as a freelancer or otherwise without a contract.

Another subject that can be investigated is the impact of the Childcare Act on female labor force participation broken down to different types of childcare. For households using free informal childcare, such as childcare provided by grandparents, the reform is not likely to have any impact. For mothers who do not have access to low-priced informal childcare, the



reform is more likely to have significant impact. Unfortunately, information about informal childcare is not easily available.

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## Appendix

### Tables

*Table A1*

Parental contributions per hour of daycare, per taxable income (2004/2005)

<b>Base: Daycare users knowing amount paid per childcare type</b>		<b>Parental contribution 2004</b>	<b>Parental contribution 2005</b>
Until €13.195	Mean	€ 0,39	€ 0,29
	N	17	25
€13.195-29.750	Mean	€ 2,09	€ 1,70
	N	44	46
€29.750-45.000	Mean	€ 2,87	€ 2,61
	N	152	154
€45.000-56.500	Mean	€ 3,22	€ 3,11
	N	97	110
€56.500-89.250	Mean	€ 3,40	€ 3,59
	N	131	122
More than €89.250	Mean	€ 3,36	€ 4,20
	N	25	29
Doesn't want to say	Mean	€ 2,40	€ 3,28
	N	18	13
Total	Mean	€ 2,94	€ 2,87
	N	483	499

Source: Jongsma 2006

*Table A2*

Parental contributions per hour of afterschool care, per taxable income (2004/2005)

<b>Base: afterschool care users knowing amount paid per childcare type</b>		<b>Parental contribution 2004</b>	<b>Parental contribution 2005</b>
Until €13.195	Mean	€ 0,43	€ 0,35
	N	22	17

€13.195-29.750	Mean	€1,29	€ 1,36
	N	36	47
€29.750-45.000	Mean	€ 3,28	€ 2,84
	N	65	71
€45.000-56.500	Mean	€ 2,87	€ 3,18
	N	62	61
€56.500-89.250	Mean	€ 3,93	€ 3,53
	N	57	65
More than €89.250	Mean	€ 3,76	€ 4,09
	N	25	23
Doesn't want to say	Mean	€ 3,58	€ 2,82
	N	8	8
Total	Mean	€ 2,88	€ 2,78
	N	276	291

Source: Jongsma 2006

*Table A3*

Descriptive statistics all variables (N = 540)

<b>Variable</b>	<b>Mean</b>	<b>Standard deviation</b>
Doing paid work now	0.64	0.480
Age	41.18	8.640
Child present	0.68	0.446
Working experience	13.83	9.076
Working experience squared	273.57	326.030
Education	4.51	1.330
Degree of urbanization	3.19	1.263
Region		
Other West	0.30	0.460
North	0.12	0.324
East	0.24	0.427
South	0.24	0.429
Gross other household income	71708.84	35345.510
Income categories		

Incomedummy2	0.19	0.392
Incomedummy3	0.15	0.354
Incomedummy4	0.15	0.357
Incomedummy5	0.18	0.386
Incomedummy6	0.17	0.373
Income low-middle-high		
Low	0.36	0.479
High	0.35	0.477
Year Indicator	0.46	0.499
Child X Year	0.33	0.469

Source: DNB Household Survey

*Table A4*

Income tax 2004

Scale	Gross income work and house €	Tax percentage	Cumulative tax amount €
1	< 16,265	33.55	5,456
2	16,265 - 29,543	40.50	10,832
3	29,543 - 50,652	42.00	19,697
4	> 50,652	52.00	...

Source: <http://www.allesoverheffingskortingen.nl/belastingtarieven/tarieven2004/>

*Table A5*

Income tax 2006

Scale	Gross income work and house €	Tax percentage	Cumulative tax amount €
1	< 17,046	34.15	5,821
2	17,046 - 30,631	41.45	11,451
3	30,631 - 52,228	42.00	20,521
4	> 52,228	52.00	...

Source: <http://www.allesoverheffingskortingen.nl/belastingtarieven/tarieven2006/>

*Table A6*

Gross other household income categories.

<b>Income</b>	<b>Category</b>	<b>N</b>	<b>Split in two</b>	<b>Split in three</b>
< € 44,000	1	90	First	Low Income
€ 44,000 – 51,010	2	102	Half	
€ 51,010 – 66,000	3	79	Second	Middle Income
€ 66,000 – 90,000	4	81		
€ 90,000 – 110,000	5	98	Half	High Income
> € 110,000	6	90		

Source: DNB Household Survey

*Table A7.1*

Working status of women in 2004 and 2006.

2006 \ 2004	Doing paid work	Not doing paid work	Total
Doing paid work	140	13	153
Not doing paid work	14	68	82
Total	154	81	235

Source: DNB Household Survey

*Table A7.2*

Working status of mothers (one or more children living at home) in 2004 and 2006.

2006 \ 2004	Doing paid work	Not doing paid work	Total
Doing paid work	102	12	114
Not doing paid work	9	49	58
Total	111	61	172

Source: DNB Household Survey



*Table A8*

Linear regression on labor force participation: Subsamples Low income and High income.  
 Dependent variable: Now paid work.

Independent variables	(1) Low income subsample	(2) High income subsample
Constant	0.084 (0.262)	-0.134 (0.228)
Age	-0.008* (0.005)	-0.013*** (0.004)
Child present	-0.072 (0.105)	0.108 (0.081)
Working experience	0.036** (0.014)	0.048*** (0.011)
Working experience squared	-0.000 (0.000)	-0.000* (0.000)
Education	0.104*** (0.024)	0.087*** (0.023)
Degree of urbanization	0.014 (0.030)	0.057** (0.028)
Region Other West	0.035 (0.124)	0.242** (0.118)
North	-0.101 (0.134)	0.134 (0.140)
East	-0.044 (0.131)	0.192 (0.124)
South	-0.103 (0.121)	0.097 (0.121)
Year indicator	-0.047 (0.118)	-0.044 (0.104)
Child X Year	0.057 (0.145)	-0.050 (0.127)
N	192	188
R Squared	0.214	0.424
F	6.22	22.36

Note: Robust standard errors in parentheses. \* Significant at 0.10 level, \*\* significant at 0.05 level, \*\*\* significant at 0.01 level.

Source: DNB Household Survey

# Figures

Figure A1

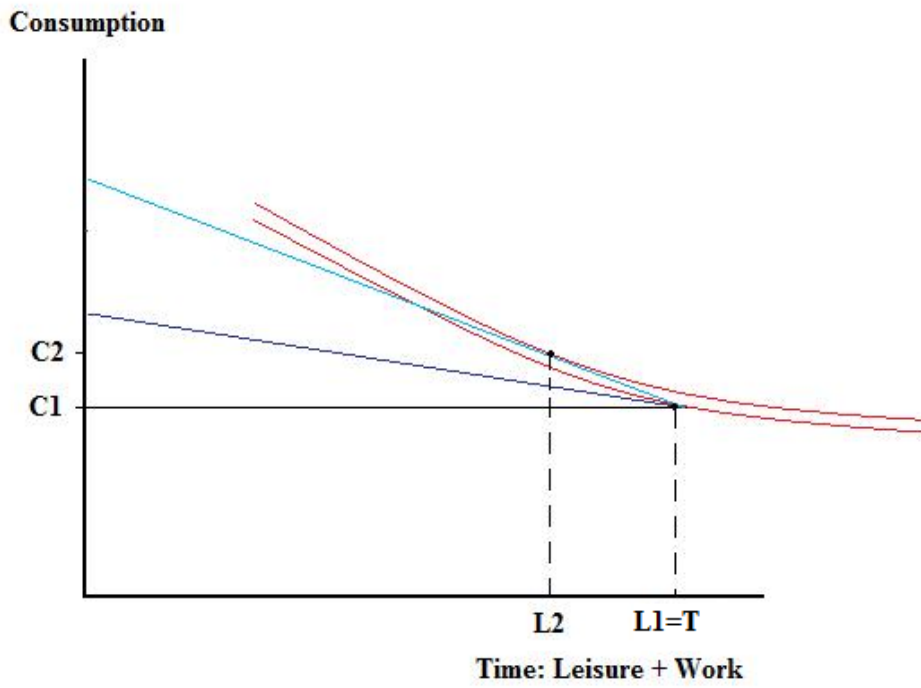


Figure A2

