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Dismissal through Disability

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## Dismissal through Disability

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### Abstract

*If a firm wants to reduce its workforce, it may dismiss some of its workers. Alternatively, it may make workers eligible for disability benefits. Upon examination these workers formally satisfy the conditions for disability enrolment. Because these conditions allow for a rather liberal interpretation of disability, these workers could have stayed on their job had they not become redundant. We use data on Dutch firms to show that at the end of the 1980s about 10 percent of the observed inflow into disability were in fact dismissals.*

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## **1. Introduction**

A firm that wants to reduce the size or to change the composition of its workforce, may choose between three methods to get rid of the redundant employees. It may induce employees to quit, it may dismiss employees, or it may make employees eligible for disability benefits. In case of an induced quit there are no separation costs involved. The other two methods have costs that may differ substantially. In the sequel we will not attempt to give a comprehensive analysis of the choice and the use of the three methods but we restrict ourselves to the two methods that involve costs. In particular we focus on the use of enrolment into disability as an alternative to dismissal.

The rules that determine the eligibility for disability benefits restrict these benefits to persons who are no longer able to work due to health problems. Because of the imperfect verifiability of these health problems and the lower costs for both employer and employees associated with a transition to disability, it has been and still is attractive to use disability as an alternative to dismissal.

The number of claimants of disability benefits is substantially larger in The Netherlands than in other European countries. For example, in 1990 there were 139 claimants for every 1000 workers in the Netherlands. For Sweden this number was 78, for Germany 43 (Aarts, Dercksen and De Jong, 1993). This raises the suspicion that a substantial fraction of the claimants was made eligible because of redundancy, and not because of poor health. This suspicion is confirmed in a number of studies which are discussed below.

We use micro-data on Dutch firms to test the hypothesis that separations into disability have been used as an alternative to dismissals. To be specific we use data on the dismissal and disability rates of firms to estimate the fraction of the desired dismissals that was channelled into disability. We find that about 10% of the new disability claimants became eligible because their job was redundant.

The paper is organised as follows. Section 2 gives a brief history of disability insurance and describes the arrangements with respect to dismissal and eligibility for disability and discusses the incentives that result from these arrangements. Section 3 describes the data. Section 4 presents the statistical model and the estimation results. Section 5 concludes.

## **2. Dismissals and disability: institutional arrangements**

In 1967 the comprehensive disability insurance for employees (WAO) was introduced in the Netherlands.<sup>1</sup> Under the terms of this law workers were insured against wage loss due to long term disability. From then on if a worker became ill, he was allowed to claim a benefit under the illness scheme for a maximum period of one year. After that he could claim a disability benefit. Workers were entitled to disability benefits after a so called disability examination, which consisted not only of a medical examination but also of an investigation of the labour market position of the worker. A worker could also be considered disabled if there was no suitable job for him at his own educational level in his previous occupation. Furthermore, unemployment was 'internalized', which means that those workers who were considered to be partially (more than 15%) disabled, could collect full disability benefits because it was assumed that partially disabled were doomed to remain unemployed. The benefit had a maximum of 80% of the wage in the last job. Disability benefits could be collected until age 65.

Since the introduction of the comprehensive disability insurance the number of workers collecting disability benefits has increased from 150,000 to about 850,000 in the beginning of the 1990s. This huge increase in the number of disability benefits induced the government to change the structure of the disability benefit system.<sup>2</sup> In 1981 the rules to calculate the wage in the last job changed: tips and overtime were no longer included in the calculations. In 1985-87 the maximum percentage of 80% of the previous wage was reduced to 70%. In 1987 there was a major restructuring of the disability benefit system of which the main objective was to reduce the inflow into disability. The most important change was the abolition of the 'internalization of unemployment' rules. Partially disabled workers were considered as such and were expected to find a job or claim unemployment benefits for their remaining work capacity. In the early 1990s there were some further changes. For employers the disability insurance premium was experience rated, the disability examination no longer took the availability of suitable jobs with respect to education and previous occupation into consideration, the duration of the benefit was limited to five years after which a re-examination had to take place and, all disabled workers younger than 50 years had to be re-examined.

Our data relate to the end of the 1980s, a period in which the institutional arrangements with respect to dismissal and eligibility for disability benefits provided strong incentives to employers and employees to use disability as an alternative to

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<sup>1</sup> In The Netherlands disability rules are given in the 'Wet op de Arbeidsongeschiktheid' (WAO) and the 'Algemene Arbeidsongeschiktheidswet' (AAW). Privately employed workers get benefits through the WAO-program, whereas the AAW covers all residents, aged 18-64.

<sup>2</sup> We do not discuss all the changes but restrict ourselves to some important examples.

dismissal.<sup>3</sup>

A dismissal occurs if a labour contract is dissolved unilaterally by a firm. The Netherlands has, like many other European countries, laws that protect workers from unjustified dismissals. The employer must give a reason for the dismissal and not all reasons are acceptable. We can distinguish between three types of reasons.

First, an employer may dismiss a worker immediately, if the worker fails to perform his tasks. The worker may challenge this decision in court. Second, an employee may be dismissed, if the relationship between the individual employee and the employer has become untenable. Third, a dismissal may be the consequence of the redundancy of the job of the employee. In order to dismiss a worker for one of these reasons, an employer must either ask permission from the regional employment office or obtain the approval of a district court.<sup>4</sup> Usually a permission from the employment office is needed in case of dismissal of a group of workers. Approval by the court may be preferred by the employee, because court settlements, in contrast to permissions by the employment office, usually grant redundancy pay to the dismissed employees. In 1990 62,000 permits were given by the employment offices and about 10,000 dismissals were approved by the courts.<sup>5</sup>

Dismissing workers by either of these methods is costly. First, the dismissal procedure takes time. The firm has to wait until the employment office or the court has reached a decision, which takes four to six weeks.<sup>6</sup> If the dismissal is approved, there is a period of advance notice of maximumally thirteen weeks. This waiting period is expensive for the firm, because it has to pay the wage of the redundant employee. The employment office does not award redundancy pay. In case of a group dismissal, i.e. more than 20 workers within three months, redundancy pay may be claimed by unions. Redundancy pay may also be imposed in a court settlement. Finally, some, mainly large, firms supplement the unemployment benefits, which replace at maximum 70% of the last wage, to 100% for some period.<sup>7</sup> After dismissal a firm is not allowed to replace a worker within 3 months (Aarts and De Jong, 1992), and this may cause additional costs to the employer.

Dismissals are also costly for workers. The unemployed worker has to search for a job.<sup>8</sup> The period that the unemployed worker receives unemployment benefits depends on his work history and age. After exhaustion of the unemployment benefits the worker may apply for means-tested public assistance.

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<sup>3</sup> See also Aarts and De Jong (1992, Chapters 2, 5 and 8).

<sup>4</sup> See article 1639w of the Dutch civil code.

<sup>5</sup> The actual number of dismissals is higher because these numbers include dismissals of groups of workers, though it is likely that the court mainly has cases of individual workers.

<sup>6</sup> Cases in which there is a pro forma defence of the worker last on average 2 weeks.

<sup>7</sup> A survey of the Ministry of Social Affairs and Employment (1989) shows that 7.5 percent of the firms supplemented the income of dismissed workers.

<sup>8</sup> Except for persons older than 57.5 year, who get an unemployment benefit until their retirement.

A transition into disability is costly for employers for several reasons. A worker only qualifies for disability benefits if he has been on sick leave for a year. Sick pay starts after two days of sick leave, and workers receive 70% of the gross wage. Most firms supplement sick pay to the level of the net wage and also pay for the first two days (Ministry of Social Affairs and Employment, 1989). Because illness insurance is only partially experience rated,<sup>9</sup> firms bear only a fraction of the direct costs of a sick leave. A sick leave has no effect on the worker's income. After one year a sick worker may apply for disability benefits. As indicated before, workers get both a medical examination and an investigation of the labour market position. On the basis of these examination an expert determines what type of work the worker should be able to do. There is strong evidence that not all disability entrants were carefully examined. In 1987 37% of the applicants got a so called 'reduced procedure' which did not involve a medical examination (Aarts and De Jong, 1992).

Disability insurance is only partially experience rated since the insurance premiums are only industry specific and do not depend on the disability record of the individual firm. Disability benefits are higher than benefits of long-term unemployed workers. Moreover, during the first (two) year(s) of disability 62% of the firms paid the difference between the disability benefit and the previous net wage of their former employees (Ministry of Social Affairs and Employment, 1989).

There is empirical evidence that in The Netherlands disability insurance has been used to get rid of redundant employees. Van den Bosch and Petersen (1983) use data on Dutch industries for 1968 - 1979 to show that the growth of disability incidence rates can to a large degree be explained by deteriorating economic conditions<sup>10</sup> Roodenburg and Wong Meeuw Hing (1985) use sectoral data to conclude that in 1981 about 35% of the annual inflow was related to labour market conditions. Aarts and De Jong (1992, Chapter 5) use micro data on the 1980 inflow into disability insurance to demonstrate that about 30-50% of the workers collecting disability benefits were in fact 'hidden' unemployed workers. Aarts and De Jong (1992, Chapter 8) use data on 1311 firms with at least 50 workers, observed in the years 1978 - 1979 to estimate a disability rate equation. They find that a decrease in the employment of a firm has a positive impact on the disability rate of that firm. They conclude that there are underlying firm-specific economic reasons for disability enrolment. Westerhout (1995) uses annual data of 1973 - 1992 to show that about half of the participation in disability schemes can be characterized as hidden unemployment. All these studies refer to the period before 1987, the year of the reform of the social security system. After 1987, the disability component and the unemployment component have been disentangled for the partially disabled workers. Therefore, the reform may have made disability enrolment as an alternative to

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<sup>9</sup> The premium only depends on the industry of the firm.

<sup>10</sup> For a survey of the influence of disability insurance on factor supply, see Danziger et al. (1981).

dismissal less attractive.

All in all the choices of employers and employee with respect to the disability enrolment depend on the balance of costs and benefits. Employers who want to get rid of workers and have two options in doing so may choose the cheapest option. Employees will consider the expected residual life time income of the two options and may also choose the option with the highest expected income. Due to incomplete experience rating employers may prefer disability over dismissal as a method to get rid of redundant employees. Because of the terms of the benefit systems redundant employees may prefer disability over long-term unemployment (Aarts and De Jong, 1992, Chapter 8). For both employers and employees disability may be the optimal choice.

### 3. The data

Our data are from a biannual panel survey of Dutch firms, conducted by Organisation for Labour Market Research (OSA). We use the first two waves of this survey, 1988 and 1990.<sup>11</sup> The sampling units are organisations, which we refer to as firms. These firms are from all economic sectors including government and education, and have at least 10 employees. The sample is stratified according to economic activity and size of the firm (three classes: 10-49, 50-99, 100+ workers).

In each wave two questionnaires are used. The first questionnaire used by enumerators gathers qualitative characteristics and financial data of the firm. Firms that responded to this questionnaire received a second postal questionnaire to collect additional quantitative information about the firm. The response to the second questionnaire is 75-80% of the response to the first one.

In 1988 the sample consisted of 2041 firms, in 1990 of 2017 firms. A large number of the 1988 firms did not respond in 1990, had a substantial change in activities or experienced a merger. Restricting ourselves to the remaining firms, we retain a gross sample of 1168 firms. If we remove those firms of which we do not know dismissal (1988: 359 firms, 1990: 435 firms) and/or disability rates (1990: 433 firms), the variables of interest in this study, we obtain an intermediate sample of 559 firms<sup>12</sup>. After removing firms that do not answer questions on the explanatory variables to be used in the empirical analysis, a net sample of 225 firms remains.<sup>13</sup>

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<sup>11</sup> The surveys are carried out from March 1989 until March 1990, and May 1991 until December 1991, respectively.

<sup>12</sup> The sole purpose of this intermediate sample is to investigate whether the selection introduces a bias.

<sup>13</sup> The main reason for the loss of cases in going from the intermediate to the net sample is the lack of response to the questions 'output' (response of 49%) and 'wage' (response of 38%). 5 firms are not included in the net sample because they contain an outlier in one of the variables (1 outlier for L (9

Our selection contains only a fraction of the firms in the original sample. Table 1 which presents the distribution of firms over economic sectors in the three samples gives a first impression of the selectivity of our dataset.

*Table 1 about here*

Because our statistical model contains lagged variables and we only have information for two years, we use a cross section of firms. This means that the information used for the estimates is mainly from 1990. Definitions of the variables in our analysis can be found in Appendix 1. Employment is measured as the number of employees in December of each year irrespective of the number of hours they worked. Workers with temporary contracts shorter than one year are excluded.<sup>14</sup> In our empirical analysis both dismissals and transitions to disability are expressed as rates, defined as fractions of employment at the start of the year.

Table 1 shows that there are many firms in both our net and our intermediate sample without dismissals or separations into disability in one or both years. In the net sample only 20% of the 225 firms have positive dismissal and disability rates in both years, while in the intermediate sample it is 16%. The differences between the net sample and intermediate sample are not very large.

*Table 2 about here*

Table 3 shows to what extent the dependent variables, the dismissal and disability rates, are affected by the selection process. The average dismissal rate is similar in the gross and net sample. The average disability rates are slightly different, but the difference can be attributed to sampling variability. Table 3 also shows that there are no substantial differences between the averages of other variables in both samples.

*Table 3 about here*

We conclude that the observed characteristics of the net sample do not differ substantially from those of less selective samples.

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standard deviations from the mean), 1 for  $f_{88}$  (10 stand. dev. from the mean), 3 for  $Y_{90}/L_{90} - Y_{88}/L_{88}$  (at least 7.5 stand. dev. from the mean). In the net sample  $f_{90}$  is maximum 0.173 and  $d_{90}$  is maximum 0.100.

<sup>14</sup> On average, the fraction of workers with a temporary contract shorter than one year is 9% of the total number of employees.



## 4. Empirical analysis

### 4.1 The statistical model

A firm has a desired dismissal rate ( $f^*$ ) and a 'true' disability rate ( $d^*$ ). Both rates are unobserved.  $f^*$  consists of the fraction of workers that should be dismissed because of economic reasons.  $d^*$  is the fraction of workers that enroll into disability, because they are unable to work for health reasons.  $d^*$  cannot be influenced by the firm in the short run, although over a longer period of time it may be affected by variables that are under control of the firm, for instance working conditions.  $f^*$  and  $d^*$  are both affected by a vector of exogenous variables  $x_1$ . In addition,  $f^*$  is influenced by  $x_2$  and  $d^*$  depends on  $x_3$ . We specify a linear regression model for  $f^*$  and  $d^*$

$$f^*_i = \beta_1'x_{1i} + \beta_2'x_{2i} + u_{1i}, \quad (1a)$$

$$d^*_i = \beta_3'x_{1i} + \beta_4'x_{3i} + u_{2i}, \quad (1b)$$

where

$$Eu_{1i}u_{2i} = 0$$

$$Eu_{ki} = 0$$

$$Eu_{ki}^2 = \tau_k^2$$

$$k = 1, 2$$

$$i = 1, \dots, N.$$

Index  $i$  refers to firm  $i$ .  $N$  is the number of firms, which is in our case 225. The assumption that the disturbances are uncorrelated after controlling for firm characteristics reflects the fact that the disability rate is given to the firm.

Instead of  $f^*$  and  $d^*$  we observe realized dismissal and disability rates ( $f$  and  $d$ ). If a firm directs a fraction  $\lambda$  of its redundancies into disability,  $f$  is equal to  $(1 - \lambda)f^*$ .  $\lambda f^*$  enrolls into the disability in the current year. Of course, these workers must be 12 months on sick leave and hence, this strategy can only be used if there is a sufficiently large number of workers on sick leave.  $d$  is equal to  $\lambda f^* + d^*$ . Substituting in (1a) and (1b) gives

$$f_i = (1 - \lambda)f_i^* = \gamma_1'x_{1i} + \gamma_2'x_{2i} + v_{1i} \quad (2a)$$

$$d_i = \lambda f_i^* + d_i^* = \gamma_3'x_{1i} + \gamma_4'x_{2i} + \gamma_5'x_{3i} + v_{2i} \quad (2b)$$

with

$$\begin{aligned} Ev_{ki} &= 0, & k &= 1,2 \\ Ev_{1i}^2 &= \sigma_1^2 = (1 - \lambda)^2\tau_1^2 \\ Ev_{2i}^2 &= \sigma_2^2 = \lambda^2\tau_1^2 + \tau_2^2 \\ Ev_{1i}v_{2i} &= \sigma_{12} = \lambda(1 - \lambda)\tau_1^2 \\ \rho_v &= \sigma_{12}/(\sigma_1\sigma_2) \\ \gamma_1 &= (1 - \lambda)\beta_1 \\ \gamma_2 &= (1 - \lambda)\beta_2 \\ \gamma_3 &= \lambda\beta_1 + \beta_3 \\ \gamma_4 &= \lambda\beta_2 \\ \gamma_5 &= \beta_4 \end{aligned}$$

We complete the specification by choosing the variables that are included in  $x_1$ ,  $x_2$  and  $x_3$ .<sup>15</sup> The variables in  $x_2$ , which are supposed to influence the desired dismissal rate are the quit rate, the lagged dismissal rate, the number of workers, the training period on the job, and the share of workers older than 50 years. The variables in  $x_1$ , which affect the both the autonomous disability rate and the latent dismissal rate are the growth (from 1988 to 1990) of the average real wage, the growth (from 1988 to 1990) of the average real productivity. The variables in  $x_3$  which influence the autonomous disability rate are the share of part-time workers, the working conditions and the share of workers on sick leave. Table 3 presents the averages of the variables in our sample (Appendix 1 gives definitions).

The statistical model must allow for the zeros in the dependent variables, and for the correlation of the disturbances. Hence, we estimate the model (2a)-(2b) as a bivariate Tobit. For ease of exposition we rewrite (2a,b) in obvious notation

$$\begin{aligned} f_i &= \omega_1'z_{1i} + v_{1i} \\ d_i &= \omega_2'z_{2i} + v_{2i} \end{aligned} \quad (3)$$

Define the indicator functions

$$I_{ki} = I(k_i > 0), \quad k = f, d$$

The likelihood function of (3) is

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<sup>15</sup> In a companion paper Hassink and Van Ours (1995) motivate the choice for the variables in  $x_1$  and  $x_2$ .

$$\begin{aligned}
& \prod_{i=1}^N \left[ \phi_2 \left( \frac{f_i - \omega_1' z_{1i}}{\sigma_1}, \frac{d_i - \omega_2' z_{2i}}{\sigma_2}; \rho_v \right) \right] I_n I_{di} \\
& * \left[ \Phi_1 \left( \frac{-\omega_1' z_{1i} - \rho_v \frac{\sigma_1}{\sigma_2} (d_i - \omega_2' z_{2i})}{\sigma_1 (1 - \rho_v^2)^{1/2}} \right) * \phi_1 \left( \frac{d_i - \omega_2' z_{2i}}{\sigma_2} \right) \right] I_{di} (1 - I_n) \\
& * \left[ \Phi_1 \left( \frac{-\omega_2' z_{2i} - \rho_v \frac{\sigma_2}{\sigma_1} (f_i - \omega_1' z_{1i})}{\sigma_2 (1 - \rho_v^2)^{1/2}} \right) * \phi_1 \left( \frac{f_i - \omega_1' z_{1i}}{\sigma_1} \right) \right] I_n (1 - I_{di}) \\
& * \left[ \Phi_2 \left( \frac{-\omega_1' z_{1i}}{\sigma_1}, \frac{-\omega_2' z_{2i}}{\sigma_2}; \rho_v \right) \right] (1 - I_n) (1 - I_{di}) \tag{4}
\end{aligned}$$

with  $\phi_1(\cdot)$ ,  $\Phi_1(\cdot)$  ( $\phi_2(\dots; \rho_v)$ ,  $\Phi_2(\dots; \rho_v)$ ) the univariate (bivariate) normal p.d.f and c.d.f., respectively. Maximum likelihood estimates of the parameters are obtained by maximizing (4) with respect to the parameters.

Estimates of the parameters of the structural model (1) can be obtained from the reduced form parameters by means of the minimum distance method (Chamberlain, 1984). The parameters of the reduced form model (2a,b) can be arranged in a 22-dimensional vector

$$\theta = (\gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5, \sigma_1, \sigma_2, \rho_v)$$

The structural model follows from the reduced form model by imposing restrictions

$$g(\pi) = \theta \tag{5}$$

where  $\pi$  is a 17-dimensional vector of structural parameters<sup>16</sup>

$$\pi = (\lambda, \beta_1, \beta_2, \beta_3, \beta_4, \tau_1, \tau_2)$$

Let  $\theta_N$  be the maximum likelihood estimator of  $\theta$ . An efficient minimum distance estimate of  $\pi$  is obtained by minimizing the quadratic form

$$Q_N(\pi) = (\theta_N - g(\pi))' (\text{var} \theta_N)^{-1} (\theta_N - g(\pi))$$

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<sup>16</sup>  $(\gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5, \sigma_1, \sigma_2, \rho_v)$  is related to  $(\beta_1, \beta_2, \beta_3, \beta_4, \tau_1, \tau_2, \lambda)$  by means the following restrictions:  $\gamma_1 = (1 - \lambda)\beta_1$ ,  $\gamma_2 = (1 - \lambda)\beta_2$ ,  $\gamma_3 = \lambda\beta_1 + \beta_3$ ,  $\gamma_4 = \lambda\beta_2$ ,  $\gamma_5 = \beta_4$ ,  $\sigma_1 = (1 - \lambda)\tau_1$ ,  $\sigma_2 = (\lambda^2\tau_1^2 + \tau_2^2)^{0.5}$ ,  $\rho_v = \lambda\tau_1/(\lambda^2\tau_1^2 + \tau_2^2)^{0.5}$

The structural model is exactly identified if the dimensions of  $\theta$  and  $\pi$  are equal. The dimension of our  $\theta$  is larger than that of  $\pi$ , which means that our structural model is overidentified. It is possible to test the overidentifying restrictions. Under the null hypothesis that the restrictions are satisfied  $Q_N$  has a Chi-square distribution and the number of degrees of freedom is equal to the number of overidentifying restrictions.

## 4.2 Estimation results

The first column of Table 4 presents the estimation results for the reduced form model.

*Table 4 about here*

The second column shows the estimation results of the structural form. Unfortunately, the test statistic  $\chi_{(5)}^2$  rejects the overidentifying restrictions at the 5 percent level, but not at the 1 percent level. It appears that  $\lambda$  is significant and equals 0.095, which implies that 9.5 percent of the desired dismissals has separated by disability enrolment and about 12 percent of the observed disability rate would have been dismissed otherwise. We checked the sensitivity of this result by adding variables that only appear in the structural dismissal rate equation to the structural disability rate equation, i.e. adding variables from  $X_2$  to  $X_1$ . We added the variables fraction employees older than 50 and employment in 1989. As is shown in footnote b in table 4 the estimate of  $\lambda$  is somewhat lower after introducing these variables. Therefore we conclude that about 10 percent of the enrolment into disability is in fact a dismissal.

We next discuss the estimated coefficients of the exogenous variables in the structural model. In the dismissal equation the wage growth has a positive sign. The coefficient of the lagged dismissal rate reflects the magnitude of adjustment costs (see Hassink and Van Ours, 1995). A larger coefficient indicates higher adjustment costs. The size of the firm has a positive effect on the dismissal rate. An interpretation of this may be that conditional on other firm characteristics and economic circumstances large firms will get rid of workers more quickly. Larger firms have a higher recruitment potential, so for them it is easier to rehire workers. The average time spend on the job to become productive has a negative impact on the dismissal rate. The share of the older workers has a negative impact on dismissals, which may be explained by the high costs involved in firing older workers.

Next, we consider the coefficients of the variables in the disability rate equation. Only the fraction of workers on sick leave in 1988 has a significant coefficient. The variable reflects the working conditions in firms. It has a positive impact, which is of course plausible.

## **5. Conclusions**

If a firm wants to reduce its workforce, it may dismiss some of its workers. Alternatively, it may make some workers eligible for disability benefits. Upon examination these workers formally satisfy the conditions for disability enrolment. Because these conditions allow for a rather liberal interpretation of disability, these workers could have stayed on their job had they not become redundant. We have demonstrated that at the end of the 1980s employers in the Netherlands used separations into disability as an alternative to dismissal. Our estimates imply that about 10% of the transitions into disability are due to redundancy of the worker. Note that this behaviour may not be in conflict with social security laws, because the workers satisfy the conditions for disability enrolment. An implication of our result is that also after the social security reform of 1987 disability enrolment was used by some employers and employees to avoid dismissals. However, comparing our results with those from previous analyses we conclude that this type of behaviour is much less common than before the reform.

## References

Aarts, L.J.M., Dercksen, W.J., and Jong, Ph.R. de (1993), "Arbeidsongeschiktheid, een Internationale Vergelijking" ("Disability, an International Comparison"), Sociaal Maandblad Arbeid, 755-769.

Aarts, L.J.M., and Jong, Ph.R. de (1992), Economic Aspects of Disability Behavior, Amsterdam: North-Holland.

Bosch, F.A.J. van den, and Petersen, C. (1983), "An Explanation of the Growth of Social Security Disability Transfers," De Economist, 131, 65-79.

Chamberlain, G. (1984), "Panel Data," in Z. Griliches and M.D. Intriligator, editors. Handbook of Econometrics, Volume 2, New York, North-Holland.

Danziger, S. Haveman, R.H., and Plotnick, R. (1981), "How Income Transfer Programs Affect Work, Savings, and the Income Distribution; a Critical Review," Journal of Economic Literature, 19, 975-1028.

Hassink, W.H.J., and Ours J.C. van (1995), "The Determinants of Hiring and Firing," mimeograph, Erasmus University Rotterdam.

Ministerie van Sociale Zaken en Werkgelegenheid (1989), "Bovenwettelijke Uitkeringen na de Stelselwijziging Sociale Zekerheid" ("Extrajudicial Benefits After the Social Security Reform"), Research Memorandum, The Hague.

Roodenburg, H.J., and Wong Meeuw Hing W.J.M.L. (1985), "De Arbeidsmarktcomponent in de WAO" ("The Labour Market Component of the Disability Insurance"), Occasional Paper, 34, The Hague, Central Planbureau.

Westerhout, E.W.M.T. (1995), "Arbeidsongeschied of Werkloos?" ("Disabled or Unemployed?"), Occasional Paper, 120, The Hague, Central Planbureau.

## Appendix 1 Definition of Variables

The variables are defined as follows. The quotes are translations of the relevant questions in the questionnaire.

### Employment, L:

"How many workers were employed in your organization in December 1988 (1990) (no temporary workers). This concerns the number of employees irrespective of the number of hours worked." The numbers of employees in December 1987 and December 1989 are constructed by means of the hires (H) and the separations (S) of employees during 1988 (1990), which are measured in the survey:  $L_{t-1} = L_t - H_t + S_t$ .

### Dismissals, F, and transitions into disability, D:

"How many employees left your organization in 1988 (1990), excluding employees with a temporary contract shorter than one year." The questionnaire distinguishes 5 reasons for leaving the firm:

- pension, early retirement, death;
- separations because of disability (D);
- dismissal (F);
- quit (Q);
- end of temporary contract with a duration > one year.

### Wage, w:

The annual gross wage in the organization at the time of the survey. The employer is asked to distinguish the salary levels of the employees in three groups where all have an equal number of employees. For each group, the maximum and the minimum wage are registered. The average wage is constructed as

$$\sum_i (L_i/L) * (w_i^{\min} + w_i^{\max}) / 2$$

where  $w_i^{\min}$  and  $w_i^{\max}$  are the minimum and maximum wage level, respectively.  $L_i$  is the number of employees in each group. The nominal wage is deflated by 1988: 100, 1990: 103.

### Sales, Y:

"Sales of the firm before taxes in thousands of guilders in 1988." (1990). Unfortunately the questionnaire is not more specific about the tax. Rather we would have used the value added of the firm, but this information is not available. Nominal sales are deflated by 1988: 100, 1990: 103.

### Training period:

Dummy variable which is one in case of a start-up period longer than 300 days. (This variable is from the first questionnaire gathering qualitative information)

**Age  $\geq$  50:**

Number of employees older than 50 years.

**Part-time:**

Number of part-time employees in December.

**Bad working conditions:**

Dummy variable which is one in case of physically (or mentally) strenuous working conditions inside the firm. (This variable is from the first questionnaire gathering qualitative information)

**Illness:**

Average number of employees absent due to illness in 1988.



**Table 1 Firms by economic sector in shares; net, intermediate and gross sample<sup>a)</sup>**

|                      | Net sample  | Intermediate sample | Gross sample |
|----------------------|-------------|---------------------|--------------|
| SBI 0-3              | 0.29        | 0.25                | 0.31         |
| SBI 5                | 0.05        | 0.08                | 0.08         |
| SBI 6                | 0.05        | 0.09                | 0.10         |
| SBI 7,8              | 0.24        | 0.21                | 0.22         |
| SBI 4 and 90         | 0.17        | 0.14                | 0.11         |
| SBI 92               | 0.03        | 0.05                | 0.04         |
| SBI 9, except 90, 92 | <u>0.17</u> | <u>0.18</u>         | <u>0.14</u>  |
|                      | 1.00        | 1.00                | 1.00         |
| Number of firms      | 225         | 559                 | 1168         |

a) The SBI-classes are according to the Standard Industrial Classification of the Netherlands, Netherlands Central Bureau of Statistics, 1974. The seven strata are: agriculture, mining and manufacturing (0-3); construction (5); trade, hotels, cafes, restaurants and repair of consumer goods (6); transport, storage, communication, banking, insurance (7,8); government and public utilities (4 and 90); education (92); other services (9, except 90 and 92).

**Table 2 Dismissals (F) and transitions into disability (D), percentage of firms, net and intermediate sample<sup>a)</sup>**

|          | Net sample  | Intermediate sample |
|----------|-------------|---------------------|
| F=0, D=0 | 0.45        | 0.50                |
| F=0, D>0 | 0.24        | 0.21                |
| F>0, D=0 | 0.11        | 0.13                |
| F>0, D>0 | <u>0.20</u> | <u>0.16</u>         |
|          | 1.00        | 1.00                |
| N        | 225         | 559                 |

a) N is the total number of observations used.

**Table 3 Means of the variables, net and gross sample<sup>a)</sup>**

| Variable                         | Net sample |         | Gross sample  | Number of firms<br>in gross sample <sup>b)</sup> |
|----------------------------------|------------|---------|---------------|--|
| <u>Dependent variables</u>       |            |         |               |  |
| $f_{90}$                         | 0.0081     | (0.001) | 0.0078(0.001) | 733  |
| $d_{90}$                         | 0.0074     | (0.001) | 0.0078(0.001) | 735  |
| <u>Firm characteristics</u>      |            |         |               |  |
| $w_{90} - w_{88}$                | 0.190      | (0.04)  | 0.216 (0.03)  | 439  |
| $Y_{90}/L_{90} - Y_{88}/L_{88}$  | 0.210      | (0.07)  | 0.161 (0.04)  | 572  |
| $q_{90}$                         | 0.065      | (0.004) | 0.076 (0.003) | 737  |
| $f_{88}$                         | 0.0080     | (0.001) | 0.010 (0.001) | 809  |
| $L_{89}$                         | 1.29       | (0.10)  | 1.17 (0.05)   | 835  |
| <u>Adjustment costs</u>          |            |         |               |  |
| Start-up $\geq$ 300 days         | 0.222      | (0.03)  | 0.261 (0.01)  | 1168   |
| <u>Personnel characteristics</u> |            |         |               |  |
| Age $\geq$ 50                    | 0.129      | (0.005) | 0.126 (0.003) | 844  |
| Part-time                        | 0.196      | (0.02)  | 0.182 (0.01)  | 830  |
| <u>Working conditions</u>        |            |         |               |  |
| Bad conditions                   | 0.787      | (0.03)  | 0.738 (0.01)  | 1168   |
| Illness in 1988                  | 0.072      | (0.003) | 0.071 (0.002) | 768  |

a) Standard deviations of the means are in parentheses. Units of the variables:  $f$ ,  $d$  and  $q$  are fractions of employment at the beginning of the year; age, part-time and illness in 1988 are fractions of employment at the end of the year; bad conditions and start-up are dummy variables;  $L$  is in hundreds of workers;  $w_{90} - w_{88}$  is the change of the yearly gross real wage, measured in ten thousands of guilders (average  $w_{88}$  is 4.19);  $(Y_{90}/L_{90} - Y_{88}/L_{88})$  is in hundred thousands of guilders (average  $Y_{88}/L_{88}$  equals 3.61);  $N$  is the number of firms.

b) For every variable the number of firms in the gross sample is equal to 1168 minus the number of missing observations of that specific variable; the number of firms in the net sample is 225.

**Table 4 Estimation results bivariate Tobit regression, reduced and structural form<sup>a)</sup>**

|                                 | Reduced form     | Structural form  |
|---------------------------------|------------------|------------------|
| <b>Dismissal rate</b>           |                  |                  |
| $w_{90} - w_{88}$               | 0.011 (1.66)*    | 0.013 (2.36)**   |
| $Y_{90}/L_{90} - Y_{88}/L_{88}$ | -0.0006 (0.13)   | -0.0009 (0.25)   |
| $q_{90}$                        | -0.039 (0.52)    | -0.049 (0.85)    |
| $f_{88}$                        | 0.402 (2.05)**   | 0.472 (3.06)**   |
| $L_{89}$                        | 0.005 (2.08)**   | 0.007 (3.30)**   |
| Start-up $\geq$ 300 days        | -0.019 (1.75)*   | -0.023 (2.72)**  |
| Age $\geq$ 50                   | -0.062 (1.15)    | -0.076 (1.80)*   |
| Constant                        | -0.026 (2.13)**  | -0.030 (3.16)**  |
| $\sigma_1$                      | 0.048 (10.32)*** | -                |
| $\tau_1$                        | -                | 0.053 (27.03)*** |
| <b>Disability rate</b>          |                  |                  |
| $w_{90} - w_{88}$               | -0.007 (1.79)*   | -0.008 (3.01)**  |
| $Y_{90}/L_{90} - Y_{88}/L_{88}$ | 0.002 (0.98)     | 0.002 (1.20)     |
| $q_{90}$                        | -0.025 (0.67)    | -                |
| $f_{88}$                        | 0.108 (0.99)     | -                |
| $L_{89}$                        | 0.004 (3.45)**   | -                |
| Start-up $\geq$ 300 days        | -0.006 (1.22)    | -                |
| Age $\geq$ 50                   | -0.029 (0.99)    | -                |
| Part-time                       | -0.012 (1.29)    | -0.010 (1.60)    |
| Bad conditions                  | 0.046 (0.88)     | 0.060 (1.63)     |
| Illness 1988                    | 0.192 (3.46)**   | 0.176 (4.52)***  |
| Constant                        | -0.022 (2.74)**  | -0.017 (3.66)*** |
| $\sigma_2$                      | 0.026 (12.07)*** | -                |
| $\tau_2$                        | -                | 0.025 (65.79)*** |
| $\rho_v$                        | 0.085 (0.82)     | -                |
| $\lambda$                       | -                | 0.095 (2.96)**   |
| $\chi_{(5)}^2$ <sup>b)</sup>    | -                | 11.95**          |
| N                               | 225              | 225              |

\* Statistically significant from zero at the 10% level.

\*\* Statistically significant from zero at the 5% level.

\*\*\* Statistically significant from zero at the 1% level.

a) Absolute t-values are in parentheses; N is the number of observations used to estimate the model;  $\sigma_k$ ,  $k=1,2$ , is the standard error of the regression of the reduced form estimates;  $\tau_k$ ,  $k=1,2$ , is the standard error of the regression of the structural form;  $\rho_v$  is the correlation coefficient in the error structure of the reduced form;  $\chi_{(5)}^2$  is a Chi-square test on overidentification with 5 degrees of freedom.

b) We experimented with additional variables in the structural disability equation: 1) inclusion of Age  $\geq$  50 gives  $\lambda = 0.0937$  (2.89)\*\* and  $\chi_{(4)}^2 = 11.84$ \*\* ; 2) inclusion of  $L_{89}$  gives  $\lambda = 0.063$  (1.86)\* and  $\chi_{(4)}^2 = 2.46$ .