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**Adverse selection in disability insurance:
empirical evidence for Dutch firms**

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Abstract in English

In this paper, we analyse the employers' decision to opt out of the public disability insurance (DI) system. For the empirical analysis we use an extensive panel of Dutch employers for the period 2000-2002. We find that cross-subsidies employers pay or receive under the current public insurance system of experience rating contribute to the opting out decision. Since cross-subsidies are risk related, this is an indication for the presence of adverse selection: high risk (cross-subsidised) firms tend to remain publicly insured, while low risk (cross subsidising) firms tend to opt out. This finding is supported by the fact that risk related characteristics such as the sector of industry and the composition of the work force by age and gender contribute to the explanation of the opting-out decision. Adverse selection could be diminished by setting public premiums in such a way that they are more actuarial fair in the long run. As a result, the risk profile of firms opting out will become more similar to that of firms not opting out.

Key words: adverse selection, cross-subsidies, disability insurance, premium differentiation

Abstract in Dutch

Dit paper analyseert de beslissing van werkgevers om uit de publieke WAO-regeling te stappen ('*opting out*'), gebruikmakend van een groot paneldatabestand voor de jaren 2000-2002. De kruissubsidies die werkgevers betalen of ontvangen onder het huidige PEMBA-systeem blijken een rol te spelen bij de beslissing om al dan niet uit te stappen. Aangezien deze kruissubsidies samenhangen met het arbeidsongeschiktheidsrisico van het bedrijf op lange termijn, is dit een indicatie voor de aanwezigheid van averechtse selectie. Dat wil zeggen dat bedrijven met een hoog arbeidsongeschiktheidsrisico (netto-ontvangers van kruissubsidies) geneigd zijn om publiek verzekerd te blijven, terwijl bedrijven met een laag arbeidsongeschiktheidsrisico (netto-betalers van kruissubsidies) geneigd zijn om uit het publieke systeem te stappen. Deze bevindingen worden ondersteund door het feit dat ook risico-gerelateerde karakteristieken van bedrijven, zoals de sector en de samenstelling van het werknemersbestand naar leeftijd en geslacht, bijdragen aan het verklaren van de *opting-out* beslissing. Averechtse selectie zou kunnen worden verminderd door de gedifferentieerde wao-premies zo te berekenen dat deze meer 'actuarieel fair' zijn op de lange termijn. Het gevolg zal naar verwachting zijn dat het risico profiel van uitstappers meer gaat lijken op dat van publiek verzekerde bedrijven.

Steekwoorden: averechtse selectie, kruissubsidies, WAO, premie differentiatie, PEMBA

Een uitgebreide Nederlandse samenvatting is beschikbaar via www.cpb.nl.

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Summary

In this paper, we analyse the employers' decision to opt out of the public disability insurance (DI) system. We find that cross-subsidies employers pay or receive under the current public insurance system of experience rating contribute to the explanation of the opting out decision. Since cross-subsidies are risk related, this is an indication for the presence of adverse selection: high risk (cross-subsidised) firms tend to remain publicly insured, while low risk (cross-subsidising) firms tend to opt out. This finding is supported by the fact that risk related characteristics such as sector and the composition of the workforce by age and gender contribute to the explanation of the opting out decision. Hence, cross-subsidies influence the composition of the population of firms opting out and firms remaining publicly insured. A dynamic implication is that the public premium will gradually increase, generating new incentives in subsequent periods for adverse selection to continue. Adverse selection could be diminished by setting public premiums in such a way that they are fairer in the long run. As a result, the risk profile of opting out firms will become more similar to that of firms not opting out. Besides cross-subsidies, there are other factors that influence the opting out decision, like risk aversion, transaction costs and disparities in effectiveness and efficiency between private and public disability insurers. Now that the initial phase of the Dutch public DI-scheme has been closed and a financial level playing field is being approached, possible disparities in effectiveness and efficiency between private and public disability insurers are expected to become clearer. Unfortunately, the possibility to opt out has been closed off for small and medium sized firms since mid 2004, since experience rating was abolished and sector wise premiums were introduced for this group. Thus we can no longer infer the effect of financial incentives on the opting out decision for this large group of firms.

1   Introduction

In the present study, we try to determine whether adverse selection plays a role in opting out from the public disability insurance (DI) in the Netherlands, using an extensive set of administrative register data for 2000-2002. Our data are confined to the public insurance, we don't have information on private insurance contracts.

The reason for this study is twofold. First, in 1998 a new public disability insurance scheme was introduced in the Netherlands, featuring opting out and experience rating[1]. Meanwhile, data have become available on this new DI-scheme, making it possible to evaluate the new scheme. Secondly, opting out as a policy option has attracted more attention lately, since the future of the European welfare state and the division of responsibilities over public and private parties has increasingly become subject of discussion. Not only concerning disability insurance (DI), but also in the field of pensions the policy option of opting out is attracting interest[2].

The main research question of this paper is whether adverse selection plays a role in the opting out behaviour of employers. If adverse selection is present then 'good risk' firms tend to opt out while 'bad risk' firms tend to remain in the public system, leading to an upward pressure on the public premium. In order to determine whether this is the case, ideally one first would like to measure the long-term disability risk of each employer. Of course, the underlying risk is unobservable and can only be approximated by a proxy variable. And since we observe only a limited time period in our dataset, we approach the individual long-term disability risk by using data for a reference group, in this case a firm's sector. The proxy variable we use is the amount of cross-subsidies firms receive (or pay). Under the experience rating system that we analyse, the level of cross-subsidies[3] is correlated with the disability risk of a firm. Under the null-hypothesis of no adverse selection we therefore expect that cross-subsidies, being an indicator for the risk of a firm, do not play a significant role in the decision to opt out.

This study contributes to the empirical literature on opting out and adverse selection. The literature dealing with social security privatisation, especially with opting out, is limited. Two types of analyses are common. The first uses large models describing the macro-economic and distributional outcomes of opting out, and the second concerns micro-econometric analysis on insurance data. An example of the first type is Kotlikoff et al. (1998), employing a large scale perfect foresight overlapping generations simulation model to compare the effects of two methods of privatising social security: forced participation in the new privatised system versus allowing people to choose to join the new system (opting out). In this model, workers will choose to opt out of social security if their present value of future social security taxes exceeds the present value of their future benefits, so decisions of agents are mutually dependent. The paper shows that opting out may, despite adverse selection, produce more favourable

[1] Opting out means that firms can decide to leave the public scheme and switch to a private insurance or self-insurance, experience rating means that the public DI-premiums are related to a firm's actual disability record.
[2] Westerhout, E. et al.
[3] For a definition of the cross-subsidies proxy variable, see section 4.2.

macroeconomic and distributional outcomes than forced privatisation. An example of the second type of research is Puelz and Snow (1994), concerning the automobile collision insurance market, using contractual data for the State of Georgia. They test the empirical predictions reached by insurance theory (of which Chiappori (2000) gives an overview). They find an equilibrium with adverse selection and market signalling (low risk types signal their quality by choosing high deductibles), and reject the hypothesis that high risks receive contracts subsidised by low risks. The current study differs from the common micro econometric studies on adverse selection in that no data on private insurance contracts have been used, we are confined to data on the public disability insurance scheme.

This paper is organised as follows. Section 2 handles the background and design of the Dutch DI-system, since some institutional details are to be known to comprehend the subsequent analysis. Section 3 starts with a theoretical background to the empirical analysis and then presents a small model of opting out behaviour. Section 4 gives an overview of the data and presents descriptive statistics on cross-subsidies and on characteristics of firms opting out. Section 5 presents the empirical analysis of the opting out decision. Section 6 concludes.

2 The Dutch Disability Insurance (DI-) Scheme

2.1 Background[4]

In the eighties and nineties of the twentieth century several social security reforms took place in the Netherlands, induced by the high number of inactive people relying on social benefits. After downward adjustment of the statutory benefit levels in the eighties[5] (mostly from 80% to 70% of last earned wages), more fundamental reforms were launched in the nineties. In 1993, eligibility conditions of the disability scheme were tightened. In 1996, the sickness scheme, concerning the first year of sickness, was privatised in order to increase incentives for firms to curb moral hazard and increase prevention and reintegration activities. The compulsory sickness benefit remained at 70% of the last wage earned.

The disability scheme, up to 1998, charged a flat rate to employees, making the system susceptible to moral hazard. In 1998 a new disability scheme was introduced[6], characterised by a premium based on experience rating, imposed on employers. This means that the premium employers pay is related to their individual disability record. The financial burden of the disability risk was shifted to employers since they are thought of as being able to influence this risk. The basic idea behind these policy changes is to increase incentives for employers to reduce the inflow into and raise outflow from the scheme, by enhancing prevention and reintegration efforts. Employers can opt out of the public scheme, either by switching to private insurance or by taking responsibility of the statutory disability benefits themselves (self-insurance). The public system remains mandatory for all disability benefits beyond the fifth year of disability. Benefit levels and entitlement criteria remain to be determined by the government. Claim assessment remains a public task, but the benefit administration and reintegration actions are executed privately once the firm has opted out. Introduction of the possibility to opt out aims firstly at more freedom of choice concerning the insurance of disability risks and secondly at more effectiveness of the administration of disability insurance by breaking the monopoly of the public administrators. Thirdly, third parties are able to offer a complete package of prevention and reintegration measures, creating synergy with the privatised sickness scheme.

After a few years, when the incentives in the maturing scheme had grown stronger, criticism against experience rating increased. In 2003, the individual experience rating premiums were replaced by a uniform premium, at least for small firms.[7] From 2004 on the public premium for

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[4] Based on Besseling, Bovenberg and De Mooij, 1998; Van Sonsbeek and Schepers, 2001 and (concerning the 2006 proposal) on information from the internet site of the Ministry of Social Affairs and Employment.

[5] At that time the majority of sectors then have agreed upon supplements to the statutory benefit levels, for disability as well as sickness payments, though.

[6] Known as the Pemba-law, where Pemba is the abbreviation of 'Premiedifferentiatie en Marktwerking bij Arbeidsongeschiktheidsregelingen', that is 'Premium Differentiation and Competition in Disability Schemes'.

[7] Small firms here are defined by wage sum < euro 625 000 (2005 boundary) (Small firms present 91.6% of the firms and 19.1% of the wage sum in 2001).

small firms is only differentiated by sector. Hence, the incentive to reduce disability costs is considerably smaller than under the system that was in operation up to and including 2002. In 2002 a more stringent system of gate keeping is introduced in the disability scheme, and in 2004 the sickness scheme is extended to a maximum of two years of benefits.

The government has announced to introduce a new system of disability insurance in 2006. The system includes a (permanent) income provision for the fully and permanently disabled. Furthermore, there is an activation scheme for the partially disabled and those who are fully but not permanently disabled. The partially disabled[8] who are working are entitled to a wage top-up; if they are not working they receive a wage-related benefit for an initial period and then a continuation benefit at the minimum level. Experience rating will eventually be abolished in the scheme for fully and permanently disabled if the yearly inflow comes down to 25 000 persons or less. Experience rating and opting out is planned to be maintained (at least for medium sized and large firms) in the schemes for partially disabled and for fully but not permanently disabled, although the exact form is not known yet.

2.2 Design of the experience rating system

The public disability insurance scheme that was introduced in The Netherlands in 1998 is characterised by experience rating. Experience rating implies a backward looking model to set premiums; hence the premium employers pay is related to their past individual disability record. The system of experience rating only applies to the benefits paid during the first five years of disability. Benefits paid in subsequent years are covered by a flat rate, also paid by employers.

The individual premium for year t is determined in two steps. First, the so called variable 'individual risk' d_{it} is calculated by use of experience rating. The firm's total disability costs S_i in year (t-2) (originated in the period (t-7) to (t-2)) are divided by the firm's average wage sum W_i over the period (t-6) to (t-2). The total disability costs in year (t-2) consist of the costs of successive cohorts whose benefits originated in the years (t-7) to (t-2). Thus, the disability risk d_{it} of an employer i at time t is[9]:

$$d_{it} = \frac{\sum_{u=0}^{5} S_{i\ t-2,t-2-u}}{\sum_{u=0}^{4} W_{i\ t-2-u} / 5} \tag{2.1}$$

Since the reference period is only five years, the 'individual risk' d_{it} obviously can differ from the real long-term risk of a firm, say d_i^*.

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[8] This applies to employees who are >35% disabled, employees with a disability percentage <35 are not eligible to these arrangements, they are stimulated to remain at work.

[9] In some cases, the information that is needed to calculate the disability risk may be incomplete. This may occur when employers have started their businesses recently, or when for some period there are no workers at a particular firm. This means that the disability risk has to be calculated over less than five years, but rescaled to a five year period.

A limiting condition in determining the firm's individual premium rates for year t is that the sum of all individual premium rates should cover the total sum of all benefits in year t. A uniform base rate b_t is calculated by dividing the estimated macro disability costs by the estimated macro wage sum for year t. This base rate is a starting value in an iterative process in which the individual premiums and premium limits are determined. The second step then is to calculate the individual premium. The individual premium rate p_{it} is equal to the base rate b_t plus a surcharge or a deduction[10] c_{it}, depending on whether the 'individual risk' exceeds or falls behind the average risk

$$p_{it} = b_t + c_{it} \qquad (2.2)$$

$$c_{it} = (d_{it} - \overline{d_t}), \qquad (2.3)$$

where $\overline{d_t}$ is the average risk over all employers[11]. Note that an implication of the system is that it only offers 'cross sectional' insurance, while on the contrary generic risks over time, for example related to business cycles, are not insured. Finally, p_{it} is trimmed by an imposed upper limit p_{max} and a lower limit p_{min}

$$p_{min} \leq p_{it} \leq p_{max}$$

There are two sets of premium limits, one for small firms and one for medium sized and large firms.[12]

Table 2.1   Determinants of the individual experience rating premiums

	2000	2001	2002
	% of the wage sum		
Upper limit small firms	4.17	4.77	6.06
Upper limit medium sized and large firms	5.56	6.36	8.08
Lower limit small firms	1.24	0.98	1.24
Lower limit medium sized and large firms	0.67	0.41	0.45
Average disability risk $\overline{d_t}$	1.43	1.51	1.75
Base rate b_t	1.54	1.66	2.11

Source: Premiedifferentiatie WAO 2003, Workers Insurance Authority (UWV).

[10] The (backward looking) average disability risk $\overline{d_t}$ might differ from the (forward looking) base rate b_t for a number of reasons, for example when there is an upward or downward trend in disability risk or when for some reason the resources of the disability fund have to be readjusted. Also, b_t contains a flat premium rate to cover for payable benefits of bankrupt firms or firms that otherwise cannot be hold to pay for their own disability claims. Surcharges and deductions are being rescaled in the initial phase of the DI-scheme in order to bring them in proportion with the base rate b_t. The reason is that b_t is initially relatively low compared to d_t because the scheme gradually grows to its mature size during the first five years. From 2003 on rescaling is left out.

[11] $\overline{d_t}$ being the weighted average of d_{it}, weighted by firm size (as calculated by UWV).

[12] The upper limit is set equal to three times the average premium in the case of small firms and equal to four times the average premium for medium sized and large firms.

Incomplete experience rating

Experience rating in the described DI-scheme is incomplete, in the sense that premiums reflect risks imperfectly, for two reasons. First, the variable 'individual risk' is based on a period of only five years. For small firms, this reference period is obviously far too short to reveal their individual long-term risk. Second, the system of experience rating is incomplete due to premium limits. Given the short reference period, premium limits clearly are a necessity to prevent small firms from unbearable premium volatility. But it is useful to be aware of their effects in terms of cross-subsidies between firms and/or sectors. If a subset of firms, for example sector s_i, is overrepresented on the upper premium limit and underrepresented on the lower premium limit, compared to the macro distribution, then sector s_i is a net receiver of cross-subsidies by other sectors in that particular year. The smaller the firm, the higher the chance it will be at one of the premium limits and that in the long run it will pay or receive cross-subsidies. For this group of firms the insurance character of the system is more dominant than for large firms.

The relatively long lag in premium setting constitutes a (short-term) drawback for fast growing firms (especially small and medium sized) facing positive payable benefits. These firms tend to pay a relatively higher nominal premium under the public DI-system compared to the costs they would bear under complete self-insurance (implying instantaneous benefit payments) or with private insurance (which in general contains smaller lags in premium setting). Therefore, a relatively high growth rate of a firm's wage sum may encourage opting out.

2.3 Opting out: design and use

When experience rating was enacted in 1998, not only experience-rating was adopted in the Dutch disability scheme but also opting out was introduced, as is discussed in section 2.1. Each year in January and July firms have the opportunity to exchange public insurance for either an insurance policy with a commercial insurance company or self-insurance. As table 2.2 shows, the number of firms opting out has increased gradually since 1998, although the vast majority of the firms is still in the public scheme. Our data do not allow distinguishing between privately insured and self-insured employers[13]. In 2004 also acquisition activities of insurance companies started to become much more serious[14]. This increased marketing effort was firstly supported by the maturity of the public scheme (making private capital funding more competitive to public pay-as-you-go) and secondly by the fact that private insurers can translate the prevailing downward trend in disability volumes faster into premium reductions then the public pay-as-

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[13] Self-insurance is possible if firms are backed up by a bank guarantee: in practice self-insurance is no option for small firms. Self-insuring firms can reduce their financial risk by a stop-loss insurance, only covering losses above a specified threshold.

[14] Small firms got the last chance to opt out in July 2004, since the switch to a sector based premiums was at that time accompanied by a switch to compulsory participation.

you-go system. This downward trend has to do with new policies like a more stringent system of gate keeping and the extension of the sickness benefit period to two years, introduced in 2004. As a result, in 2004 3.8% of the employers opted out. Opting out of the Dutch public disability arrangement is not a once and for all decision, since opting in again is permitted to all firms whenever they choose to. After opting in, the rule is that firms stay within the public arrangement for at least three years. The duration of private insurance contracts generally varies between one and three years.

Table 2.2   **Share of firms outside the public disability scheme (1998-2002)**

	Small firms	Large firms	All firms	All firms
	% of firms			% of wages
1998	0.0	0.1	0.0	1.6
1999	0.5	1.5	0.6	3.7
2000	0.5	1.6	0.7	5.0
2001	0.8	2.0	0.9	5.6
2002	1.2	2.2	1.3	5.8
2003	1.7	3.3	1.8	6.3
2004	3.8	3.7	3.8	–

Source: Premiedifferentiatie WAO 2003, Workers Insurance Authority (UWV).

3 Modelling opting out

In this section, we discuss the determinants of the opting out decision from a theoretical / micro-economic point of view. We identify three determinants of opting out: first the expected long-term costs outside the public system compared to the expected costs when remaining inside the public scheme (using cross-subsidies as a proxy variable), second the enhanced financial uncertainty associated with opting out and third short run considerations. Using this information, we derive a small model describing the dichotomous choice between opting out and remaining in the public system. This forms the basis for the empirical analysis presented in section 5.

3.1 Determinants of opting out: the role of cross-subsidies

From a micro-economic viewpoint, rational firms will base the opting out decision on a comparison of the long run expected costs inside and outside the public system. Premiums consist of expected payable benefits and cross-subsidies between firms. Cross-subsidies occur if some firms pay premiums that are on average higher than their long run expected costs and other firms pay premiums that are on average lower then their expected costs.

We expect cross-subsidies to be smaller under private DI due to market pressure, since a competing firm would be able to take clients by offering lower premiums to net payers of cross-subsidies. Although private insurers have no full information on risks, from interviews we learned indeed that they use the available information to classify employers in risk categories[15], thereby reducing cross-subsidies. Besides, private insurers learn about the individual risks of firms, where the learning is not confined to a five years period, as under the public system under consideration, which helps to reduce cross-subsidies in the long run. Given the assumption that cross-subsidies tend to be smaller under private DI, the level of cross-subsidies paid or received under the public system is expected to be a determinant of the opting out decision.

Under the experience rating system we analyse, the level of cross-subsidies[16] is correlated with the disability risk of a firm. Therefore, if cross-subsidies are found to be a determinant of the opting out decision, adverse selection occurs. 'Good risk' firms tend to opt out while 'bad risk' firms tend to remain in the public system.

Besides long run expected costs, we also expect (bankruptcy) risk to be a factor influencing the opting out decision. Firms try to avoid that in a particular year costs exceed a certain critical value which would cause financial problems. Under the public DI system extreme premiums are

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[15] Private insurers base their premium initially on the disability record of the sector an applicant belongs to and on the composition of the workforce by age. Once disability claims occur, premiums are (partly) based on individual experience rating, as interviews with some of the main players in the field revealed (Nationale Nederlanden, Achmea, Fortis). The extent to which experience rating is applied depends positively on the size of the firm.

[16] For a precise definition of the cross-subsidy proxy variable, see section 4.2.

prevented by the presence of premium limits, but private insurance premiums contain more uncertainty since private insurers are not beforehand restrained by premium limits. Considering this, we expect firm size to be a decisive factor in the opting out decision, first because the larger the firm the less erratic the pattern of disability costs over time due to the law of large numbers and second because large firms may have more possibilities to cope with financial volatility. Finally, short run considerations may play a role in the opting out decision. For example, opting out can be a way to cash a financial advantage of risk reduction faster by circumventing the delay in premium setting. On the other hand, if a firm is paying the maximum premium it will not rush to opt out, since in the short run it pays less than its payable benefits.

3.2 A model of opting out behaviour

Figure 3.1 and 3.2 focus on the expected long-term cross-subsidies variable. The figures give a graphical presentation of the relation between the long-term disability risk of a firm and the disability insurance premium paid. p_o displays the premiums levied by a representative private insurer. p_p is the premium a firm pays under the public disability insurance scheme, bounded by upper limit p_{max} and lower limit p_{min}. p_p^* shows the premium that would be paid under the public scheme in the *hypothetical* case that the upper and lower limits would not exist[17]. Let us first define long-term cross-subsidies.

$$s_p = p_p^* - p_p \tag{3.1}$$

Long-term cross-subsidies received (s_p) under the public scheme are equal to the hypothetical premium p_p^* minus the public premium p_p. The upper triangle in the figures (right from r_2) represents cross-subsidies received, the lower triangle (left of r_1) represents cross-subsidies paid. Firms facing a long-terms risk up to r_1 are net contributors, while firms with a long-term risk higher then r_2 are net receivers of cross-subsidies in the presented figures. Here it becomes clear that risk profile and the level of cross-subsidies received or paid are related.

The price differential between private and public insurers equals

$$f = p_p^* - p_o \tag{3.2}$$

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[17] In the area between r_1 and r_2, p_p^* does not necessarily equal p_p in practice, this is only the case if ex ante premiums foregone as a result of the upper limit are exactly compensated by the extra premiums received as a result of the lower premium limit. In our database, firms between r_1 and r_2 hardly pay any cross-subsidies, so figure 3.1 and 3.2 give a fairly accurate presentation.

It represents the possible cost advantage of private insurance, consisting of effectiveness and/or efficiency advantages plus cost differentials concerning capital funding versus pay as you go financing[18]. We assume this differential to be constant, i.e. independent of the risk level.

Figure 3.1   **Opting out range if $P_p^* < P_o$**   **Figure 3.2**   **Opting out range if $P_p^* > P_o$**
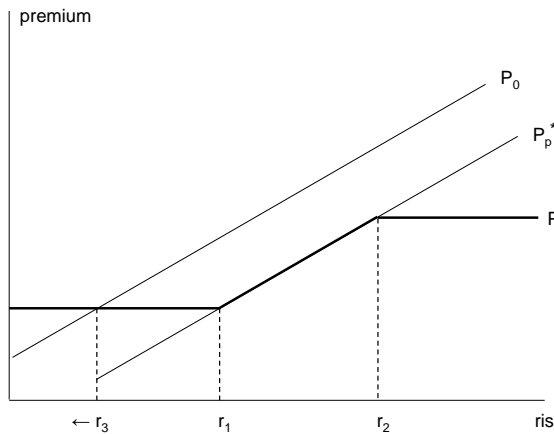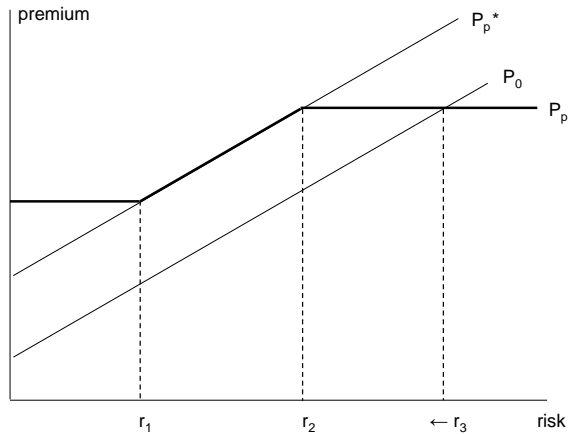

The expected financial effects of opting out are positive for a specific firm if $p_o < p_p$. In figure 3.2, where f is positive, it can be easily seen that $p_o < p_p$ holds if

$$s_p \leq f \tag{3.3}$$

Hence, the cost advantage of private insurance is larger than the cross-subsidies received under the public regime. In figure 3.1, where f is negative, this condition implies that the cost disadvantage of private insurance is smaller than the cross-subsidies paid under the public regime. Interestingly, a comparison of figure 3.1 and 3.2 suggests that opting out does not develop gradually but discontinuously, conditionally on the assumption of f being a constant. Once f becomes positive, opting out starts to become a financially interesting option to a much larger part of the firms (the area left of *r2* is much larger in fig. 3.2 than in fig. 3.1). Not every firm facing a positive net effect of opting out will indeed decide to opt out. The financial advantage is weighted against the enhanced risk under a private regime, denoted by h, where h is assumed to be a (probably non-linear) function of firm size and f.

$$s_p \leq (f - h) \tag{3.4}$$

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[18] Disability benefits of special groups ("vangnetgroepen") that cannot be attributed to specific employers are incorporated as a flat rate in the experience rating premium. This flat rate is not levied on firms that have opted out. Therefore, also this rate is part of the shift variable.

4 Data

4.1 Administrative register data

The data we use are administrative register data originating from three separate datasets[19], each collected by the Workers Insurance Authority (UWV). The first dataset consists of variables concerning the assessment of the experience rating premium (the amounts of DI-benefits per year, the insured wage sums, etcetera). The second dataset delivers information on characteristics of the working force, such as age and gender. These data are aggregated to firm level for this purpose. From the third dataset the inflow into the DI-scheme is known, as well as its characteristics. The dataset contains no information on whether firms that opted out are privately insured or self-insured, nor does it contain any information on the characteristics of their private insurance contract.

Table 4.1 gives a summary statistics of the data. The first three columns are based on the complete set of firms being registered in these particular years. The years mentioned are the years for which the premium was calculated, but most data relate to the situation two years earlier. The two columns at the right hand side of the table show the characteristics of the sample used for the opting out regressions. Data for 2001 and 2002 are pooled, resulting in a sample of almost 365 000 observations (employers * years), out of which 1431 observations (686 in 2001 and 745 in 2002) refer to employers opting out of the public disability insurance system in 2001 or 2002 (that is 0.39%). For the purpose of this study, first a balanced panel data set was constructed, using only observations of employers that are registered in all three separate years. This leads initially to a database of about 278 000 employers, but for several reasons a smaller sample was created[20]. One reason for reducing the sample stems from our interest in the actual opting out decision, hence we are interested in flows rather than in stocks of opting out firms. Therefore, we not only dropped the year 2000, but also left firms that opted out already in 2000 out off the analysis. The selected sample is confined to firms with at least 3 employees. In this sample, about three-quarter of the firms pay the minimum premium. In the full sample about 85% of the firms pay the minimum premium, caused by the fact that a relatively high percentage of the very small firms is on the lower premium limit.

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[19] The datasets are respectively known as "Gegevens Premiedifferentiatie WAO", "Verzekerde Personen en Dienstverbanden (VPD)" and "Periodieke Informatie Arbeidsongeschiktheidsverzekeringen (PIAV)".

[20] Once firms have opted out in 2001, their observations regarding 2002 are removed from the dataset, since they cannot decide to opt out in 2002 again. Since this concerns a very small group, the bias this creates in the estimators will be negligible. Furthermore, very small firms (with less than three employees) are left out of the data base for reasons of manageability, reducing the panel size by almost a third. Besides, also a very limited number of cases with inconsistent data, for example negative wage sums, have been eliminated. We also have removed observations with extreme yearly changes in wage sums (over (-) 50% per year, probably caused by merger and splitting up of firms), resulting in a further 2% reduction.

Table 4.1   Employer characteristics: total and selected sample

	Full sample			Selected sample	
	2000	2001	2002	2001	2002
Number of employers	309174	315314	312656	178718	185778
Number of employees	6524458	6972086	6922609	6117629	6057600
Average employer size	21.1	22.1	22.1	34.2	32.6
Small employers (%)	88.1	88.1	88.5	78.5	78.4
Med/large employers(%)	11.9	11.9	11.5	21.5	21.6
Sectors (%)					
Primary sector	6.9	6.7	6.7	5.6	5.6
Industrial sector	21.3	21.3	21.4	22.3	22.1
Trade sector	28.1	27.6	26.8	26.0	25.4
Services, transport and temporary employment agencies	7.4	7.4	7.5	7.6	7.8
Catering	8.2	8.3	8.3	7.9	8.3
Social and cultural services, (semi-)public sector	14.3	14.1	14.0	13.1	12.7
Financial sector	13.9	14.7	14.0	11.9	12.6
Total	100.0	100.0	100.0	100.0	100.0
Age and gender (%)					
Male <=45 years	42.8	43.2	43.5	43.7	43.3
Male >45 years	13.4	13.0	12.7	12.9	13.3
Female <=45years	33.6	34.0	34.3	34.3	33.9
Female >45years	10.2	9.8	9.5	9.0	9.4
Experience rating variables					
Disability risk (%)[a]	1.18	1.37	1.35	1.32	1.48
DI premium (%)[a]	1.40	1.51	1.58	1.38	1.78
% p_{min}	86.2	84.5	83.2	72.6	74.9
% between p_{min} and p_{max}	8.7	10.7	12.2	21.9	19.1
% p_{max}	5.1	4.9	4.5	5.5	6.0
Opting out (% of employers)					
Not publicly insured[a]	0.66	0.91	1.27	0.40	1.05

[a] These variables are calculated as unweighted averages.

4.2   Measuring cross-subsidies

In section 3.1, we identified cross-subsidies as an explanatory factor for opting out, both for structural reasons and for the sake of expediency. As for the structural argument, we expect long-term cross-subsidies to be relevant, since we expect firms to be looking forward and be interested in minimising their long-term costs. If the public scheme is more expensive to low risk firms than a private DI-insurance due to (higher) cross-subsidies, this constitutes an incentive for these firms to opt out.

Besides, short run considerations may play a role in the opting out decision. For example, if a firm pays the maximum public insurance premium (less than its payable benefits) in a certain year, it has an incentive to remain publicly insured at least temporarily since this firm is being 'subsidised' in the short run. Moreover, private insurers prefer to contract employers that have a 'clean' record, since the transfer of already created payable benefits to a private insurer is financially unattractive[21]. Firms can opt out as long as their disability record is 'clean', possibly enjoying premium reduction, and switch back to the public scheme once they have revealed to be a 'bad risk'. This behaviour can be stimulated by the premium setting of insurers.

Short-term cross-subsidies are not only relevant for opportunist reasons, however. For large firms we expect a positive correlation between their recent individual disability record and their long-term expected risk. For small firms this correlation will be low since their disability record for a single year is likely to either underestimate or overestimate their average future disability record. Large firms thus have more information on their individual disability risk than small firms do, since their recent disability record is more revealing about their long-term risk to a certain extent. Hence, when large firms try to assess their long-term risk they will not only look at the risk of their reference group, but also consider their own recent disability record. As a result, we expect short-term 'cross-subsidies' to be a relevant variable for large firms explaining the opting out decision from the structural point of view.

Since firms are forward looking in their decisions while our data are backward looking, the data are used as proxies for future values of the variables used in the decision making process. In order to calculate the cross-subsidies firms expect to pay or receive in the long run, ideally one would like to compare the expected premium under the public scheme with a firm's long-term risk d^*. The risk of a firm clearly is not observable, however. Moreover, given the fact that the system of experience rating was introduced quite recently, figures on individual benefits created are, especially in the case of small firms, not very informative about the long run risk of a particular firm. Therefore, as a second best solution, we make use of the revealed risk of reference groups to approach the long-term cross-subsidies of a particular firm. In the concrete, the long-term cross-subsidies proxy variable is calculated (for each year separately) as the sector average of the cross-subsidies s_p. Remember that (according to equation 3.1) s_p is the disparity between the hypothetical public premium that would hold if premium limits did not exist, and the actual public premium[22].

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[21] Statistics from the pooled sample for in 2001 and 2002 point in the same direction: among employers that opted out in 95.5% has negative short-term 'cross-subsidies', while this figure is 92.6% for employers staying inside the public scheme. Finally, since opting in again is allowed, strategic behaviour is possible.

[22] Hence, we use the average hypothetical premium (that would hold if premium limits did not exist) of a risk group (in this case of a sector) as a proxy for the long term disability risk of individuals in that risk group. Behind the average premium lies an uneven distribution of premiums (with many zeros for small firms with a clean disability record). However, since this is a picture at a given moment in time, while at other times different firms will have positive disability records, this average is a useful way to approach the long term risk.

The long-term cross-subsidies of an individual firm are thus approximated by the average disparity $(p_p^* - p_p)$ in the sector the firm belongs to[23].

Short-term 'cross-subsidies' are calculated as the difference between the hypothetical public premium that would hold if premium limits did not exist, and the actual public premium. This way we approach the difference between premiums paid and the level of payable benefits in a particular year. Note that this variable is not calculated as a sector wise average (as is the case for the long-term cross-subsidies) but for each employer individually. Short run 'cross-subsidies' are negative if an employer has a clean disability record over the reference period, since in that case p_p^* is zero and p_p is equal to the minimum premium.

4.3   Descriptive statistics

This section presents some detailed descriptive statistics from the pooled sample on which the opting out regressions in the next section are based. The incidence of opting out differs by employer size, as table 4.2 shows. Opting out is most popular in 2001 and 2002 among small employers and large employers, middle sized employers staying slightly behind.

Table 4.2   Opting out by employer size class (2001 and 2002 pooled)

Number of employees:	2001/2002	
	Employers * 1000	Of which opting out (%)
2 - 5	128	0.34
6 - 15	133	0.51
16 - 50	70	0.35
51 - 250	27	0.19
251 -1000	4	0.29
>1000	1	0.85
Total	364	0.39

Table 4.3 shows that young male workers are overrepresented among firms opting out, while women and elder men are underrepresented. Figure 4.1 shows a positive correlation between the percentage of male employees under 45 years and the incidence of opting out. This suggests that employers with a relatively high percentage of young male employees assess their disability risk as lower than average. Statistical information confirms this assumption. Table 4.4 shows that women have a higher inflow probability than men, and that the inflow probability is

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[23] Since the long-term cross-subsidies are calculated per sector, adding sector dummies as a control variable would suggests an overlap that could cause identification problems. However, long-term cross-subsidies are calculated for all 69 underlying sectors (as they are distinguished by UWV) and differ per year, while the sector dummies concern 6 sectoral aggregates and are time-invariant. Hence, the sector dummies are supposed to pick up cross sectional variation, while long-term cross-subsidies are expected to pick up time variation and the cross sectional variation within the sectoral aggregates.

age related, although this is partly counteracted by the fact that since 1990 women have a higher probability to leave the DI-scheme than men.

Table 4.3   Population of firms opting out and remaining publicly insured, by age and gender

	Firms opting out	Firms remaining publicly insured
		(in %)
Men <45 yrs	61	43
Men 45-65 yrs	9	14
Women <45 yrs	26	34
Women 45-65 yrs	4	10
Total	100	100

This table is based on the full sample, including very small firms (N<3).

Figure 4.1   Employers opting out (in %) by employee profile (percentage of young male employees)
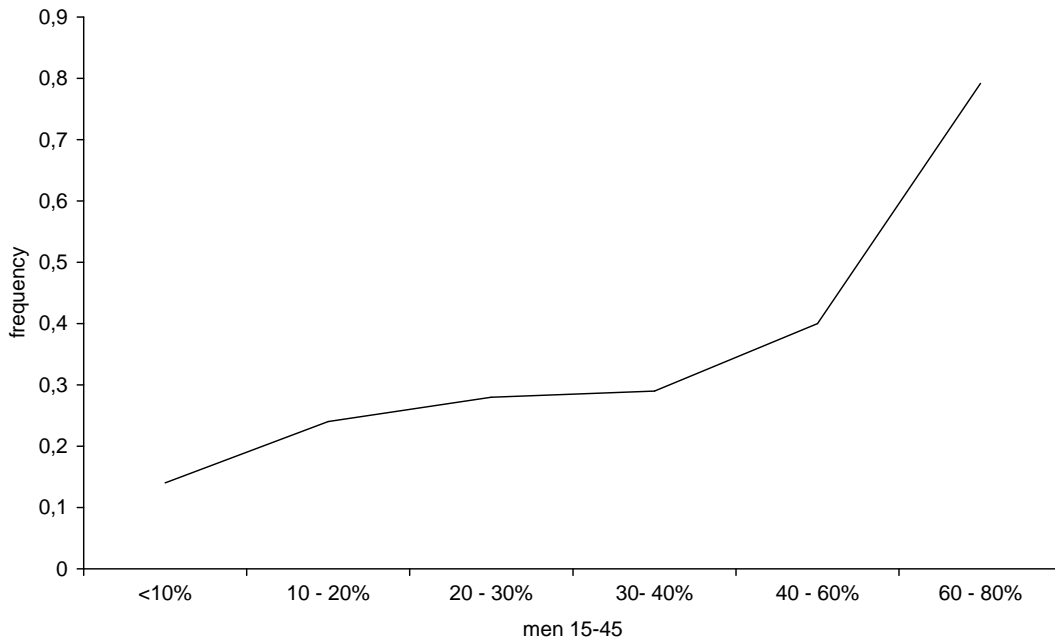
Table 4.4   Dutch DI-inflow (in %) by gender and age, 1990 and 1999[a]

	Men		Women	
	1990	1999	1990	1999
15-25 years	0.4	0.2	0.8	0.5
25-35 years	1.0	0.7	1.6	1.6
35-45 years	1.5	1.1	2.2	1.9
45-55 years	2.5	1.7	4.0	2.7
55-65 years	3.1	2.4	5.2	3.1
Total	1.5	1.1	2.0	1.7

[a] Source: Thio et al, 2004.

Table 4.5   **Opting out by long-term cross-subsidies (proxy variable) (2001 and 2002 pooled)**

Long-term cross-subsidies received (in %):	2001/2002	
	Cases * 1000	Of which opting out (%)
< 0	116	0.71
0 - 0.5	232	0.25
0.5 - 3.0	14	0.13
> 3.0	1	0.00
Total	363	0.39

Table 4.5 shows that the percentage of firms opting out is negatively correlated to the long-term cross-subsidies received. Similarly, table 4.6 shows that the large majority of firms pays short-term 'cross-subsidies' between 0 and 1% (mostly firms with no disability claims paying the minimum premium). Of this group, 0,41% opted out in 2001-2002. Also employers receiving positive short-term 'cross-subsidies' opted out, but to a somewhat lesser extent.

Table 4.6   **Opting out by short-term 'cross-subsidies' (2001 and 2002 pooled)**

Long-term cross-subsidies received (in %):	2001/2002	
	Cases * 1000	Of which opting out (%)
< 0.0	336	0.41
0.0 - 3.0	12	0.30
3.0 - 6.0	5	0.24
> 6.0	10	0.18
Total	363	0.39

5   Empirical Analysis

5.1   Estimation results

Table 5.1 presents the Maximum Likelihood estimation results of a reduced form probit model, t-values are presented between parentheses. Regressions are made on the selected sample (see table 4.1) and on two sub samples containing employers with more than 15 and 50 employees respectively. We make this distinction by size because we expect that for large firms short-term cross-subsidies will be more decisive than for small and medium sized firms (see section 4.2).

In section 3.2 we derived that the following variables are relevant determinants of the decision to opt out: long-term cross-subsidies, short-term cross-subsidies and firm size, besides control variables. In addition we include a number of extra control variables[24], such as age, gender and wage level. The first column of table 5.1 represents the regression on the selected sample. The proxy variable for long-term cross-subsidies received shows a negative sign and a reasonably high t-value. The interaction term with firm size shows that the effect of long-term cross-subsidies received on opting out is somewhat smaller for firms with 50 employees or less, but this is not significant. The sharpest effect obtains for large firms (N>1000). We posted the hypothesis that there is a negative relationship between long-term cross-subsidies and the probability of opting out. Table 5.1 shows that this hypothesis is confirmed by the estimation results[25]. Thus, the risk profile of firms tends to influence the opting out decision, suggesting that adverse selection is present. In the next section we will use simulations to get some feeling for the magnitude of the elasticities.

A negative sign is expected for the short-term 'cross-subsidies' variable in the opting out regression. Table 5.1 shows that we indeed find a negative sign for the short-term 'cross-subsidies' variable, although the significance is weak, so short-term 'cross-subsidies' do not seem to play a significant role. However, columns two and three of table 5.1 show a similar specification applied to sub samples with ≥15 and ≥50 employees respectively. Larger firms turn out to show a higher coefficient for short-term 'cross-subsidies'. This is according to our expectations, since the larger the firm the more information short-term 'cross-subsidies' contain about their individual long-term risk. For this reason larger firms are expected to put a higher weight to their short-term results in deciding on opting out. This is also confirmed by the results for the interaction terms in the specification in the first column of table 5.1. The general pattern is that the larger the firm is, the larger the negative coefficient for the short-term 'cross-subsidies', although again the estimates of individual coefficients are insignificant.

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[24] See the Appendix for a description of the control variables.

[25] As a robustness-test we firstly have estimated an alternative specification containing the natural logarithm of (1+ cross-subsidies), and secondly we have estimated on a sample excluding cases with extremely high cross-subsidies. Both alternatives give results that are in line with the original results.

Table 5.1   Results of probit model on opting out decision[a]

	Selected sample	Subgroup ≥15 employees	Subgroup ≥50 employees
Log likelihood	− 8696.2	− 2227.4	− 470.8
Number of observations	364496	107948	23998
Pr (opting out)	0.0039	0.0034	0.0032
Long-term cross-subsidies (received)	− 0.47	− 0.34	− 0.97
	(4.26)	(2.28)	(2.92)
Short term 'cross-subsidies' (received)	− 0.002	− 0.04	− 0.82
	(0.44)	(1.35)	(1.33)
Long-term cross-subsidies * 5 < N ≤ 15	0.03		
	(0.21)		
Long-term cross-subsidies * 15 < N ≤ 50	0.29		
	(1.85)		
Long-term cross-subsidies * 50 < N ≤ 250	− 0.02	− 0.39	
	(0.06)	(1.36)	
Long-term cross-subsidies * 250 < N ≤ 1000	− 0.29	− 0.57	− 0.23
	(0.55)	(1.00)	(0.34)
Long-term cross-subsidies * N > 1000	−1.09	− 1.37	− 0.97
	(1.22)	(0.98)	(0.86)
Short-term 'cross-subsidies' * 5 < N ≤ 15	− 0.008		
	(1.13)		
Short-term 'cross-subsidies' * 15 < N ≤ 50	− 0.01		
	(0.53)		
Short-term 'cross-subsidies' * 50 < N ≤ 250	− 0.16	− 0.16	
	(0.92)	(0.82)	
Short-term 'cross-subsidies' * 250 < N ≤ 1000	− 0.22	− 0.25	− 0.19
	(0.52)	(0.48)	(0.14)
Short-term 'cross-subsidies' * N > 1000	− 0.06	− 0.11	− 0.89
	(0.11)	(0.17)	(0.06)
Industrial sector	0.71	0.54	4.09
	(8.57)	(3.43)	(24.05)
Trade sector	0.54	0.50	3.95
	(6.35)	(3.16)	(22.50)
Services, transport and temp. employment agencies	0.45	0.30	3.68
	(5.02)	(1.82)	(.)
Catering	0.18	0.26	4.13
	(1.86)	(1.55)	(19.19)
Social and cultural services, (semi-)public sector	0.10	− 0.25	..
	(0.97)	(1.18)	..
Financial sector	0.81	0.55	3.85
	(9.19)	(3.30)	(20.06)
13 613 euro< average wage per employee ≤ 22 689 euro	− 0.019	− 0.05	− 0.009
	(0.79)	(0.98)	(0.09)
Average wage per employee > 22689 euro	− 0.11	− 0.12	0.08
	(2.82)	(1.60)	(0.59)

Table 5.1   **Results of probit model on opting out decision (continued)**

	All employers	Subgroup ≥15 employees	Subgroup ≥50 employees
5 < N ≤ 15	0.14		
	(6.46)		
15 < N ≤ 50	0.075		
	(1.90)		
50 < N ≤ 250 , < 250	− 0.05	− 0.15	
	(0.79)	(2.72)	
250 < N ≤ 1000	0.19	0.10	0.23
	(1.77)	(0.91)	(1.72)
1000 < N	0.64	0.50	0.65
	(4.21)	(3.21)	(3.38)
Year 2002	− 0.005	− 0.13	− 0.34
	(0.26)	(3.41)	(3.94)
Percentage of women younger than 45	− 0.30	− 0.30	0.03
	(7.38)	(2.74)	(0.12)
Percentage of men older than 45	− 0.97	− 1.07	− 0.53
	(12.48)	(5.50)	(1.16)
Percentage of women older than 45	− 0.83	− 0.37	0.89
	(8.63)	(1.49)	(1.84)
Wage sum < 15* average wage sum	0.08	− 0.003	− 0.52
(narrow premium bracket applies)	(1.98)	(0.06)	(1.23)
Change in wage sum (in %)	0.004	− 0.006	0.004
	(1.52)	(0.75)	(0.30)
Constant	− 3.08	− 2.76	− 6.60
	(32.47)	(17.24)	(33.18)

[a] Explained variable is the opting out incidence, T-values between parentheses.

The composition of the workforce by age and gender is quite a strong determinant of the probability to opt out. The variables indicating the percentage of female employees (below 45 years and over 45 years) and male employees over 45 years all show a significant negative sign in the opting out regression. In order to assess their long-term risk employers apparently consider their age-gender-composition. Both females and elderly workers seem to contribute to extra risk. This suggests that the long-term cross-subsidies variable employed is indeed an imperfect measure of the individual long-term risk.

In section 3.1, employer size was indicated as one of the determining factors in the opting out decision: the larger the firm, the less sensitivity for risk. The empirical results suggest a U-shaped relationship between size and probability to opt out. This can be explained by the fact that under the current system of experience rating cross-subsidies are concentrated at smaller firms. For middle sized firms, who face a high probability to stay in between the premium limits, cross-subsidies are less relevant and thus there is less reason to opt out. Very large firms,

finally, are again prone to opt out (and probably self -insure) for reasons of effectiveness, for example with respect to reintegration. The U-shaped relationship suggests that this effect is not picked up completely by our cross subsidy variable (which is sector based), but is expressed through the size variables. As an alternative we included a continuous size variable (not reported in the table). We find a positive but diminishing effect of size on the probability to opt out, but the fit is worse as compared to the less restricted case of size class dummy variables.

For the change in wage sum we expect a positive sign, since the relatively long lag in premium setting under the public DI-system may encourage relatively fast growing firms to opt out (see section 2.2). Corresponding to these considerations we find a positive sign in the opting out regression.

The six sector-dummies all show positive coefficients significantly differing from zero. Also the level of the wage per employee and the institutional size class (Wage sum compared to 15* average wage sum) make a difference in the opting out decision. Both coefficients point into the direction of a negative relationship between wage per employee and the probability of opting out.

Finally we find a negative coefficient for the year 2002-dummy, while the t-value is rather low. Time is supposed to matter for three reasons in this analysis. First, the maturation of the public scheme makes that pay as you go is less expensive than capital funding during the initial phase of the scheme. This effect diminishes every year until it phases out completely when the pay as you go system reaches its full time window, making opting out more attractive each subsequent year in this phase, all other things being equal. Second, due to selectivity, the population of employers inside the public scheme is expected to change over time, showing a diminishing propensity to opt out. These effects are opposite. Beforehand no specific sign was expected for the coefficient of this variable. Third, the business cycle may affect the behaviour of firms. Since opting out in the estimation period was still exceptional, the estimated (negative) constant is rather large in absolute value.

5.2   Micro-simulations

In this section we present simulations in order to illustrate the impact of the estimation results. The simulations are based on the regression results in the first column of table 5.1. Table 5.2 presents the predicted probabilities to opt out for specific values of four continuous independent variables, following from micro-simulations. In the first column the results for the (non-weighted) average employer are specified.

First, the long-term cross-subsidies are varied, ceteris paribus, in order to illustrate the partial effect of a change in this variable. The second column shows that, under these conditions, the probability to opt out amounts to 0.41 percent in case the long-term cross-subsidies are zero percent of the wage sum. Receiving cross-subsidies of 1% of the wage sum reduces the probability to opt out to a level of 0.12%, while at a subsidy level of 2% the

probability is almost zero[26]. Long-term cross-subsidies of – 0,50 (the employer is a net contributor in the long run) doubles the probability to opt out to about ¾%. Since cross-subsidies paid are merely determined by the lower premium limit, a level of cross-subsidies below – ½ is not plausible. To sum up, perceived long-term cross-subsidies do have a considerable impact on the decision to opt out, which implies in economic terms that adverse selection is at hand. It is found that for firms that pay long-term cross-subsidies of ½% of their wage sum, their probability to opt out would almost be reduced by half in case cross-subsidies were abolished (by comparing case B to case E in table 5.2).

Table 5.2	Predicted probabilities for specific values of four continuous independent variables				
	Case A	Case B	Case C	Case D	Case E
Variable I:					
Long-term cross-subsidies received [a]	0.14	0.0	1.00	2.00	– 0.50
Probability to opt out (*100%)	0.34	0.41	0.12	0.04	0.73
Variable II:					
Short-term 'cross-subsidies' received [a]	0.10	0.0	10.00	100.00	– 1.00
Probability to opt out (*100%)	0.39	0.39	0.30	0.08	0.41
Variable III:					
Change in wage sum (in %)	0.75	0.0	2.00	25.00	– 2.00
Probability to opt out (*100%)	0.39	0.39	0.40	0.51	0.38
Variable VI:					
Percentage of male employees <45 years	44	0	25	75	100
Probability to opt out (*100%)	0.33	0.26	0.32	0.57	0.78

[a] Cross-subsidies as a percentage of the wage sum.

Second, short-term 'cross-subsidies' (variable II in table 5.2) as well play a role. Short-term 'cross-subsidies' (received) can take quite large positive values, especially with small firms, resulting in a low probability to opt out. But the negative range (subsidies paid) is limited since this is merely determined by the lower premium limit compared to zero premiums. The effect on the opting out probability is substantial only in case of very high cross-subsidies.

Third, the change in wage sum only influences the decision to opt out notably in case of sharp growth or serious downsizing.

Fourth, the effect of changes in the composition of the workforce is evident. In this simulation we varied the percentage of male employees from the average of 44% to 0%, 75% and 100% respectively. The percentages of the other groups (men over 45 years, women under 45 years and women over 45 years) were adapted in such a way that the relative proportions of these three groups remained unchanged. Other variables unchanged, an increase in the share of young male workers to 100% roughly doubles the probability to opt out.

[26] All firms get the same value, as indicated in the table. This may violate the budget constraint of the DI-system administrator. However, here we are only interested in the sensitivity of the opting out decision as implied by our estimation results.

In order to get a view of the effects of some non-continuous variables (sector and size) as well, table 5.3 sketches eight specific employer cases. Case I shows a large firm in the Financial sector, with a high percentage of young male workers, paying cross-subsidies in the long run as well as in the short run. This firm has a relatively high probability to opt out (6%). If we confine ourselves to reasonable variable values, this case more or less approaches the maximum reachable probability, given the relatively large negative constant in our estimate. As we move to the Public sector, or reduce employer size or the percentage of young male workers (as in case II to IV), the probability comes down. Case V to VI combine a small employer size with some extremes concerning the composition of the workforce, respectively in the industrial and service sector, showing relatively low probabilities to opt out. These examples show that, besides the level of cross-subsidies and the composition of the work force, also the sector and the employer size are influential variables to the opting out decision.

Table 5.3   Predicted probabilities for specific employer cases

Case nr.		Pr(opt out) (in %)	Δ Pr (in %) compared to case 0.
0.	Average employer	0.22	
I.	N=1000, Financial sector, male<45 years = 72%, long run cross-subsidies – ½%, short run 'cross-subsidies' = – 1%	6.05	2667
II.	As case I, but N=10	2.29	947
III.	As case I, but male<45 years = 44% (conform average, case 0.)	1.57	619
IV.	As case I, but Public sector	1.18	438
V.	As case I, but Service sector, N=10, female<45 years = 100%	0.61	178
VI.	As case V, long run cross-subsidies 0.2%, short run 'cross-subsidies' = 2,0%	0.25	12
VII.	As case VI, but Industrial sector, male>45 years = 100%	0.07	– 68

For all cases holds: wage per employee = 20 000 euro, wage growth = 3%.

Let us consider some micro-simulations in more detail. If we set long-term cross-subsidies to zero percent, the outcome hardly differs from the original probability to opt out, as we saw already in table 5.2. This is the result of two opposite effects. First, received cross-subsidies no longer play a role in preventing from or postponing opting out, so part of the former subsidy receivers will decide to opt out. Second, opting out incentives change slightly for the group of cross-subsidy payers, and as a result part of them will find it no longer appealing to opt out. Both effects more or less counterbalance[27], as a result the average predicted percentage of firms opting out in this simulation is 0.41%, not substantially different from the current probability of 0,39%. But the composition of firms opting out will change because adverse selection will be

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[27] The underlying partial effects are as follows. Putting received long-term cross-subsidies to zero would increase the overall probability to opt out from the current 0.39% to 0.43%, while putting paid long-term cross-subsidies to zero would decrease the overall probability to opt out from the current 0.39% to 0.37%.

diminished, so more high risk firms will opt out and more low risk firms will remain publicly insured.

Another micro-simulation addresses the situation of one uniform premium rate for all employers. Compared to the situation of experience rating, cross-subsidies paid as well as received are larger. Some groups have a higher incentive to opt out, while others have a higher incentive to remain inside the public system. On balance, the overall probability to opt out in this simulation amounts to 0,53%, that is a 36% increase compared to the prevailing experience rating situation.

It should be noticed that in our micro simulations we only vary cross-subsidies between sectors. This follows from the fact that we use sector based cross-subsidies as a proxy for a firms' individual long-term cross-subsidies, since the real long-term risk of a firm is not observable. This implies that cross-subsidies paid and received within sectors are not observed, although in reality they may be determining in the opting out decision as well.

To draw a conclusion, the results of the empirical analysis confirm that long-term cross-subsidies as well as firm size influence the opting out decisions. However, since long-term cross-subsidies as defined here are, due to data limitations, a restricted measure of the long-term risk of firms, it is not surprising that also the composition of the work force by age and gender, as well as the sector of industry are important and significant explanatory variables. This all points into the direction that firms base their decision on a risk assessment, and that relatively 'good risks' decide to leave the public scheme. Hence, adverse selection is confirmed by the data[28]. Short-term incentives are far less important, at least for smaller firms. Larger firms tend to use information on short-term cross-subsidies as an indicator for their individual long-term disability risk.

A rigorous study of long run dynamics is outside the scope of this paper, but the subject is interesting enough to make some comments on it. Since employers' opting out decision is sensitive to the level of cross-subsidies and good risks tend to opt out, the average premium as well as the premium limits for the firms remaining inside the public DI-system will gradually have to rise gradually, resulting again in incentives to opt out in next periods. On the other hand, we expect especially small firms to opt in again once they encounter disability claims. Since opting in has hardly occurred yet, no elasticity of the opting in decision with respect to cross-subsidies could be estimated. This is one reason why dynamics can not be simulated properly using the available regression results. A second reason is that the estimated parameters become less appropriate when the risk profile of the firm population in the public system changes. Hence, to study dynamic features, a more advanced approach will be needed.

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[28] By contrast, de Jong and Lindeboom (2004) find no evidence for adverse selection by employers concerning insurance of the first year of sickness (the period before possible enrolment into the disability insurance scheme). The public sickness insurance was abolished in the Netherlands in 1996, since then firms can choose between self-insurance and private reinsurance.

6   Conclusions

In this paper, we analyse the decision of employers to opt out of the public disability insurance (DI) system. The Dutch public DI-scheme is characterised by incomplete experience rating: premiums levied on firms are related to their disability record, but with certain distortions. Due to these distortions premiums are run not completely fair but contain cross-subsidies from low risk firms to high risk firms in the long. We expect premiums in the private insurance market to be fairer due to market pressure, which has been confirmed by interviews with private disability insurers about their methods of premium setting. Therefore we expect that cross-subsidies could contribute to the explanation of opting out behaviour.

We analyse whether cross-subsidies between sectors, as present in the public DI-scheme, are a determinant of the opting out decision of firms. We find that cross-subsidies indeed contribute to the explanation of the opting out decision. Since cross-subsidies are risk related, this is an indication for the presence of adverse selection: high risk (cross-subsidised) firms tend to remain publicly insured, while low risk (cross subsidising) firms tend to opt out. This finding is supported by the fact that risk related characteristics such as sector and the composition of the workforce by age and gender contribute to the explanation of the opting out decision. Hence, cross-subsidies influence the risk profile of the population of firms remaining publicly insured. A dynamic implication is that the public premium will gradually increase, generating new incentives in subsequent periods for adverse selection to continue. If long-term cross-subsidies were to be abolished, one expects more high risk firms to opt out and more low risk firms to remain inside the public system. As a result, the risk profile of opting out firms will become more similar to that of firms not opting out.

The fact that adverse selection is present does, however, not necessarily mean that the overall probability to opt out is enhanced. Whether the overall probability is enhanced depends on the magnitude of and relative sensitivity for received and paid cross-subsidies respectively. Micro-simulations show that if long-term cross-subsidies turn to zero the overall probability to opt out slightly increases, due to the fact that cross-subsidies received have more impact than cross-subsidies paid. This means that the cross-subsidies in the current scheme may even have had a decreasing impact on the opting out incidence in the period analysed. But we have to be careful drawing conclusions, because the proxy variable we use is an imperfect measure of a firm's long-term risk profile.

Long-term cross-subsidies can be reduced by setting premiums as fair as possible. Private insurers use more information than the public DI-administrators in setting premiums. As an example, private insurers classify firms into risk groups before applying experience rating, while in the public experience rating system a uniform base rate is used for all employers. The employer specific experience rating premium is calculated by varying around this uniform base rate, where the discount or surcharge is based on the disability record of the firm. High risk sectors are overrepresented on the upper premium limit and as a consequence receive long-term

cross-subsidies from other sectors. This could be reduced if specific base rates were used for different risk groups, for example distinguished by sector and composition of the workforce (as private insurers do)[29]. This way, one combines the advantages of experience rating with reduced cross-subsidies between risk groups. Possible drawbacks are a larger administrative burden and increased selection of employees 'at the gate'. However, this drawback should be considered in its context, since private insurers adopt comparable strategies in setting their premiums.

Besides cross-subsidies, there are other factors that influence the opting out decision. These are merely factors that are encountered by any firm opting out, whether high risk or low risk, and they may influence the total probability to opt out much more than cross-subsidies do. Due to data limitations, these factors are only analysed implicitly in this study. First, transaction costs and risk aversion may play a role, although the impact of risk aversion may be limited because the option to return to the public scheme has been kept open. Secondly, in the initial phase of the DI-scheme cost differentials associated with pay as you go financing versus capital funding may have discouraged opting out (through relatively high private premiums) and also have been discouraging the supply side to develop. Thirdly, disparities in effectiveness and efficiency between private and public disability insurers may be influential. We do not know yet whether these disparities are in favour of the private or public insurers. But now that the initial phase of the public DI-scheme has been closed and financial level playing field is being approached[30], private insurers have started to develop the market for disability insurance more seriously and possible disparities in effectiveness and efficiency are expected to become clearer. If private parties start to create an overall cost advantage this may become a more decisive factor for opting out than long-term cross-subsidies are. Unfortunately, mid 2004 the possibility to opt out has been closed off for small and medium sized firms, since for this group experience rating was then abolished and sector wise premiums were introduced. Thus we can no longer infer the effect of financial incentives on the opting out decision for this large group of firms[31].

Further research would be necessary to quantify the influence of transaction costs, risk aversion and disparities in effectiveness and efficiency. Furthermore, it would be interesting to repeat the analysis in a later instance as the population of firms opting out has grown larger. Availability of more data on firms returning to the public scheme would make it possible to analyse the long run dynamic consequences of the adverse selection mechanism in Dutch disability insurance.

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[29] Also for the new public DI-insurance for partial or temporary disability (the 'WGA'), to be introduced in 2006, this approach to public premium setting would be worth considering.

[30] To create level playing field it can be advisable to divide disability benefit costs of special groups that cannot be attributed to specific employers ("vangnetgroepen") over all employers, not only over firms inside the public scheme.

7 References

Aarts, L.J.M. en Ph.R. de Jong, 1996, *Private voorziening van de sociale zekerheid in de praktijk*, Vuga.

Abbring, J.H., P.-A. Chiappori, J.J. Heckman and J. Pinquet, 2003, Adverse selection and Moral Hazard in Insurance: Can Dynamic Data Help to Distinguish, *Journal of the European Economic Association*, pp 512-521.

Abbring, J.H., P.-A. Chiappori and J. Pinquet, 2003, Moral Hazard and Dynamic Insurance Data, *Journal of the European Economic Association*, 767-820.

Akerlof, G.A., 1970, 'The Market for Lemons: Qualitative Uncertainty and the Market Mechanism', *Quarterly Journal of Economics*, Vol 84, pp.488-500.

Anderson, P.M. and B.D. Meyer, 1993, Unemployment Insurance in the United States: Layoff Incentives and Cross-subsidies, *Journal of Labor Economics*, Vol. 11, Part 2, S70-S95.

Anderson, P.M. and B.D. Meyer, 1994, The Effects of Unemployment Insurance Taxes and Benefits on Layoffs Using Firm and Individual data, NBER Working Paper 4960.

Barr, N., 1993, *The Economics of the Welfare State*, Oxford University Press.

Besseling, P.J., L. Bovenberg and R. de Mooij, Premium differentiation in social insurance, *CPB Report*, 1998/1.

Boadway, R., M. Leite-Monteiro, M.G. Marchand and P. Pestieau, 2004, Social Insurance and redistribution with Moral Hazard and Adverse Selection, CEPR Discussion Paper 4553.

Boyer, M. and G. Dionne, 1989, An Empirical Analysis of moral hazard and Experience rating, *The review of economics and statistics*, Vol. 71, Issue 1, 128-134.

Chiappori, P.A., and B. Salanie, 2000, Testing for Asymmetric Information in Insurance Markets, *The Journal of Political Economy*, Vol. 108, No.1., 56-78.

Chiappori, P.A., 2000, Econometric Models of Insurance under Asymmetric Information, in G. Dionne, ed., *Handbook of Insurance*, North Holland.

CPB, 1997, 'Premiedifferentiatie in de WAO. En in de WW?', special topic in *CEP1997*.

Dionne, G., N. Doherty and N. Fombaron, 2000, Adverse Selection in Insurance Markets, in G. Dionne, ed., *Handbook of Insurance*, North Holland.

Finkelstein, A., 2004, Minimum Standards, insurance regulation and adverse selection: evidence from the Medigap market, *Journal of Public Economics*, 88, 2515-2547.

Finkelstein, A., 2002, The Interaction of Partial Public Insurance Programs and Residual Private Insurance Markets: Evidence from the U.S. Medicare Program, NBER Working Paper 9031.

Hyatt, D.H. and T. Thomason, 1998, Evidence on the Efficacy of Experience Rating in British Columbia, A Report to the Royal Commission on Workers' Compensation in BC.

De Jong, Ph. And M. Lindeboom, 2004, Privatisation of sickness insurance: Evidence from the Netherlands, *Swedish Economic Policy Review* 11.

Koning, P.W.C., 2004, Estimating the impact of experience rating on the inflow into disability insurance in the Netherlands, CPB Discussion Paper 37.

Kotlikoff, L.J., K.A. Smetters, J. Walliser, 1998, Opting Out of Social Security and Adverse Selection, NBER Working Paper 6430.

Lomwel, A.G.C. and J.H.M. Nelissen, Ziekteverzuim, bedrijfskenmerken en verzuimbeleid: een analyse op basis van paneldata, OSA-publication A194, 2003.

Puelz, R. and A. Snow, Evidence on Adverse Selection: Equilibrium Signalling and Cross-Subsidization in the Insurance Market, *The Journal of Political Economy*, Vol. 102, No. 2, 236-257.

Sonsbeek, J.M. van and J.H. Schepers, Evaluatie Arbeidsongeschiktheids- en Ziekteverzuimmaatregelen sinds 1992, 2001, Ministry of Social Affairs and Employment, The Hague.

Thio, V., R. Halbersma, P. Vemer en Ph. de Jong, 2004, Arbeidsparticipatie en arbeidsongeschiktheid bij vrouwen, APE-rapport nr. 100.

Westerhout, E., M. van de Ven, C. van Ewijk and N. Draper, 2004, Naar een schokbestendig pensioenstelsel. Verkenning van enkele beleidsopties op pensioengebied, CPB.

Appendix 1

Definitions of independent variables other than cross-subsidies

Firm size dummies are based on the number of employees, classifying observations into six groups. The class of 2-5 employees is chosen as a reference group in the regressions.

Four variables present the composition of the pool of employees by age (under / over 45 years) and gender. The variable that refers to the percentage of male employees under the age of 45 is chosen as a reference group in the regressions. Initially more detailed information on the age composition was available in the data base, but due to the relatively small group of employers opting out, it was necessary to put classes together in order to obtain sufficient mass in each size class.

The same consideration holds for the classification of observations into sectors. For the sake of identification it was necessary to aggregate to seven sectors. We discriminate between the industrial sector, the trade sector, catering and the financial sector and furthermore the sector of services, transport and temporary employment offices and the (semi-)public sector, including social and cultural services.

In the Dutch public DI-system there are two sets of premium limits, roughly one for small firms and one for medium sized and large firms, the latter having a wider premium bracket (see table 2.1) Which premium bracket is relevant to an employer is based on the level of the wage sum: the wide bracket is relevant if wage sum > 15* average wage sum, otherwise the narrow bracket holds. So not only the employer size, but also the average wage level influences into which regime a firm sorts. To control explicitly for the effect of this institutional variable, we include a dummy variable for this institutional size class. The dummy is one for employers to whom the narrow premium bracket is relevant.

The average wage sum per employee is included as a control variable through dummy variables relating to the following average wage sum classes: 0 to 13 613 euro, 13 613 to 22 689 euro[32] and more than 22 689 euro. The lowest class is taken as a reference group in the opting out regressions.

The change in wage sum of an employer is defined as the average yearly change in wage sum over the period (t-2) up to (t-6), or part of this period in case the employer did not exist the full period. Observations with extreme changes in wage sums (over (-) 50% per year, probably caused by merger and division of firms) have been removed from the sample.

Finally, we define a time-dummy, describing the year the observation relates to. The year 2001 is chosen as a reference, the 2002 dummy is presented in the regressions on pooled data.

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[32] Which is 30 000 and 50 000 former Dutch guilders, respectively.