The impact of various policy measures on employment in the Netherlands

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Abstract
This contribution looks at the impact of various policy measures on employment in the Netherlands using a static structural microeconomic model of the Dutch labor market. This model contains a productivity equation that describes the demand side of the labor market, a wage function, a labor supply function and an equation that describes minimum wage costs. The model also takes into account the impact of the business cycle. The model allows us to look at the impact of very specific policy measures. Model simulations show that it is less simple to combat the poverty trap (voluntary unemployment) as compared to the productivity trap (involuntary unemployment). However, efficiency gains can be achieved if more tailored policy measures are taken.

Key-words: labour supply, employment, microsimulation

1. Introduction

This paper presents the prototype model developed as a pilotstudy of the MIMOSA-project. MIMOSA aims at developing a dynamic microsimulation model for the Dutch labour market as a flexible and reliable tool for policy analysis. Here, emphasis will be on policy measures that alleviate (in)voluntary unemployment in the Netherlands. In spite of the increased employment in the Netherlands during the last two decades, a large group of persons is still voluntary or involuntary unemployed. In order to arrive at effective policy measures it is necessary to get insight in the causes of unemployment. Besides problems with respect to the matching of supply of and demand for labor, two categories of causes exist:

1. The productivity trap (or involuntary unemployment)
A person has a too low productivity as compared to the wage to be paid by an employer. Various elements might play a role here. One can think of an insufficient level of education, a loss of skills and motivation due to unemployment, outdated knowledge, or physical or mental disablement. It is of importance here to know how the productivity trap is connected to education and experience, and how this can be solved by a reduction of the minimum wage costs, by generic policy measures or by specific measures for well-defined groups.
2. The poverty trap (or voluntary unemployment)
A person has insufficient incentives to do paid labor. The wage income to be earned is - in combination with the fixed costs of work - too low to accept a job, in view of the other household income and/or benefits to be received. This can be influenced by (the lack) of sanctions. Besides, discouragement effects may be present. Minimum wages play a role as their level also determines the minimum benefit level in the Netherlands.

The productivity trap is at work at the lower end of the labor market and can be alleviated by lowering minimum wage costs. One can think here of a reduction of the gross (minimum wage) or the use of labor costs subsidies. The poverty trap can be suppressed by making work financially more attractive. This can be done by lowering taxes and other levies (like social insurance contributions) on wages or by extra (tax) facilities for working persons as compared to persons receiving a benefit.

There is a vast research literature on the impact of minimum wages on employment via the productivity trap. For a recent overview, see Brown (1999). The larger part of the literature refers to the United States. Until the 1980s the main conclusion was that minimum wages negatively affect employment, which is in line with theory on perfect competition. However, it is also noticed that the impact (at least in the US) is limited, be it that larger effects are found for young (low-educated) persons. The reported elasticity with respect to teenage employment is in the range of -0.1 to -0.3. The view with respect to this, changes in the early 1990s due to the findings for the fast-food industry by Card and Krueger. Card and Krueger (1994) - applying differences in differences - did not find a negative impact of an increase of the minimum wage on employment in the services sector. Instead of an expected decrease, they find a small increase in employment due to the 18 percent increase in the minimum wage in New Jersey in 1992. This analysis has been repeated for more states and during a longer time period in Card and Krueger

(1995). Again, this study does not find a negative impact of increasing minimum wages on teenage employment. Also for the United Kingdom zero or positive effects have been found; see Machin and Manning (1994) and Dickens et al. (1999). Machin and Manning's (1994) findings have been based on regressions using aggregated data from the U.K. Wage Councils. Including GDP growth as an explanatory variable limits the positive impact to Catering, whereas the impact is zero or negative for the other three groups (Retail, Clothing and Hairdressing). Dickens et al. (1999) also use data from the U.K. Wage Councils. They take into account supply shocks (via sector and year dummies) and demand shocks (via sales variables) and find a significant positive effect of increases of the minimum wage on employment. All these studies refer to imperfect markets (monopsony) in order to explain these findings.

However, several recent studies have reported negative effects of minimum wages on employment in the US (see e.g. Currie and Fallick, 1996 and Burkhauser et al. 2000) and France (see Abowd et al., 2000 and Kramarz and Philippon, 2001). In contrast with e.g. Card and Krueger (1995), Burkhauser et al. (2000) control for macroeconomic effects and robustness of the model, using monthly data for 51 states during the period January 1979 - December 1997. They find a negative elasticity of teenage employment with respect to the minimum wage, which varies between -0.2 and -0.6. The aforementioned US studies use aggregated data. Currie and Fallick (1996) use individual-level panel data for 1979, 1980 and 1981 in order to analyze the increase in the federal hourly minimum wage from USD 2.90 to USD 3.10 in January 1980 and from USD 3.10 to USD 3.35 in January 1981. They find a significant negative effect of the increases of the minimum wage on youth employment. Kramarz and Philippon (2001) use micro data and study the impact of changes of total labor costs on the transition from employment to unemployment and vice versa for France. For the former they report an elasticity of -1.5, implying a large negative effect of increasing minimum wages on employment. The same approach has been followed by Abowd et al. (2000) for France and the United States. For France their results are comparable to those of Kramarz and Philippon (2001); for the US they do not find employment effects of a higher minimum wage.

For the period 1985-1989, Van Soest and Kapteyn (1988) found that lowering minimum wages by 10% resulted in an employment gain of a bit more than 100,000 jobs in the Netherlands. This implies an elasticity of about -0.2.

The impact of minimum wages on employment via the poverty trap runs by means of the reservation wage. If benefits are (positively) related to the development of the minimum wage, the reservation wage will increase when the minimum wage is raised. As a consequence, a potential employee will be less inclined to accept a job offer. As a result the probability to become or to remain voluntarily unemployed will increase. This holds both under perfect competition and imperfect competition. So, if benefits are positively related to the minimum wage, an increase of the minimum wages affects employment via the higher benefits in a negative way as a consequence of a lowering of the labor supply. With respect to the impact of benefits on labor supply, a lot of literature is present. For the United States, we mention the overview by Moffit (1999). For the Netherlands, the country that is the subject of this study, the elasticity is about -0.2; see Graafland (2000, p. 218).

As said, here we look at various instruments that are able to combat the poverty and productivity trap in the Netherlands using micro data for the 1990s. Our analysis is based on a structural microeconometric model, in which labor supply, labor demand, wage formation and minimum wage costs are dealt with simultaneously. So, the employment decision is the result of considerations at the level of both individuals and firms. We determine how the productivity trap and poverty trap affect this process. In this way we are able to look at the impact of various labor policy instruments on both the supply and demand side. We proceed as follows. Section 2 describes the data used and the definition of voluntary and involuntary unemployment. Section 3 gives the model. In section 4 we look at the impact of various labor market policies. Finally, section 5 concludes.

2. The data

The data are drawn from the 1990 up to and including 2001 waves of the Dutch Socio-Economic Panel. This panel consists of about 5000 households in each wave and is representative of the Dutch population excluding people living in institutional households. We limit ourselves to persons aged 16 to 65 years. Moreover, we require:

- if a partner is present, both partners are younger than 65 years of age
- if a partner is present, both partners filled in the questionnaire
- the respondents are still in the household in the next year and filled in the questionnaire in both years, as the income data refer to the year before

• persons are available for the labor market; so, persons not available (NA) for the labor market (see below) have been excluded from the analysis.

Children aged 18 years and over and living with their parents have been considered as separate decision units and, as a consequence, they have been treated as separate observations.

The analysis refers to three groups: employed persons, involuntary unemployed persons and voluntary unemployed persons. The group of employed persons (WORK) consists of all persons with a paid job and not belonging to the group not available (NA). Persons with a part-time job and looking for additional work have been classified as being employed. The category NA refers to students, persons receiving full-time disability benefits, persons receiving pensions or other retirement benefits and persons in mandatory military services, unless such a person is working for 20 hours or over per week. In the latter case one is employed. People who are not employed or unavailable are either voluntary or involuntary unemployed. The distinction has been based on search behavior. Involuntary unemployed (IU) persons are those who are actively looking for a job, and have applied for a job at least once in the last two months. Moreover, if a job has been offered they are prepared to get started in that job within two weeks. If one does not meet these requirements one has been classified as being voluntary unemployed (VU).

Table1 gives an overview of the distribution by the 3 categories WORK, IU and VU over the years 1990-2000. During this period we have 56,709 observations: 27,586 refer to men and 29,123 to women.

3. The model

We apply a structural, static model of the labor market, which consists of four parts. The first part describes the demand side and gives the reservation wage for the employer (or the productivity of the potential employee as seen by the employer). The second part describes the market wage, which is a function of the reservation wage of the employer. We assume that both are independent of the number of hours worked by the employee. The third part describes the individual's preferences. It shows how an individual chooses the number of working hours, given the market wage and the tax and social security system. We assume that the individual maximizes his or her utility that depends on income and leisure. For persons with a partner we allow

Table 1: Observed proportion of unemployed and employed persons in the Dutch Socio-Economic Panel by sex for 1990, 1995 and 2000 and total numbers

	Voluntary unemployed VU %	Involuntary unemployed IU %	Paid job WORK %	Number N
		Men		
1990	2.56	3.44	94.00	2613
1995	4.34	4.66	91.00	2616
2000	3.00	2.90	94.10	2270
1990/2000	3.27	4.23	92.50	27,586
		Women		
1990	42.08	6.42	51.50	2759
1995	27.59	9.07	63.34	2762
2000	19.87	6.68	73.45	2427
1990/2000	29.68	7.91	62.42	29,123

that the hours decision is also determined by the number of hours worked by the partner and by the partner's income. This gives us the labor supply of individuals. The fourth part introduces the minimum wage costs for the employer. We now describe these four blocks.

3.1. Reservation wage of the firm

The demand side of the labor market has been described by the productivity equation F^*, which can be considered as the amount that a firm is prepared to pay per hour at maximum. The equation reads as follows:

$$\ln F_i^* = \beta_0 + \beta_1 ZF_{i1} + ... + \beta_m ZF_{im} + \varepsilon_{iF} \quad (3.1)$$

Here F_i^* is the gross reservation wage rate of the firm for individual i. This maximum amount to be paid by the employer is determined by the marginal productivity of the potential employee. The variables ZF_{i1}, ..., ZF_{im} are observed characteristics of individual i that affect his or her productivity; e.g. age, sex and level of education. However, the amount that a firm is prepared to pay probably also depends on the economic situation. We therefore include the unemployment rate and an indicator for the business cycle as explanatory variables. We also included time dummies to capture possible changes in the production structure. Unobserved characteristics that influence productivity, like firm-specific skills that are not expressed by education or experience (or age), are included in the error term ε_{iF}.

3.2. Wage rate

The wage rate has been based on the productivity equation. We assume that the employer approximately knows the individual's productivity. Therefore, the wage rate can be set equal to the (unobserved) productivity. Moreover, we introduce dynamics by linking the wage rate to the labor market situation (MR). This has been measured by the number of involuntary unemployed divided by the sum of this number and the number of employees (all in the preceding year), in which we distinguish between 18 segments. The segments are determined by level of education (low, middle, high), age ((30 years, 31-45 years, (45 years) and sex. The coefficients with respect to MR have been based on Van Soest and Kalwij (1996, p. 39). So, we have for the wage rate W^*:

$$\ln W_i^* = \ln F_i^* + \eta_s MR_s(-1) + \varepsilon_{iME} \quad (3.2)$$

in which s is the segment individual i belongs to. The observed wage rates have been calculated from the reported labor income and the number of worked hours. Measurement errors will be present for various reasons. The measurement error has been included in the model by adding an extra error term ε_{iME} to eq. (3.2). We assume that this error term is distributed normally with expectation 0 and standard deviation σ_{me}.

3.3. Labor supply

Next to the reservation wage of the firm, the reservation wage of the individual plays a role. The latter describes the supply side of the labor market. The reservation wage has implicitly been modeled via the individual preferences. The preferences of individuals are expressed by a direct utility function. We distinguish two groups. Group I only considers his or her own labor supply. This refers to singles, single parents, children living with their parents, other household members not being head or partner, and members of non-family households. Group II takes into account the labor supply by the partner. These are married or cohabiting men and women. Utility has been modeled as a function of (own) worked hours (h) and the net income per week (y), and for group II also the number of hours worked by the partner (hp). In the latter case income y includes the partner's income. We use a flexible utility function, quadratic in worked hours and income:[1]

$$U(v) = v'Av + b'v \quad (3.3)$$

with

$v = (y,h)'$	group I
$v = (y, h,hp)'$	group II

A is a 2x2 (group I) or 3x3 (group II) matrix, b is a two (group I) or three dimensional (group II) vector. To allow the utility function to vary with taste shifters the parameters may vary with a vector X of individual and household characteristics. As taste shifters we use age, sex, number of children, age of the youngest child, level of education and dummies for single parents and persons living at their parents. We also use the unemployment rate and a business cycle indicator in order to reflect the impact of the macroeconomic situation on labor supply.

The data give information on various types of unemployment benefits. However, this only holds for those persons who are actually unemployed. Unemployment benefits depend on labor history and age and have a limited duration (at most five years for persons above the age of 40). Due to the static nature, labor history is not available in the model. We therefore only take into account the social assistance a household receives when household income (excluding family

allowances) is below the official poverty line. As a consequence, unemployment benefits are ignored.[2] On the other hand, other income (including family allowances) has been included. The income of other household members has been left out of consideration. This implies that labor supply of children living with their parents does not depend on the parents' earnings and labor supply of parents is independent from the children's earnings.

Following Van Soest (1995), utility maximization has been approached by replacing the actual choice set by a finite number of points. Utility maximization takes place by finding the best point in this finite set. To that end we do not need to require that the tax system and benefits system is piecewise linear or convex. We normalize the full-time working week at 40 hours. For both single and joint decision makers we use eleven points ($n=11$). These correspond with no working (0 hours) and working for 4, 8, 12, ..., 40 hours, respectively. Joint decision makers maximize their joint utility function on the basis of the hours worked by both partners. Net income y now is the sum of the labor income of both plus possible additional income and / or social assistance minus income tax payments and social insurance contributions.[3] If one of both partners is involuntary unemployed, utility is maximized over the set of working hours, under the restriction that the unemployed partner does not work.

Finally, we introduce fixed costs of working (fcw). Models without fixed costs of working generally underpredict the number of non-workers and overpredict the number of (small) part-time jobs. One way to repair this is the inclusion of fixed costs of working; see Van Soest (1995). This makes not working more attractive than working a few hours per week. We model the fixed costs as a combination of individual and household characteristics (Z_1, ..., Z_r) and a constant:

$$fcw = \delta_0 + \delta_1 Z_1 + ... + \delta_r Z_r \qquad (3.4)$$

One has to bear in mind that we do not have any specific information with respect to these fixed costs. This means that we introduce these as an unobserved latent variable. This variable refers to both actual costs (like travel costs and costs of day care) and immaterial costs (like factors that limit the acceptation of a paid job; think of time and search costs). We cannot distinguish between these components in the model. As explanatory variables we use the same variables that were used as taste shifters, except the economic climate indicators. Instead of these latter variables, we include time dummies. The development in the parameter values of these time dummies reflects social developments that affect these fixed costs (in a positive or negative way). One can think of the availability of child care facilities inside or outside the workplace, travel costs, time costs of traffic congestion, and so on.

The fixed costs are incorporated in the utility function by replacing income y_j by $y_j - fcw_j$ if individual j works.

GEV I errors have been added to the utility values of all alternatives in the finite choice set. The errors can be considered as the random part of the evaluation of each alternative. We now get:

$$u(v_j) = U(v_j) + \varepsilon_j, \quad j=0, ..., n \qquad (3.5)$$

This is similar to a multinomial logit model. The probability that an individual chooses alternative j, conditional on wage rate, tax and benefit rules, exogenous variables and random preferences has now been given by:

$$P\{j\} = exp\{U(v_j)\} / \Sigma_k \, exp\{U(v_k)\}, \; j=0, ..., n \qquad (3.6)$$

The probabilities for persons without a partner can be determined in an analogous way.

3.4. Minimum wage

We apply the gross legal minimum (youth) wage M. In practice the applied minimum may deviate from the legal minimum wage. One reason for this is that the legal minimum wage refers to the amount to be paid per week and the weekly number of hours in a full-time job differs over branches. Another reason is the existence of salary scales, of which the lowest wages are above the minimum wage. Moreover, it is possible that firms pay less than the minimum wage as a consequence of illegal practices or ignorance. We therefore introduce T^*, the minimum wage rate that is relevant for the employer. This variable will not be observed in practice. We assume that its logarithm depends on the logarithm of the gross legal minimum wage, the level of education and an error term following a normal distribution with mean 0 and standard deviation σ_t^{educ}. We now can determine the probability that the individual's productivity is above the minimum wage that is of importance for the employer. For each level of education we have: $P(\ln F^* > \ln T^* | \ln F^*) = \Phi([\ln F^* - \alpha + \beta \ln M] / \sigma_t)$, in which Φ equals the distribution function of the standard normal distribution. This implies that we allow the possibility of offering a job to someone with productivity below the legal minimum wage. It also allows the possibility of not offering a job to a person with productivity

above the minimum wage.

3.5. Productivity, preferences and minimum wage

On the basis of the foregoing we are able to derive the following probabilities for each individual:

1. the probability that a person will be prepared to work against the legal minimum wage or the market wage, if higher; in this case his or her reservation wage (R^*) is below the maximum of the legal minimum wage rate and the offered wage rate W^*: $R^* < max(M, W^*)$

2. the probability that a person's productivity (as required by the employer) is above the minimum wage relevant for the employer: $F^* > T^*$.

This gives us the following four possibilities:

1. $R^* > max(M, W^*), F^* < T^*$ (A+P)

The individual has a reservation wage above the maximum of the legal minimum wage and the market wage. Therefore he or she will not be prepared to work: the poverty trap (A) applies. Productivity is below the minimum wage relevant to the employer, so that the productivity trap (P) also applies.

2. $R^* > max(M,W^*), F^* \geq T^*$ (A)

The individual has a reservation wage above the maximum of the legal minimum wage and market wage. Therefore he or she will not be prepared to work and the poverty trap (A) applies. Productivity is above the minimum wage relevant to the employer: the productivity trap does not apply and the individual is voluntary unemployed.

3. $R^* \leq max(M, W^*), F^* < T^*$ (P)

The individual has a reservation wage below the maximum of the legal minimum wage and his or her market wage. The poverty trap therefore does not apply. However, productivity is below the minimum wage relevant to the employer, so that the productivity trap (P) applies. This person is involuntary unemployed.

4. $R^* \leq max(M, W^*), F^* \geqq T^*$ (W)

The individual has a reservation wage below the maximum of the legal minimum wage and his or her market wage. The poverty trap therefore does not apply. Productivity is above the minimum wage relevant to the employer and the productivity trap does not apply. This person will work (W).

We now determine for each person for each group the probability that s/he is in that group. The poverty trap has been considered here in a broad sense. Usually this concerns people who enjoy a benefit and do not want to work. Here, it also refers to, for example, persons who do not receive any benefit, but do not work at all, because their partner has a sufficiently high income or assets are large enough to live from.

3.6. Estimation

The model has been estimated using all observations in the sample with the exception of those who are not available for the labor market (see section 2). We apply simulated maximum likelihood. This is among other things due to the point that unobserved wages for unemployed persons have been replaced by predictions. The prediction errors will be substantial. One possibility is to integrate out the disturbance term of the wage equation in the likelihood. However, this may be computationally burdensome in case of partners. We therefore approximate this integral by a simulated mean. For each individual whose wage is unknown, we take R draws from the distribution of the error term(s) in the wage equation(s) and compute the average of the R likelihood values, conditional upon the drawn error. This estimator is a special case of smooth simulated maximum likelihood. It is asymptotically equivalent to maximum likelihood for large R, see Hajivassiliou and Ruud (1994). Our results have been based upon $R = 10$. In former applications using similar models it appeared that this is enough to get reliable estimates; see Van Soest (1995) and Van Soest and Das (2001). For the estimation results we refer to Nelissen(2005).

4. Simulation of policy measures

4.1. Description of policy measures

The model can be used to estimate the effects of various possible labor market instruments on employment. Here, we look at the impact of the following ten alternatives.

1. The impact of the Specifieke Afdrachtkorting (SPAK), a wage costs grant

The Specifieke Afdrachtkorting (SPAK) aims at maintaining and creating low paid labor by means of a decrease of the labor costs for the employer. The SPAK affects employment via a lowering of the labor costs and, consequently, lowers the productivity trap. Employers receive a reduction on the taxes and social security contributions to be paid for employees who earn less than 115% of the statutory minimum wage. The SPAK has been introduced in 1996. It amounted to €538 on an annual basis in 1996. It has been increased in 1997 and 1998. From 1998 it amounts to about 10% of the wage costs at the minimum wage level. In 2000 it was €1836. In the years 2003-2005 it will be abolished.

2. The introduction of an Earned Income Tax Credit (EITC) on an hourly basis

An EITC influences the net labor income and

affects the labor supply decision in this way, or the poverty trap. Here, we introduce (in stead of the SPAK) an EITC that amounts to €1000 for full-time working persons earning less than 115% of the legal minimum wage. This amount has been lowered in a linear way to €0 for persons earning 150% of the legal minimum wage. This measure has the same costs as the SPAK (€0,9 billion)

3. An increase of the tax allowance for workers

An alternative for the EITC is a general increase of the tax allowance for working persons. Using again €0.9 billion as a starting-point, each working person receives a net amount of €165 per annum. This again combats the poverty trap.

4. A change in the social assistance benefit

Lowering the social assistance benefit (without decreasing the legal minimum wage) will make work pay better and, consequently, will lower the poverty trap. We discuss the impact of a decrease of the social assistance benefit by 5%.

5. A change in the minimum wage combined with a change in the social assistance benefit

In this alternative we lower both the social assistance benefit and the legal (gross) minimum wage by 5 %. This policy measure both affects the poverty trap and the productivity trap.[4]

6. A higher tax exemption for working couples and single parents with young children

The poverty trap is in particular of importance for persons with young children. One way to combat this is to increase the tax exemption for working parents with young children. To that end we introduce an extra tax exemption of net €1,560 per annum for women when children younger than 12 years are part of the household and half this amount if the youngest child is between 12 and 17 years of age. The amount only holds if the single parent or both parents are working for at least 20 hours per week. The total cost of this measure also amount € 0.9 billion.

7. A higher child allowance for all, or only for working persons

Actually, a higher child allowance for working persons has the same effects as a higher tax exemption for households with children, albeit that the exemption now depends on the number of children present in the household. As a consequence, one might expect a higher participation rate of women with (young) children as compared to alternative 6. We apply the same conditions: the higher child allowance only holds if the single parent or both parents are working for at least 20 hours per week. The increase of the child allowances has been set to 70%, giving again additional costs of €0.9 billion.

8. A higher compensation for childcare

The high costs of childcare are often seen as one of the major limitations for partners with young children to participate both. Here we look at the impact of a decrease of the childcare costs of 25%. To that end we include the results of a reduced form model for the costs of childcare costs; see Appendix A. We also discuss a weekly subsidy of €28 per child aged 0 to 3 years and €14 per child between 4 and 12 years of age for full-time working wives (and proportionally lowered amounts for part-time working wives) under the condition that the single parent or both parents are working for at least 20 hours per week. The total costs of the latter measure again amount to €0.9 billion

9. A change in the social assistance earnings test and income test for the unemployment benefit

An alternative to make work pay better is to apply the earnings test less strictly. As an example we look at a policy in which the social assistance benefit is not lowered by 100% of the labor income, but by only 75%. In another variant labor income is lowered by 90%. In addition, the income test for the unemployment benefit has been adjusted in an analogous way.

10. More restrictive requirements for persons with a social assistance or an unemployment benefit.

As we do not explicitly model job arrivals, we are not able to include the effect of sanctions for unemployed persons who show low efforts with respect to finding a job. To get some insight in the possible impact of sanctions we reduce the social assistance or unemployment benefit for persons who have proportionally high changes to get offered a job. This has been implemented by lowering the benefit by 25% for singles whose probability that the firm's reservation wage (F^*) is larger than the minimum wage costs (T^*) is 90% and by 10% when the probability amounts to between 80 and 90%. For joint decision makers the discount amounts to 25% if $P\{F^*>T^*\}$ is larger than 90% for both partners, 17.5% if the probability is larger than 90% for one partner and between 80 and 90% for the other partner and equals 10% if $P\{F^*>T^*\}$ is between 80 and 90% for both partners.

We have to note that our model does not take into account the impact of changes in tax rates or public debt for financing these instruments. As

the SPAK is an existing scheme (that costed about €0,9 billion in 2000) and - as far as possible - we use a budget of the same amount for the other policy measures (albeit this does not hold for the measures mentioned under point 4, 5, 9 and 10). This means that we can compare the effects of the measures mentioned under 1, 2, 3, 6, 7 and 8 without problem. For example, our results actually show what will be the effect if the SPAK has been replaced by, for example, an EITC as described before. The impact of the measures mentioned under 4, 5, 9 and 10 will probably be larger with respect to the (positive) employment effects as they also result in lower distortions.

4.2. Simulation results

The impact of these 10 policy measures is shown in table 2-4. Table2 shows the impact on both the number of persons that participates and the number of full-time jobs in 2000. This table also shows the impact of the economic climate on the results. To that end we take the economic situation mid 2002 as a starting-point. The proportional impact for various subgroups (single and joint decision makers, men, women, educational and age groups) can be found in table 3. For example, the SPAK results in an increase of 17,000 full-time jobs. This implies an increase of total employment by 0.24%. Among married and cohabiting women (Fj in the table), employment increases by 0.37%. So, the proportional impact amounts to (0.37/0.24) = 1.5 for this group. Analogeously, the impact for persons aged 30 to 45 years of age is 0.6 as for this group employment increases by 0.14%. Table 4 shows the impact of the policy measures on the productivity and poverty trap.

The SPAK results in an increase of the number of employees by 30,000 in 2000. The employment gain in full-time equivalent jobs amounts to 17,000. These persons were involuntary unemployed before, as the SPAK resists the productivity trap. Women, people younger than 35 years of age and low-educated persons profit most from the SPAK. The total costs of the SPAK amounted to about 0.9 billion euro in 2000. If this amount had been used to implement an EITC or an extra tax allowance for workers, the employment gain would be smaller. The EITC increases participation by 12,000 persons in 2000. However, the EITC also affects the hours decision. As a

Table 2: Effect of policy measures on employment in 2000 and in 2000 using the economic climate of mid 2002: participation (Nrs) and equivalent fulltime jobs (Hrs) in thousands, total costs (in billion €) and the costs per extra job in thousands of euros (K€).

Policy measure	2000 (Nrs)	2000 (Hrs)	Econ climate 2002 (Nrs)	Econ climate 2002 (Hrs)	Costs 2000	Per job 2000
1. Impact SPAK	+30	+17	+62	+38	0.9	K€ 53
2. EITC	+12	+14	+15	+18	0.9	K€ 64
3. Tax allowance	+6	+8	+8	+10	0.9	K€ 112
4. Social assistance – 5%	+8	+12	+9	+11		
5. Minimum wages and social assistance – 5%	+44	+35	+50	+38		
6. Tax exemption young children	+19	+31	+20	+30	0.9	K€ 29
7. Child all. workers +70%	+18	+31	+21	+28	0.9	K€ 29
8. Childcare costs -25%	+9	+10	+5	+6	0.2	K€ 42
Subsidy per worked hour	+29	+28	+28	+27	0.9	K€ 32
9. Less strict earnings test	–6	–19	–5	–17		
(25 resp. 10%)	–4	–9	–2	–8		
10. More strict rules	+29	+38	+22	+28		
Impact economic climate 2002	–262	–243				

Tab1e 3: The (full-time equivalent) employment effect (All) and the relative effects specified by subgroups (see text)

Policy measure	All	Mj	Fj	Ms	Fs	Education			Age		
	*1000					L	M	H	Y	M	O
SPAK	17	0.3	1.5	1.0	1.6	2.6	0.7	0.0	2.5	0.6	0.7
EITC	14	0.3	1.4	1.6	1.7	2.1	0.9	0.2	1.3	0.9	1.1
Tax allowance	8	0.3	1.3	1.1	1.6	1.2	1.0	0.8	0.5	0.8	1.7
Social assistance –5%	12	1.0	0.2	1.9	3.2	1.4	1.1	0.5	1.3	0.4	1.7
Soc.ass+min.wages–5%	35	0.7	0.6	2.4	2.5	1.3	1.2	0.3	1.9	0.7	1.0
Tax exempt yng children	31	0.1	1.9	0.0	1.8	1.2	1.1	0.7	0.7	1.5	0.5
Child all workers +70%	31	0.1	2.0	0.0	1.4	1.2	1.0	0.8	0.2	1.6	0.5
Child care costs –25%	10	-0.2	2.6	0.0	0.3	1.2	1.0	1.0	1.5	1.4	0.0
Child care costs/hour	28	-0.3	2.4	0.0	1.1	1.1	1.1	0.8	0.7	1.7	0.1
Soc. ass earn test –25%	-19	1.1	0.3	0.8	3.0	1.3	1.0	0.8	0.7	0.5	2.0
More strict rules	38	0.8	0.4	1.4	3.5	1.4	1.0	0.6	0.3	0.6	2.0
Economic climate 2002	-243	-0.1	0.4	4.3	4.3	1.1	1.0	0.9	2.3	0.7	0.8
SPAK based on economic climate 2002	38	0.1	0.8	2.8	3.5	2.4	0.8	0.1	3.4	0.5	0.5

Mj = male joint decision makers; Fj = female joint decision makers; Ms = male single decision makers; Fs = female single decision makers;
Level of education: L = low; M = middle; H = high;
Age group: Y = up to 30 years of age; M= 30 up to 45 years of age; O = 45 years and over.

Table 4: The impact of labor market measures and conditions on employment, the poverty trap and the productivity trap in 2000 (participation)

	Employment	Poverty trap	Productivity trap
SPAK	+30,000	0	–30,000
SPAK and economic climate 2002	+62,000	0	–62,000
EITC	+12,000	–14,000	+2,000
Tax exemption	+6,000	–6,500	+500
Social assistance –5%	+8,000	–9,000	+1,000
Social assistance + min. wages –5%	+44,000	–4,000	–40,000
Tax exemption young children	+19,000	–20,500	+1,500
Child allowance workers +70%	+18,000	–19,500	+1,500
Child care costs –25%	+9,000	-10,000	+1,000
Child care costs/hour	+29,000	-32,000	+3,000
Social assistance earnings test –25%	–6,000	0	+6,000
Social assistance more strict rules	+29,000	–30,000	+1,000
Economic climate 2002	–262,000	+71,000	+191,000

consequence, the employment gain in terms of full-time equivalents is larger, to wit 14,000. So, replacement of the SPAK by an EITC will result in employment for 18,000 persons, whereas the loss in equivalent full-time jobs amounts to 3,000. Low-educated persons have the largest advantage of the EITC, married men and high-educated persons the lowest. The impact of the extra tax allowance is smaller. Participation increases by 6,000 persons and employment increases by 8,000 full-time equivalent jobs. This measure is in particular attractive to older persons. Again, married men hardly profit from the measure. Both the EITC and extra tax allowance tackle the poverty trap. However part of the group has a too low productivity, which results in an increase of the number of involuntary unemployed persons (the productivity trap). The costs per created full-time job are rather high in 2000. An extra job created by the SPAK costs €53,000; for the EITC the costs of an extra full-time job amount to €64,000 and for the extra tax allowance even €112,000.

A lowering of the social assistance benefit by 5% tackles the poverty trap. It results in an increase of employment by about 8,000 persons and a bit higher increase in full-time equivalents. In combination with a decrease of the minimum wage by also 5%, the employment gain is much larger. Now, participation grows by 44,000 persons and in terms of full-time jobs the gain amounts to 35,000 jobs. About one tenth of these were before voluntary unemployed persons, the remaining part refers to former involuntary unemployed persons. The lower social assistance results in particular in employment gains for single women and to a lower extent single men, low-educated persons and older people. The combination of a lower social assistance and a lower minimum wage especially improves employment among singles and young people.

The extra tax exemption for single parents who work at least 20 hours per week and families with children, where both partners also work at least 20 hours per week each, results in an extra employment of almost 20,000 persons (in full-time equivalents 31,000 jobs). The resulting costs per extra (full-time) job are €29,000. An alternative is to raise child allowances by 70% for those persons who meet the aforementioned hours restriction. The impact of this measure is about the same. Raising or lowering child allowances unconditionally hardly affects employment.[5] Also subsidizing childcare costs affects employment in an only limited way. Lowering these costs by 25% results in an increase of employed persons by less than 10,000 persons.[6] All these measures are advantageous to women with a partner in particular and, to some extent, to low-educated persons. Young persons benefit most from the lower childcare costs, whereas the tax exemption for young children and child allowances are proportionally more beneficial to middle-aged persons.

A larger impact of childcare subsidies on participation has been found by linking the subsidy to the number of children and the number of hours worked by the wife. A weekly subsidy of €28 per child aged 0 to 3 years and €14 per child between 4 and 12 years of age for full-time working wives (and proportionally lowered amounts for part-time working wives) increases participation by 29,000 persons. However, the employment gain is about the same as for the tax exemption and higher child allowance for working families (about 30,000 full-time jobs). So, replacement of the SPAK by one of these related measures will result in an increase in the number of equivalent fulltime jobs. As the total costs of the measure again amount to €0.9 billion, an extra full-time job also costs about K€30 in 2000. This measure is more beneficial with respect employment of middle-aged women and middle-educated women (as compared to the lowering of child care costs by 25%). All these policy measures with respect to the costs of young children tackle the poverty trap. Also here, part of the group that is prepared to work now has a too low productivity, which results in an increase of the number of involuntary unemployed persons (the productivity trap). This amounts to about 10% of the group that now is prepared to participate.

A less strict earnings test (income test) with respect to social assistance results in a decrease of employment. If it is allowed to keep 10% (25%) of other income, the number of employed persons declines by 4,000 (6,000); in full-time equivalents the loss amounts to 9,000 (19,000) jobs. This measure actually strengthens the poverty trap. The impact is the largest for single women, low-educated persons and older people.

The reduction of the social assistance benefit for persons with a high probability that their productivity exceeds the minimum wage costs (indicated by 'more strict rules') tackles the poverty trap. It results in an increase of the number of employed persons by 29,000 in 2000. Also, part-time employment is promoted by this measure: the number of jobs in full-time equivalents increases by over 38,000 in 2000. Singles, low-educated persons and older people are most sensible to this measure.

Changes in the economic climate affect employment. This effect runs via three ways: (1)

the reservation wage of the employer is affected by the change in the economic climate; (2) the market wage rate is influenced by the unemployment rate and (3) labor supply is sensitive to changes in the economic climate. If the economic climate of mid 2002 would have been at work in 2000, this would have resulted in a loss of 243,000 full-time jobs and 262,000 persons would have lost their job.[7] This in particular refers to young single persons. The decreased participation is the consequence of both the poverty trap (discouraged worker effects) and the productivity trap. The latter dominates: 70% of the decrease in participation has been related to the productivity trap. As a consequence, policy measures that combat the productivity trap have a larger impact during a recession. For example, whereas the SPAK results in an increase of 17,000 full-time jobs in 2000, its effect would be much larger under the economic climate of 2002. Now its impact amounts to almost 62,000 persons, that share 38,000 full-time jobs. In stead of K€53, the costs of an extra job due to the SPAK now amount to less than €24,000.

The EITC and tax allowance also result in a higher employment gain in economic bad times, but the impact is smaller than found for the SPAK: the impact is 4,000 and 2,000 jobs respectively higher as compared to 21,000 extra jobs for the SPAK. A lower social assistance is somewhat less effective during a recession and due to that the impact of a combination of both a lower benefit and a lower minimum wage is rather limited. The policy measures that refer to the presence of young children are also less effective during a recession. Discouraged worker effects do play a role here. On the contrary, less strict rules with respect to the earnings test result in a somewhat smaller loss of jobs when the economic climate is rather bad. The reduction of the social assistance benefit for persons with a high probability that their productivity exceeds the minimum wage costs has a smaller impact when the economic climate deteriorates. This is caused by the higher requirements put forward by employers under these circumstances. This actually increases the poverty trap.

4.3. Comparison with other studies

With respect to the SPAK we find an impact of 17,000 full-time jobs in 2000. Using results from a questionnaire among employers, Van Polanen Petel et al. (1999) found a positive net effect of 44,000 to 76,000 jobs. In contrast, Mühlau en Salverda (2000) report no positive effect applying a cross-sectional analysis at the meso level. Our result corresponds to the findings of the CPB Netherlands Bureau for Economic Policy Analysis. Werkgroep Toekomst van het Arbeidsmarktbeleid (2001) reports an extra employment of 20,000 jobs.

Van Soest, Euwals and Donkers (1996) and Van Soest and Kalwij (1996) simulated the impact of a wage costs subsidy for the year 1988. Here, the subsidy amounts to €2700 for employees with a gross wage rate below 110% of the minimum wage (WML), to €1800 if the gross wage rate is in between 110 and 120% WML and €900 if the gross wage rate is in between 120 and 130% WML. Both find an employment increase of about 0.6 percentage points, which is considerably higher than found by us.

CPB Netherlands Bureau for Economic Policy Analysis reports a proportionally large impact with respect to the EITC. An employment gain of 30,000 jobs is to be expected, using the same total amount (€0.9 billion); see Werkgroep Toekomst van het Arbeidsmarktbeleid (2001, appendix 5). Applying a tax allowance for workers, the employment gain is about 10,000 jobs, which corresponds well with our findings. This implies that according to Werkgroep Toekomst van het Arbeidsmarktbeleid (2001) the EITC results in a larger employment gain in comparison with the SPAK. This is among other things related to the way in which we take into account the impact of the replacement rate on wage formation. In our model the impact is only indirectly. Changes in the replacement rate influence labor supply, that in turn affects the labor market indicator *MR* in the productivity equation. In the CPB model there also exists a direct relationship. On the other hand, the CPB uses a much larger labor supply elasticity for married women.

Earlier research with respect to the effects of childcare subsidies on labour supply is inconclusive. Graafland (2000) reports a reduced form elasticity between the average childcare costs and the labor supply of partners with children of -0.15. This results from the assumption that changes in the childcare costs have the same impact as equivalent changes in the net wage. As a result, the impact of lowering childcare costs results in an effect that is three times as high as our simulation results.[8] Graafland points at the possibility that his results might overestimate the labor supply effect as he does not take account of endogenous changes of childcare subsidies. Other studies for the Netherlands, like Groot and Maassen van den Brink (1992), and more recently, Dobbelsteen et al. (2000), do not find a significant effect of child care costs on participation.

The foregoing shows that our results with respect of the EITC and childcare subsidy deviate from the resuls reported by CPB Netherlands

Bureau for Economic Policy Analysis. This is partly related to the circumstance that our model focuses on the labour market, whereas CPB applies a general equilibrium model. Therefore, we are not able to take into account the impact that runs through markets, whereas CPB does. For example, higher employment may result in higher domestic consumption volumes, that in turn leads to an additional (small) increase in employment. Another difference, as said, refers to the way the replacement ratio affects wage setting. Differences also exist with respect to the wage elasticities, in particular the elasticities that refer to partners. CPB assumes an elasticity of 1.0. This elasticity has been based on estimation results and literature overviews that refer to the mid 1980s. Our estimates are in the range of 0.3 to 0.4. These latter estimates are more in line with findings for other countries applying more recent data.

4.4. Implications for Japan

Although the study refers to the situation in the Netherlands, the results might also be of importance for Japan. A first important finding is that combatting the poverty trap partly results in an increase of the productivity trap. The problem here is that there is a group of persons that has a small willingness to work, but at the same time has a very low productivity. If policy measures force them to start looking for a job (for example, due to a lowering of social assistance benefits), they have an only small probability to find a job due to their low productivity. In stead of voluntary unemployed, they will become involuntary unemployed. The Japanese public assistance scheme appears to fail to appreciate this problem. As a consequence, low productive persons and also parents of low productive children up to 20 years of age have to bear a burden that hardly can be influenced by them.

Another possibly relevant finding is that unconditional child allowances and extra child care facilities - policy measures that might play a role in Japan due to the concern with respect to low fertility - increase labour participation to an only limited extent. If these policy measures are also meant to promote participation, it is recommendable to link extra benefits and provisions to the number of hours worked by the family members. It is also important to note that lowering child care costs is in particular advantageous for higher educated persons, whereas increases in child allowances are in particular at help for lower and middle educated persons.

A third remark concerns youth unemployment. We find that labour costs subsidies (like the SPAK) particularly promote employment among low-educated young persons. We also find that productivity strongly increases at young ages when experience increases (not shown in this paper). This is an indication that specific labour costs subsidies for young low-productive persons might help to prevent them from long-term unemployment. Such a labour costs grant has a greater impact than measures that combat the poverty trap.

A fourth remark refers to changes in the pension system. Due to the population ageing Japan has gradually delayed the pensionable age for the *Employees' Pension Insurance* from 60 to 65 years of age. Although the larger part of the Japanese (male) population is still at work in this age bracket, the higher pensionable age can result in an increase of involuntary unemployment, as the productivity function shows a large decrease from the age of about 60 year, in particular for lower educated persons. This possibly results into a larger appeal for the *Old Age Continuous Employment Benefits* and in this way the lower budget needs for the pension system are partly undone by higher budget needs for the unemployment insurance.

5. Conclusions

In this contribution we have looked at the impact of various policy measures on employment in the Netherlands. To that end we applied a static structural microeconomic model of the Dutch labor market. This model contains a productivity equation that describes the demand side of the labor market, a wage function, a labor supply function and an equation that describes minimum wage costs. The model also takes into account the impact of the business cycle. The model allows us to look at the impact of very specific policy measures.

An important finding is that we do not find evidence for a positive impact of higher minimum wages on employment. In contrary, we find a negative influence. Model simulations also show that it is less simple to combat the poverty trap (voluntary unemployment) as compared to the productivity trap (involuntary unemployment). However, efficiency gains can be achieved if more tailored policy measures are taken. Table 5.2, for example, shows that the SPAK is in particular effective to young, low-educated singles. We also find that generic policy with respect to the costs of child care is less effective as compared to a policy that connects benefits to the number of hours worked. It further appears that the economic climate largely affects the impact of some policies. Policy measures like labor costs reduction appear to be more effective in economic bad times, whereas other ones (like EITC) have a more stable impact.

This might plea for a more specific application of various labour market instruments.

A disadvantage of the model presented is that the model has a partial nature. Therefore, we are not able to take into account the impact that runs through markets. On the other hand, this impact is mostly moderated in comparison with the initial effect. Another point is that the model is a static one. This among other things affects for example the way in which the wage equation has been specified. The replacement ratio and tax rates now only affect the wage setting process in an indirect way via the labor supply equation. This problem can be solved in a dynamic model. Another point that deserves attention is to what extent e.g. labor costs reductions are shifted forward to employees and thereby result into higher wages.

Further improvements are possible in order to derive the impact of even more specific measures. As said, one can think of a dynamic setting. In that case it is recommendable to include disability and pension decisions. Then, we will also be able to look at the impact of various policy measures that run via social insurance schemes. Secondly, it is possible to desaggregate the labor market further by region and / or industrial sector. This offers the possibility of the development of even more tailor-made policy measures.

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Notes

1 When leisure is used in stead of worked hours, we get the same specification for the preferences; the parametrization only changes.

2 Sensitivity analyses shows that this assumption hardly affects the results.

3 The net income has been derived from the gross wage using standard tax-deductable items.

4 The gross minimum wage for adults amounted to C=2.406 per month in 2000 (or C=15.78 per hour, including 8% holiday allowance and assuming a 38 hours working week). About 300,000 persons receive the minimum wage.

5 Not included in the tables.

6 The low impact of changing child care costs on employment is in accordance with findings by Dobbelsteen et al. (2000) who report an insignificant impact of lower child care costs on employment.

7 If the economic climate of 1990 or 1995 had been at work in 2000, employment would have been lowered by 35,000 full-time equivalent jobs, whereas the economic situation in 1998 would result in 55,000 fewer jobs.

8 This corresponds with the difference in the wage elasticity for partners.

References

Abowd, J.M., F. Kramarz, D.N. Margolis and T. Philippon (2000) *The Tail of Two Countries: Minimum Wages and Employment in France and the United States.* IZA DP No. 203, Bonn: IZA.

Brown, C. (1999) Minimum Wages, Employment and the Distribution of Income. In: O. Ashenfelter and D. Card (eds.) *Handbook of Labor Economics*, vol. 3B. Amsterdam: North-Holland, 1201-1263.

Burkhauser, R.V., K.A. Couch and D.C. Wittenburg (2000) A Reassessment of the New Economics of the Minimum Wage Literature with Monthly Data from the Current Population Survey. *Journal of Labor Economics*, 18, 653-680.

Card, D. and A.B. Krueger (1994) Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *American Economic Review*, 84, 772-793.

Card, D. and A.B. Krueger (1995) *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton, NJ: Princeton University Press.

Currie, J. and B.C. Fallick (1996) The Minium Wage and the Employment of Youth: Evidence from the NLSY. *Journal of Human Resources*, 31, 404-428.

Dickens, R., S. Machin and A. Manning (1999) The Effects of Minimum Wages on Employment: Theory and Evidence from Britain. *Journal of Labor Economics*, 17, 1-22.

Dobbelsteen, S.H.A.M., S.S. Gustafsson and C.M.M. P. Wetzels (2000) *Child care in the Netherlands between government, firms and parents*. Mimeo, University of Amsterdam.

Graafland, J.J. (2000) Childcare subsidies, labour supply and public finance: an AGE approach. *Economic Modelling*, 17, 209-246.

Groot, W. and H. Maassen van den Brink (1992) *Labor supply and non-parental child care demand*. RM 920, Amsterdam: UvA.

Hajivassiliou, V.A. and P.A. Ruud (1994) Classical estimation methods for LDV models using simulation. In: Engle, R.F. and D.L. McFadden (eds.) *Handbook of Econometrics*, Vol. 4, Amsterdam: North-Holland, 2383-2441.

Kramarz, F. and T. Philippon (2001) The impact of differential payroll tax subsidies on minimum wage employment. *Journal of Public Economics*, 82, 115-146.

Machin, S. and A. Manning (1994) The Effects of Minimum Wages on Wage Dispersion and Employment: Evidence from the U.K. Wages Councils. *Industrial Labor Relations Review*, 47, 319-329.

Moffitt, R.A. (1999) Welfare Programs and Labor Supply. In: A.J. Auerbach and M.D. Intriligator (eds.) *Handbook of Public Economics*, vol. 4. Amsterdam: North-Holland, 2393-2430.

Muhlau, P. and W. Salverda (2000) Employment effects of low-wage subsidies: The case of 'SPAK' in the Netherlands. In: W. Salverda, C. Lucifora en B. Nolan (eds.) *Policy measures for low-wage employment in Europe*. Cheltenham: Edward Elgar.

Nelissen J. (2005). The Impact of Various Policy Measures on Employment in the Netherlands. Project Report on the Role of Social Security in the Era of Changing Family Structure and Working Style (March 2005).

Van Polanen Petel, V.C.A., T.W. Hu, J. de Koning and C. van der Veen (1999) *Werkgelegenheidseffecten van de SPAK en VLW*. Rotterdam: NEI.

Van Soest, A.H.O. (1989) Minimum wage rates and unemployment in the Netherlands. *De Economist*, 137, 279-309.

Van Soest, A.H.O. (1995) Discrete choice models of family labor supply. *Journal of Human Resources*, 30, 63-88.

Van Soest, A.H.O. and M. Das (2001) Family labor supply and proposed tax reforms in the Netherlands. *De Economist*, 149, 191-218.

Van Soest, A.H.O., R. Euwals and B. Donkers (1996) *Arbeidsparticipatie, lonen, uitkeringen en werkgelegenheid*. The Hague: Vuga.

Van Soest, A.H.O. and A. Kalwij (1996) *Loonvorming en werkgelegenheid in Nederland*. The Hague: Vuga.

Van Soest, A.H.O. and A. Kapteyn (1988) *Minimumlonen en de werkloosheid in Nederland*. Tilburg: EIT.

Werkgroep Toekomst van het Arbeidsmarktbeleid (2001) *Aan de slag*. The Hague: Ministerie van Sociale Zaken en Werkgelegenheid.

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Appendix : A reduced form model for the costs of childcare.

For the analysis of the impact of child care subsidies on labor participation, we used a reduced form model, which has been estimated using data from the OSA Labour supply panel 2000. The costs of childcare have been determined in six steps:

1. A logit model that indicates whether mothers with children of 0 to 3 years of age make use of childcare has been estimated.
2. An OLS-model for the number of daily periods has been estimated for mothers with children of 0 to 3 years of age that make use of childcare.
3. A logit model that indicates whether mothers with children of 4 to 12 years of age make use of childcare has been estimated.
4. An OLS-model for the number of daily periods has been estimated for mothers with children of 4 to 12 years of age that make use of childcare.
5. A logit model that indicates whether it concerns paid childcare has been estimated.
6. An OLS model for the amount of childcare costs has been estimated.

The model results can be found below.

1. Logit model for childcare for children aged 0-3

Number of obs = 255
LR chi2(5) = 122.29
Log likelihood = -115.59188
Pseudo R2 = 0.3460

Variable	Coefficient	Standard error	t-value
h_f	0.235	0.037	6.42
$h_f * h_f$	-0.004	0.00093	-4.37
# ch 0412	-0.463	0.162	-2.86
Edl4f	1.102	0.392	2.81
Edl5f	2.582	1.183	2.18
Constant	-1.674	0.386	-4.33

h_f is the number of hours worked by the mother; # ch04 is the number of children aged 4 to 12 years; Edl4f (Edl5f) is a dummy variable that equals one if the mother has finished vocational colleges (university).

2. Number of daily periods childcare (0-3 years)

Number of obs = 129
F(1,127) = 18.94
Adj R-squared =0.1229
Root MSE = 1.8971

Variable	Coefficient	Standard error	t-value
h_f	0.069	0.016	4.35
Constant	2.484	0.370	6.71

3. Logit model for childcare for children aged 4-12

Number of obs = 490
LR chi2(5) = 144.53
Log likelihood = -181.02196
Pseudo R2 = 0.2853

Variable	Coefficient	Standard error	t-value
h_f	0.100	0.021	4.78
$h_f * h_f$	-0.00086	0.00037	-2.34
Edl4f	0.632	0.268	2.36
Age yng child (B)	0.934	0.211	4.42
B * B	-0.073	0.015	-4.87
Uses ch care 0-3	2.831	0.524	5.41
Constant	-5.534	0.770	-7.18

h_f is the number of hours worked by the mother; Edl4f is a dummy variable that equals one if the mother has finished vocational colleges; Age yng child is the age of the youngest child; Uses ch care 0-3 is a dummy variable that equals one if the mother makes use of childcare for children aged 0-3 years.

4. Number of daily periods childcare (4-12 years)

Number of obs = 118
F(1,116) = 19.92
Adj R-squared =0.1392
Root MSE = 1.6735

Variable	Coefficient	Standard error	t-value
h_f	0.054	0.012	4.46
Constant	1.291	0.328	3.93

5. Logit paid childcare (if childcare)

Number of obs = 201
LR chi2(5) = 38.76
Log likelihood = -87.507536
Pseudo R2 = 0.1813

Variable	Coefficient	Standard error	t-value
Uses ch care 0-3 (a)	0.325	0.129	2.53
Uses ch care 4-12 (b)	0.392	0.205	1.91
(a) * (b)	-0.118	0.0146	-2.55
h_f	0.054	0.021	2.50
Edl45	1.559	0.460	3.39
Constant	-1.259	0.538	-2.34

Uses ch care 0-3 is a dummy variable that equals one if the mother makes use of childcare for children aged 0-3 years; Uses ch care 4-12 is a dummy variable that equals one if the mother makes use of childcare for children aged 4-12

years; hf is the number of hours worked by the mother; Edl45f is a dummy variable that equals one if the mother has done vocational colleges or university.

6. Costs of childcare (if paid childcare)

Number of obs = 156
F(3,152) = 27.55
Adj R-squared =0.3395
Root MSE = 366.16

Variable	Coefficient	Standard error	t-value
Uses ch care 0-3 (a)	0.325	0.129	2.53
Uses ch care 4-12 (b)	0.392	0.205	1.91
(a) * (b)	-0.118	0.0146	-2.55
h_f	0.054	0.021	2.50
Edl45	1.559	0.460	3.39
Constant	-1.259	0.538	-2.34

Uses ch care 0-3 is a dummy variable that equals one if the mother makes use of childcare for children aged 0-3 years; Uses ch care 4-12 is a dummy variable that equals one if the mother makes use of childcare for children aged 4-12 years.