PhD_2026_03

Disability Insurance Design with Employer and Employee Behavior

Laura Jansen

Netspar

Academic paper

Disability Insurance Design with Employer and Employee Behavior

Jansen, Laura

DOI:
10.33612/diss.1524904950

Publication date:
2026

university of
groningen

Disability Insurance Design with Employer and Employee Behavior

Laura Jansen

Theses in Economics and Business

Disability Insurance Design with Employer and Employee Behavior

Laura Jansen

Publisher: University of Groningen, Groningen, The Netherlands

Printer: Ipskamp Printing, Enschede, The Netherlands

Cover page: Photo by Catrin Johnson on Unsplash

This document was prepared using LaTeX.

Disability Insurance Design with Employer and Employee Behavior

PhD thesis

to obtain the degree of PhD at the
University of Groningen
on the authority of the
Rector Magnificus Prof. J.M.A. Scherpen
and in accordance with
the decision by the College of Deans.

This thesis will be defended in public on

Thursday 25 June 2026 at 12:45 hours

by

Laura Johanna Jansen

born on 24 March 1999 in Nijkerk

Supervisors
Prof. V. Angelini
Dr. M. Groneck

Co-supervisor
Dr. R. van Ooijen

Assessment Committee
Prof. A.R. Soetevent
Prof. M. Salm
Prof. J. Wallenius

Acknowledgements

At the end of 2025, I came across a survey held by Nature, which asked the question: What makes PhD students happy? The answer: Good supervision (Nature, 2025). Based on my own PhD trajectory, I could not agree more. I would like to start my acknowledgements by thanking my supervisors Viola, Max, and Raun for making my PhD not only successful but also very much enjoyable. From the start to the finish of the PhD, including the job market phase, I have always felt very supported. I could always knock on your door for advice, whether thesis-related or beyond. Whenever I encountered difficulties with one of the projects and would worry about it myself, the problems always seemed much more manageable after our meetings. Viola, thank you for your incredible support throughout my research, especially during the job market, and for always making sure that projects did not continue endlessly. Max, thank you for always having an open door, for both big and small questions, and for consistently being very engaged with my projects and their outcomes. Raun, thank you for your thoughtful writing advice and suggestions for creative ideas at the right time, but also for checking in on how things were going beyond my thesis.

Within the University of Groningen, there are many other colleagues who have shared their feedback on my work through one-on-one meetings or during seminars, or people who have shared job market advice with me. Thank you very much! I want to thank FEBRI for its support and for making this PhD possible in the first place.

I also want to thank my assessment committee, Adriaan Soetevent, Martin Salm, and Johanna Wallenius, for reading, assessing, and providing valuable feedback on my dissertation.

During my PhD, I also had the opportunity to collaborate with and learn from several researchers outside of the University of Groningen, all of whom, in different ways, improved my research and dissertation. This includes, but is certainly not limited to, Pierre Koning, who is a co-author on one paper and offered valuable advice on the other two. I am also grateful to the Netspar community with whom I've participated in many events, and especially Lieke Beekers who has twice been a discussant for my papers and who will be my colleague from April onwards. At the start of 2025, I visited EUI in Florence, and I am thankful to Alex Ludwig for hosting my stay, as well as to many PhD students and researchers at EUI. Finally, I have collaborated with UWV and am especially grateful to Marcel Spijkerman for working with me on a UWV-kennisverslag and for explaining so much about the data and UWV procedures.

I also want to thank Sándor Sóvágó and Adriaan Soetevent, who supervised my LPR-project during the Research Master and who made me feel really excited about doing research and staying for a PhD, which I was still unsure about at the start of my Master's.

Next, I want to thank many of my fellow PhD students who shared this journey with me. Aukje, I'm very happy that you have been my office mate since the very start of our PhD. I think that supportive PhD friends should also be an important determinant in Nature's survey on PhD happiness. Sander, our mental health walks and afternoon snacks have greatly improved my mood (as can be expected from mental health walks). Simon, thanks for all the shared lunches and coffees: even when the work was hard, lunch would always be fun. I would also like to thank many other PhD colleagues with whom I've shared the PhD experience: those who started with me on the ninth floor, those who joined later, or those I already knew from the ReMa (Carlotta and Janneke!), and those whom I have shared an office with, including Claudio with whom I have navigated part of the job market. Thank you all for the support and shared experiences.

My next step will be a position as postdoctoral researcher at the Department of Economics of the University of Leiden. I am very excited about this position, not just because I get to be in the beautiful city of Leiden but also because I am very happy to work with a great team of researchers led by Egbert Jongen. I am very grateful to be able to join such a great university and interesting project.

Outside of the PhD, I have received much support from people in my personal life. My group of friends (or *flents*, as our official name is) from home, Dide and Dinand, Talin and Anca, and my Northside friends, thank you for sharing many glasses of wine and for always putting my PhD troubles into perspective. Jeremy, thank you for making me work on my weightlifting technique rather than my dissertation, and for reminding me to keep a healthy work–life balance.

My family has always been a constant source of support, believing in me and my choices. Papa en mama, opa en oma, mijn schoonfamilie, bedankt voor alles. From across the ocean, Lisa, I miss you being here in the Netherlands every day, and the newest addition to the family, Seb: although you are far away, your arrival has brought me so much joy, and I hope that one day we will all live much closer to one another.

Finally, I would like to thank those for whom it is hardest to put into words just how grateful I am. Tristan, thank you for always being there, for your calm presence and for making me laugh whenever I am stressed. I love you very much. Boris, thank you for being the sweetest cat and for making home feel so much more like home. My PhD would not have been the same without you sitting on my lap, critically reading my work.

Laura Jansen
Groningen, February 2026

Contents

Chapter 1

Introduction

1.1 Motivation

While most individuals hope to reach retirement in good health, many people ultimately do not. Across the OECD, one in six working-age adults reports having a disability (OECD, 2022). Having a disability does not necessarily imply an inability to work. Still, in 2019 individuals with disabilities were 27 percentage points less likely to be employed than those without disabilities (OECD, 2022). Combined with higher medical expenditures, this lower employment rate exposes individuals with disabilities to substantial financial risks. In the OECD in 2019, one in four people with a disability lived in a household below the poverty line, compared to one in seven among those without disabilities (OECD, 2022). These disparities highlight the crucial role of disability insurance (DI) in protecting individuals against the income losses associated with health problems.

However, public DI systems are costly and under increasing pressure from population ageing. Increasing retirement ages increase DI inflow and spending as older workers are more likely to experience health problems (OECD, 2022). Because retirement ages tend to rise in line with overall life expectancy while healthy life expectancy does not always keep pace, DI inflow can be expected to rise further (OECD, 2025). For instance, the DI inflow in the Netherlands increased by almost 60% between 2018 and 2024 (Berendsen et al., 2025).

Against this background, the design of DI systems has become increasingly important. Policymakers face a well-known insurance-incentive trade-off: DI should provide sufficient insurance value to those with limited work capacity, while avoiding benefit structures that are so generous or easy to access that they reduce labor supply among those with remaining work capacity. When the system incentivizes individuals to work less than their remaining capacity, this is referred to as *employee-side moral hazard*. The standard policy tools used to navigate this trade-off are the strictness of screening or eligibility criteria, and the level of benefit generosity (Haller et al., 2024; Low and Pistaferri, 2015).

While a lot of attention is paid to employee-side moral hazard, less so is paid to the role of employers, even though they can also exhibit moral hazard. Employers can influence DI applications and inflow through the provision of work accommodations, such as changing the job tasks, allowing for flexible hours, or making alterations to the physical workplace (e.g. screen magnifiers or adjusted equipment). Many people leave employment due to health issues whose impact on their job could be mitigated through such accommodations. When these individuals would receive accommodation, the empirical literature finds that they have a higher chance of returning to work, delaying DI application, or even of not entering DI at all (Burkhauser et al., 1999; Campolieti, 2005; Everhardt and de Jong, 2011; Hill et al., 2016; Maestas et al., 2019; Van Ooijen et al., 2024). However, because accommodations are costly and employers typically do not feel the costs of public DI because they contribute to DI through uniform premiums independent of their own employees' DI inflow, firms may underinvest in accommodation (Hawkins and Simola, 2024; Prinz and Ravesteijn, 2020). This is referred to as *employer-side moral hazard*. Therefore, there exists scope for employer-side policy instruments that force firms to internalize the costs of DI entry and encourage them to accommodate.

For the design of DI, it is therefore essential to account for the behavior and incentives of both employees and employers. This thesis theoretically considers the optimal design of public DI with both employee and employer moral hazard and empirically assesses the strength of employee and employer moral hazard in response to changes in DI policy instruments. Chapter 2 builds a model of optimal DI design, including employer and employee behavior, and examines three key policy instruments. The first two are the standard tools aimed at worker behavior: the strictness of eligibility and medical screening, and the level of benefit generosity. The third one is experience rating, which aims to reduce employer-side moral hazard. Experience rating links firms' DI contributions to the DI inflow of their own employees and is intended to increase accommodation. Chapter 3 considers employer-side moral hazard and its response to experience rating. It empirically assesses the effect of experience rating on the accommodation provided to long-term sick-listed workers in the Netherlands, exploiting variation caused by a reform that extended experience rating to non-permanent employees. Finally, Chapter 4 studies employee-side moral hazard in response to screening. It estimates the DI application and employment effects of a Dutch reform that eliminated medical screening for DI applicants aged 60 and above.

This study is set in the Netherlands, whose DI system provides a uniquely informative context for examining how firms and workers respond to DI policy. Historically, the Netherlands was known for its exceptionally high DI inflow (the so-called “Dutch disease” by European labor economists) (Burkhauser et al., 2008; Koning and Lindeboom, 2015). Since around 2002, the Dutch DI inflow dropped dramatically after a sequence of major reforms, many of them centered on employer incentives and stricter screening (Koning and Lindeboom, 2015). More recently, however, the system again faces rising DI applications, severe shortages of insurance physicians, and increasing administrative complexity, prompting the introduction of measures such as the fast-track procedure for older workers (OCTAS, 2023).

While the Dutch institutional details are specific, the underlying challenges are not. Low employment rates of workers with disabilities, population aging and increasing retirement ages, rising frequencies of mental health issues, and shortages of healthcare professionals are not unique to the Netherlands (OECD, 2023b, 2022). The mechanisms studied in this thesis, such as employer accommodation, selective hiring, and age-specific screening are therefore highly relevant outside the Dutch context and speak to broader policy debates on the sustainability and optimal design of DI systems.

1.2 Thesis aim and research questions

Against this background, this thesis aims to study the optimal design of DI when both employee and employer behavior are taken into account, and to study how employers and employees respond to changes in the DI system. It combines the development of a theoretical framework for optimal DI design with empirical analyses that assess the magnitude of employee- and employer-side moral hazard. To achieve this aim, the following research questions are examined:

1. How should DI be designed when both employee and employer behavior are taken into account?
2. How does incorporating employer behavior change the role and optimal levels of standard employee-side DI policy instruments?
3. What trade-offs arise when using employer-side incentives to influence DI inflow and employment outcomes?
4. How do employees and employers respond to changes in DI policy instruments, and how strong are the resulting moral hazard effects?

1.3 Thesis overview

Chapter 2, titled "Optimal Disability Insurance: Employer and Worker Incentives" develops a theoretical model that characterizes the optimal design of public DI when both employer and employee behavior are explicitly accounted for. This allows me to analyze not only the optimal level of the two standard employee-side DI policy parameters (DI eligibility and generosity) but also of experience rating that targets employer behavior.

I build my model by extending the Diamond and Sheshinski (1995) model, recently used by Haller et al. (2024), with a firm side. I introduce the concepts of accommodation and selective hiring and let the firm and worker participate in a sequential game. The model is set up as follows. First, the government decides on the three policy parameters: experience rating, benefit generosity, and eligibility. Then, the firm decides whether to hire the worker, based on expected profits and the disability level, and next, whether to accommodate the worker. Finally, the worker decides whether to apply for DI and if their application is rejected, whether to stay employed or not. The model features heterogeneity in the disability levels and workers face uncertainty regarding the DI application outcome.

With this model, I am one of the first to simultaneously assess firm and worker moral hazard in the context of optimal DI. Previous literature only focuses on either the employee side and the insurance-incentive trade-off (Diamond and Sheshinski (1995), Haller et al. (2024), Low and Pistaferri (2015)), or only considers the employer side and experience rating (Prinz and Ravesteijn, 2020). Aizawa et al. (2025) do model both employer and employee behavior in a model of DI yet do not include accommodation or endogenous DI applications.

In Chapter 3, titled "Do Stronger Employer Responsibilities Enhance Work Accommodation for Sick-Listed Workers? Evidence From a Dutch Reform", together with co-authors, I empirically assess how large the firm's accommodation response to experience rating is. Specifically, we study the effects of experience rating in sick leave and DI premiums on the work accommodation provided to long-term sick-listed workers and on the employer's insurance choice.

We exploit a Dutch reform implemented in 2013 and 2014, in which experience rating of sick leave and DI benefits was extended to non-permanent employees and where the level of experience rating was tied to the firm's size. We use unique survey data from the National Social Insurance Institute (NSII) targeted to nine-month sick-listed workers, that includes questions about workplace accommodation and firms' choices to opt out of public sick leave insurance. This allows us to set up a difference-in-differences analysis where we consider the effect of introducing or removing experience rating on accommodation and on the firm's choice to opt out of public sick leave insurance. Opting out of public sick leave insurance means that the firm, rather than the NSII, has to directly pay for sick leave benefits and is responsible for all reintegration, although most firms choose to privately insure this risk when opting out.

Previous literature considers the effects of experience rating on DI inflow, yet does not look at the mediating factor: accommodation, which we are able to do because of the unique survey data we employ. Moreover, this chapter also expands the limited research on experience rating and firms' insurance choices, which has been studied only sparsely for DI and more extensively for workers' compensation. It also fills an important gap by examining non-permanent employees, a vulnerable group with higher DI risks and few employer incentives, for whom the impact of experience rating remains unclear.

Finally, in Chapter 4, titled "Application and Employment Effects of Reduced Screening for Disability Insurance Benefits of Older Workers", my co-authors and I study a 2022 Dutch reform that removed the medical DI screening for workers aged 60 and above. The policy was introduced to address long waiting times at the NSII and targeted older workers because the potential labor supply loss from more lenient DI access is smaller for this group, consistent with evidence that employment rates among older workers are considerably lower (OECD, 2025). Although reduced screening may increase the welfare value of benefits for older applicants, it could still come with substantial employment losses. This chapter examines how the removal of medical screening affected DI applications and employment outcomes, providing the first causal evidence on reduced DI screening for older workers and distinguishing between the policy's mechanical effects and its moral-hazard responses.

We use administrative data on all sick leave spells in the Netherlands provided to us by the NSII. The reform that introduced the fast-track measure implied that DI applicants of at least 60 years old at the end of the two-year sickness period can forgo medical assessment during the DI screening. If they use this option, they are automatically granted full temporary DI. Because full DI offers much weaker incentives to remain employed than partial DI, this option effectively reduces work incentives for older workers who may still have some residual work capacity. In this sense, the reform combines a relaxation of screening with more generous benefits for older applicants. We apply a difference-in-differences strategy to estimate the effects of the reform on DI applications and subsequent employment.

This chapter makes two main contributions to the literature. First, it provides the first causal estimates of a reform that reduces DI screening specifically for older workers, while previous literature mostly assesses stricter screening. Second, we are able to disentangle mechanical responses from moral-hazard responses, and provide a unified framework of how screening rules shape applications, award composition, and employment behavior near retirement.

1.4 Main findings

This section summarizes the main findings of the thesis. Chapter 2 provides several theoretical insights on the optimal design of disability insurance when both employer- and employee-side moral hazard are taken into account. Chapter 3 provides empirical evidence on employers' behavioral responses to changes in experience rating, while Chapter 4 estimates the effects of medical screening on employee-side moral hazard.

Chapter 2 delivers three key theoretical findings. First, worker application and labor supply decisions interact tightly with firms' accommodation and hiring choices, leading to a set of disability thresholds that jointly determine firm and worker behavior. These thresholds segment workers into groups that differ in their DI application and employment responses, and similarly determine when firms accommodate or stop hiring as disability increases. Second, experience rating shifts these thresholds in two opposing ways: it encourages accommodation by making DI inflow more costly for firms, but it also discourages hiring of workers with higher disability levels. The optimal level of experience rating balances these forces, and I show that raising experience rating improves welfare when the accommodation response is strong, the hiring response is weak, and workers value accommodation highly. Third, I show that standard DI parameters, eligibility and benefit generosity, also affect employer behavior. Stricter screening or lower benefits not only change worker incentives but also weaken the impact of experience rating on firms, causing them to adjust hiring and accommodation. As a result, the optimal levels of these traditional DI instruments depend on firm elasticities as well, and cannot be determined without accounting for employer responses.

Chapter 3 produces three main empirical results. First, we do not find a significant effect of experience rating on the likelihood of long-term sick-listed workers being accommodated, for either permanent or non-permanent employees. Second, firms become significantly more likely to opt out of public sick leave insurance for non-permanent employees following the introduction of experience rating. Third, accommodation provision is unequal: non-permanent employees are substantially less likely to receive accommodations, although most other determinants of accommodation are similar across the two groups. That is, a younger age, higher education, and being employed at a large firm positively correlate with accommodation, while heart or vascular conditions are negatively associated.

Finally, Chapter 4 shows that the removal of medical screening for DI applications of workers aged 60 or older led to a clear increase in full DI awards, while DI applications rose only modestly. The behavioral response is stronger in labor supply than in application behavior: one year after the end of the sick leave period, employment falls by 2.1 percentage points, and the earnings decline corresponds to a 31% crowd-out effect, in line with weaker work incentives under full temporary DI. The effects also differ across groups. Application rates rise for women but not for men, and the increase in awards is largest among workers in the lowest pre-disability earnings quintile.

1.5 Policy implications

The main findings of this thesis lead to several implications for the design and implementation of DI systems, which are discussed below.

Employer behavior should be explicitly incorporated into the design and evaluation of DI policies.

The results of Chapter 2 show that DI policies operate through both employers and workers, implying that optimal policy design cannot be based on worker responses alone. In a worker-only framework, changes in screening stringency or benefit generosity affect DI inflow solely by altering workers' application incentives through employee-side moral hazard. Once employer behavior is taken into account, however, we learn that these same policy parameters also affect firms' hiring and accommodation decisions by changing their exposure to experience-rated DI costs. Firms' hiring and accommodation responses, in turn, affect workers' decisions to apply for DI. As a result, the optimal levels of these traditional DI parameters depend on firm elasticities and cannot be determined in a worker-only framework.

Employer incentives should be designed to promote accommodation while limiting unintended effects such as selective hiring.

Chapter 2 shows that experience rating involves a fundamental trade-off: while it can increase accommodation and reduce DI inflow, it may also discourage firms from hiring workers with higher disability risk. The optimal level of experience rating therefore depends on the relative strength of these opposing effects. Moreover, Chapter 3 finds no increase in accommodation for long-term sick-listed workers, suggesting that experience rating may be more effective as a preventive tool, encouraging early accommodation, rather than as an incentive for late-stage interventions.

The uneven provision of accommodation across different types of workers indicates a need for policies that address unequal access to accommodation beyond experience rating.

Chapter 3 shows that sick-listed workers differ substantially in their likelihood of receiving accommodation. Since these disparities exist in a system with experience rating, this suggests that employer incentives alone do not ensure equitable access to accommodation. Policies that directly target unequal provision, such as accommodation subsidies or additional support for firms employing sick or disabled workers, may therefore be needed.

Relaxing DI screening for older workers should be applied selectively given the substantial employment losses that it generates.
Reduced screening can be an effective tool to shorten waiting times and ease administrative pressure in periods of physician shortages, and employment rates among older workers are already lower than those of prime-aged workers (OECD, 2025). However, such reforms may cause moral hazard in terms of DI applications and employment. Chapter 4 shows that removing medical assessments for workers aged 60 and above strongly reduces employment while leading to only a modest increase in DI applications. Overall, the increase in DI spending and reduced labor tax revenues significantly offset the associated administrative savings, leading to a net fiscal cost of approximately 85 million euro per year. These findings suggest that relaxed screening may be justified under specific circumstances, but should be used cautiously and targeted to situations where administrative gains outweigh the associated employment costs.

Consider simplifying the DI system to improve understanding among workers and employers and to reduce administrative burdens.
While not a direct result of the analyses in this thesis, all three studies highlight the complexity of the Dutch DI system, which is hard to navigate not only for researchers but also for employers and employees. For example, one explanation for the absence of an accommodation response among long-term sick-listed workers may be limited employer understanding of the experience rating system (Chapter 3). In addition, the decline in full permanent DI awards following the introduction of the fast-track measure suggests that some workers may have preferred the certainty of immediate access to full temporary DI over the more uncertain regular assessment process (Chapter 4). This points to a system that is difficult to understand and navigate, and suggests that greater simplicity could help workers and employers make better-informed decisions. Simplification would also reduce the administrative burden faced by the Dutch NSII.

1.6 Future research

This thesis opens several avenues for future research that build on its theoretical and empirical contributions to advance our knowledge about DI design when both firm and worker behavior matter. A first priority is to bring the theoretical framework of Chapter 2 to the data. The model's optimality conditions for experience rating, benefit generosity, and screening strictness can be empirically estimated using a sufficient-statistics approach with linked survey and administrative data on employment, accommodation, and DI outcomes. This would provide direct policy implications: are current levels of experience rating, benefits, and eligibility too high, too low, or just right?

While the sufficient-statistics approach is well suited for policy evaluation, it does not capture dynamic behavior over the life cycle. An important extension is therefore to develop a dynamic life-cycle or search-matching model with disability risk and endogenous firm behavior, allowing for evolving health, savings, repeated accommodation decisions, and renegotiation on employment terms. Such a framework would capture longer-term responses that are abstracted from in the static model. This model could be estimated and calibrated using Dutch data.

A third avenue is to exploit the reform studied in Chapter 4 as exogenous variation in DI receipt, rather than considering the effects of screening. The removal of medical screening for older workers provides an exogenous instrument to estimate the causal effects of DI receipt on various outcomes, including retirement timing and health. This would complement existing studies that use assessor leniency as an instrument in settings without strong employer incentives.

Fourth, further research is needed to assess whether experience rating affects preventive accommodation or reintegration earlier in the sickness spell. The absence of accommodation effects for long-term sick-listed workers in Chapter 3 suggests that employer incentives may operate at earlier stages, where interventions could be more effective in preventing DI entry.

Finally, future work should explicitly estimate selective hiring responses to employer incentives. While existing research mainly estimates the DI inflow effects of experience rating, firms may also respond by adjusting hiring toward healthier workers. Quantifying both accommodation and selective hiring is essential to fully understand how employer incentives shape DI inflow and employment outcomes.

Chapter 2

Optimal Disability Insurance: Employer and Worker Incentives

This chapter is based on Jansen (2025). I want to thank my supervisors Viola Angelini, Max Groneck and Raun van Ooijen for their support throughout this project. I also want to thank Jesús Bueren, Albert Jan Hummel, Pierre Koning, Alexander Ludwig, Tianyu Ma, Wanda Mimra, Stefan Pichler, Arthur van Soest, Adriaan Soetevent, Sándor Sóvágó, Yan Xu, and Gijsbert Zwart for valuable comments and discussions about this chapter. Finally, I thank the participants at Ca'Foscari-Groningen PhD Exchange Seminar, EEF Micro Meeting, EUHEA, EUHEA PhD Conference, EUI Informal Seminar, LolaHESG, Netspar Pension Day, and at the SASCA PhD Conference. I gratefully acknowledge funding from Netspar for the project 'Work in old age and when disabled: The role of employer responsibility'.

2.1 Introduction

One in six working-age individuals in the OECD reports having a disability, making disability insurance (DI) a major component of public spending (OECD, 2022). Demographic change is projected to further increase DI expenditures (Lorenzoni et al., 2019). In several OECD countries, DI inflow is already growing rapidly: in the Netherlands, for example, DI inflow rose by 60% between 2018 and 2024 (Berendsen et al., 2025). Designing optimal DI programs is therefore a crucial policy challenge. Standard social insurance theory shows that the optimal program balances a trade-off: a generous DI system reduces income risk for workers unable to work, but can also reduce work incentives for those with remaining work capacity. This balance, known as the insurance-incentive trade-off, determines the optimal design of DI (see e.g. Chetty and Finkelstein (2013); Chetty and Saez (2010) or Low and Pistaferri (2015)).

However, little is known about how employers affect optimal DI design. Employers can play a crucial role in retaining workers who have work disabilities with remaining capacity to work. As work disabilities are context-specific, employers can enable workers to use their remaining work capacity by offering work accommodations, such as altering the physical workplace through e.g. elevators or screen magnifiers, providing adjusted equipment, allowing flexible hours, or changing the job task description. Such accommodations have empirically been shown to increase continued employment (Burkhauser et al., 1995a, 1999; Campolieti, 2005; Everhardt and de Jong, 2011; Hill et al., 2016; Van Ooijen et al., 2024). Yet, employers may provide less accommodation than is socially optimal, since they do not directly bear the DI costs of their employees. This may lead to firm-side moral hazard when accommodation efforts are not observed by the insurer (Hawkins and Simola, 2024; Prinz and Ravesteijn, 2020; OECD, 2008).

To address firm-side moral hazard, some governments have shifted part of disability risk and responsibility onto employers. The Netherlands represents an extreme case, with exceptionally strong employer responsibilities in its DI system. Typically, public DI premiums are at least partially financed by employer contributions, paid through uniform premiums that are the same across firms, regardless of the DI inflow of their employees. In the Netherlands, DI premiums are experience rated: firms whose employees generate higher-than-average DI costs face higher premiums, while those with lower costs pay less.[1] This directly ties DI costs to the employer and incentivizes accommodation to avoid DI entry. However, it also raises an important question: to what extent should disability risks be shifted to the firm? The key trade-off is that while experience rating may increase accommodation, it may also reduce firms' willingness to hire workers who are disabled or who are at higher risk of developing a disability, a process known as selective hiring. As a consequence, a full shift of disability costs to the firm might not be warranted.

In this chapter, I develop a theoretical framework of optimal DI to determine the optimal level of experience rating, accounting for both worker and employer behavior. I extend the framework of Haller et al. (2024), based on the Diamond and Sheshinski (1995) model, by endogenizing employer behavior. The resulting employer-employee framework incorporates both the accommodation-hiring and insurance-incentive trade-offs. Within this framework, I derive a Baily-Chetty-type formula for the optimal level of experience rating, which balances its central trade-off between improved accommodation and selective hiring.[2] I also show that the optimal levels of the standard DI policy parameters—eligibility and benefit generosity—are altered by incorporating employer behavior.

To model optimal DI design, I develop a sequential game with three types of players: the government, employers, and workers who are heterogeneous in disability. In the model, higher disability raises both disutility of work and productivity loss. Employers decide whether to hire a worker and, if so, whether to provide accommodation, which reduces disutility and productivity loss but is costly. Workers then decide whether to apply for DI and whether to leave the labor force if rejected. The government chooses three DI policy parameters: the level of experience rating, benefit generosity, and eligibility. Solving the model by backward induction yields several disability thresholds beyond which firms and workers change behavior. To characterize optimal DI design, I maximize a utilitarian social welfare function with respect to these policy parameters.

[1] In addition to experience rating, Dutch employers are also responsible for up to two years of sick pay and face strong reintegration requirements before DI entry, placing unusually strong responsibilities on firms relative to other OECD countries (OECD, 2008).

[2] The Baily-Chetty formula of optimal social insurance is a formula determining the optimal benefit level, that equates the consumption smoothing gains from increasing benefits to the behavioral response on labor force participation. This formula can be estimated empirically to determine the optimal level of experience rating in the sufficient-statistics framework, without having to estimate the full model (Baily, 1978; Chetty and Finkelstein, 2013).

This generates Baily–Chetty-type conditions for each of the policy parameters.

The analysis yields three key findings. First, I show how employee application and labor supply decisions interact with firms' accommodation and hiring choices. This identifies four disability thresholds that guide worker behavior, leading to five groups of workers with different behavior: *i*) below a first disability threshold, workers are too healthy to apply for DI; between this level and the next, workers apply only when not accommodated; *ii*) above a second threshold, workers always apply to DI but, if rejected, remain employed; *iii*) above a third threshold, workers apply to DI but only remain employed if accommodated; and *iv*) beyond a final threshold, workers always apply to DI and never remain employed when rejected. Moreover, I derive that employer behavior also depends on two disability thresholds: an accommodation threshold and hiring threshold. Employers only accommodate employees who respond to accommodation: that is, those who would otherwise apply for DI or leave employment after DI rejection. Firms accommodate the first group of workers up to a disability level where accommodation remains profitable, but at higher disability levels accommodation ceases. At even higher disability levels, hiring itself stops once expected profits turn negative due to experience rating. These thresholds illustrate how firm and worker decisions are jointly determined. The subsequent analysis shows how the policy parameters shift the thresholds between these groups and hence increases one group by decreasing another one.

Second, I establish how experience rating affects behavior and how its optimal level can be characterized. In the model, this implies that experience rating shifts the disability thresholds, changing the shares of workers in each of the groups. Increasing experience rating, which forces firms to internalize DI costs, has two effects: it lowers the accommodation threshold (increasing accommodation) but also lowers the hiring threshold (reducing hiring). The sufficient-statistics formula I derive weighs these opposing forces to identify the welfare-maximizing level of experience rating. Whether higher experience rating raises welfare is therefore theoretically ambiguous. I find that it improves welfare when the elasticity of accommodation with respect to experience rating is large and the elasticity of hiring is small, and when workers value accommodation strongly.

Third, I show that the standard DI policy parameters—DI eligibility and benefit generosity–depend on employer behavior. Endogenizing firms introduces new mechanisms. Stricter DI screening reduces the probability of DI receipt, lowering the expected cost of experience rating for firms. As a result, firms accommodate fewer workers but hire more. These two factors disappear in a worker-only framework, where stricter eligibility solely reduces DI applications through worker moral hazard. A similar logic applies to benefit generosity: cutting benefits makes DI less attractive for workers but also weakens the threat of experience rating for firms. In response, firms again hire more but accommodate fewer, raising applications. In contrast, a worker-side model would predict a decline in DI applications due to the decreased attractiveness of benefits to the worker. These results imply that even policy parameters formally targeted at workers indirectly shape employer behavior, and therefore their optimal levels cannot be set without accounting for firms. While it is theoretically ambiguous whether eligibility and benefits should optimally be stricter once firm behavior is endogenized, I show which elasticities (accommodation, hiring, and DI receipt) enter the new optimality conditions.

This chapter makes three key contributions. First, I endogenize employer behavior in the sufficient-statistics framework of DI (the Haller et al. (2024) framework), showing how firm accommodation and hiring interact with worker application and labor supply. Aizawa et al. (2025) also model worker and firm behavior in a quantitative structural model of DI. However, they focus on screening at hiring and do not include accommodation, endogenous DI application decisions, or experience rating. Second, I analytically determine the socially optimal level of experience rating when both employer and employee behavior are considered. The model of Prinz and Ravesteijn (2020) is the only study that also derives an optimality condition for experience rating, yet they only capture firm responses. They do not include accommodation and model retention as a binary choice of the firm, while in fact, the worker's response to accommodation determines whether a worker remains employed. Thus, both sides are essential to the analysis. Finally, I show that the two standard employee-side policy parameters in the Haller et al. (2024) framework—eligibility rules and benefit levels—are also affected by firm responses. This demonstrates that optimal DI policy cannot be designed solely from the worker side: employer behavior systematically shifts the optimal levels of these parameters.

The main policy implication of this study is that optimal DI design must consider both insurance-incentive trade-offs and employer-side effects. Countries seeking to limit firm-side moral hazard and increase accommodation could employ employer incentives, such as experience rating, but must weigh potential selective hiring against the accommodation effect. Even in systems without explicit employer incentives, worker-side policy parameters trigger firm responses, so reforms should account for both types of agents.

The rest of this chapter is organized as follows. Section 2.2 reviews related literature. Section 2.3 introduces the main model, which is analyzed and solved in Section 2.4, where I also derive the optimality conditions for experience rating, benefit generosity, and eligibility criteria. Section 2.5 contrasts the main model to an economy without experience rating and examines its welfare implications. Section 2.6 discusses model assumptions and alternative versions, and Section 2.7 concludes.

2.2 Literature

This chapter fits within the theoretical literature on social insurance by studying how employer behavior and incentives shape optimal DI design. There are two broad strands in the theoretical literature: the sufficient-statistics approach, relying on Baily-Chetty-type formulas that can be estimated to assess the optimality of policy parameters, and the structural modelling approach: where often lifecycle models are employed that have to be fully calibrated to estimate optimal policy, and can also be used for policy counterfactual simulation. The sufficient-statistics approach, first developed by Baily (1978) and Chetty (2006) in the context of unemployment insurance (UI), uses a few empirically estimable statistics to determine the optimal level of benefits, balancing the consumption-smoothing benefits of insurance against moral hazard (labor supply reduction) costs, using the so-called Baily-Chetty formula. Since then, various other papers have used and extended this framework for optimal UI policy (see e.g. Gruber (1997); Kolsrud et al. (2018); Landais et al. (2018); Landais and Spinnewijn (2021); Schmieder et al. (2016)). A small strand also endogenizes employer screening and hiring behavior for UI, for instance Lehr (2017) and Meier and Obermeier (2025).

A much smaller fraction applies the sufficient-statistics framework to DI. Meyer and Mok (2019) use it to assess the welfare-maximizing level of DI in the US, while Deshpande and Lockwood (2022) estimate only a part of the Baily-Chetty formula: the insurance value of DI in the US. More recently, Haller et al. (2024) employ the Diamond and Sheshinski (1995) model to analyze the welfare effects for two employee-side policy parameters, eligibility rules and benefit generosity, in Austria.

Yet, the sufficient-statistics literature solely focuses on worker behavior and does not include the employer. Therefore, employer incentives such as experience rating cannot be evaluated. Prinz and Ravesteijn (2020) provide the only model capturing the optimal level of experience rating, but only include firm responses and not those of the worker. They argue that experience rating causes a selection and retention effect, i.e. a binary choice of the firm to retain a worker after a health shock. For optimal experience rating, they argue that these two effects should be traded off against each other.

Optimal DI is also considered in structural models. These models usually consider the trade-off between insurance and the labor supply disincentives, focusing solely on worker behavior (Ball and Low, 2014; Britton and French, 2020; Low and Pistaferri, 2015). Aizawa et al. (2025) provide the first structural equilibrium search model on DI that combines worker and firm behavior. Firms offer contracts with non-wage benefits to screen out disabled workers. While these non-wage benefits could be interpreted as a form of accommodation, the model only captures screening at hiring and not the effects of accommodation on DI application or worker retention.

This chapter also uses insights from the mostly empirical literature on experience rating, which generally finds positive, although sometimes insignificant, effects on DI inflow or sustained employment (see e.g. Koning (2009); Van Sonsbeek and Gradus (2013); De Groot and Koning (2016); Koning et al. (2025); Hawkins and Simola (2024); Kyyrä and Tuomala (2023)). Yet, limited evidence exists on the mechanisms behind these effects—accommodation and selective hiring. Jansen et al. (2025) find no significant effect of experience rating on the accommodation rates of long-term sick-listed workers in the Netherlands, while Hawkins and Simola (2024) estimate that experience rating shifts new hires away from higher-risk workers in Finland. Prinz and Ravesteijn (2020) also document selective hiring in the Netherlands as a result of experience rating.

I build on these strands of the literature by combining employer and employee behavior into one framework of DI, where I can simultaneously consider worker- and firm-side policy parameters. Since hiring, accommodation, and employee responses to accommodation are explicitly modeled, I am able to also evaluate the effects of experience rating, which is not possible in models abstracting from these factors.

2.3 Model set-up

To determine the socially optimal level of experience rating while connecting both firm and worker behavior, I develop a sequential game that extends the Diamond and Sheshinski (1995) model with a firm side. Key features of the model are workers that are heterogeneous in their disability level who can be hired by the firm. Firms can provide accommodation which reduces the productivity loss and disutility caused by disability. If a hired worker successfully applies for DI, the worker has to pay an experience rating fee. Compared to the Diamond and Sheshinski (1995) model, the firm side is novel, as are its implications to the worker and government: accommodation and hiring are newly added (in the original model, no one is accommodated and everyone is already hired), and the government can employ an additional policy instrument, experience rating. Besides this, the government and worker side are modeled after Diamond and Sheshinski (1995) and Haller et al. (2024).

2.3.1 Model environment, timing, and choices

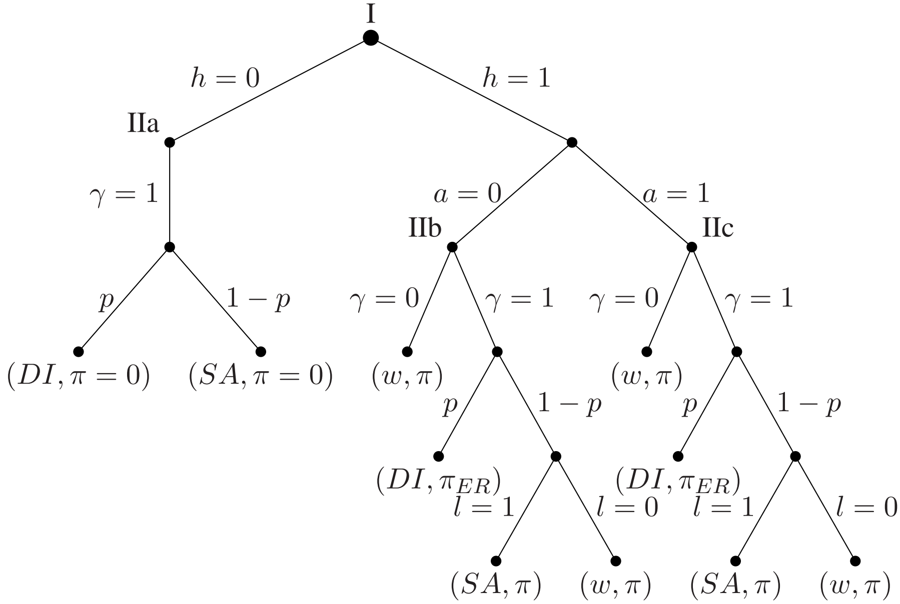
I model a sequential game with three types of players: the government, identical firms, and heterogeneous workers. Workers are ex-ante heterogeneous in their disability type $\theta \in \left[0, \bar{\theta}\right]$ which is drawn randomly from a continuous distribution $F(\theta)$. The economy consists of a continuum of workers and the same number of identical firms that are randomly matched.

The timing and choices of the model are depicted in Figure 2.1. First, the government decides on the DI policy parameters: the level of experience rating η, the level of DI benefits b and the DI eligibility threshold θ^e. The government also determines the level of social assistance s. Next, the firm decides whether to hire ($h \in \{0, 1\}$) the worker matched to them, and if hired, whether to accommodate ($a \in \{0, 1\}$) the worker. Finally, the worker observes the choices of the employer. The worker chooses whether to apply for DI ($\gamma \in \{0, 1\}$), which is granted with probability $p(\theta)$, with $p'(\theta) > 0$. When a DI application is rejected, the worker decides whether to keep working ($l = 0$) or to leave and collect social assistance ($l = 1$).

2.3.2 Workers

Workers are risk-averse and optimize utility, while being heterogeneous in their disability level $\theta \in \left[0, \bar{\theta}\right]$. The disability level doubles as labor disutility that applies only to

Figure 2.1: *Game tree of employer and employee decisions*



Notes: The game starts at point I, where the firm observes the disability level of the matched worker. The firm then decides whether to hire the worker (h). Conditional on hiring, it chooses whether to accommodate (a). At one of points IIa, IIb, or IIc, the worker's decisions stage begins. The workers chooses whether to apply for DI (γ). Applications are granted with probability p; if rejected, the worker either remains employed or exits the labor force (l).

employed workers. A worker can be in three states. The first state is employment, with utility $u(w - \tau) - \theta + \mathbb{1}_a v$, where w denotes the fixed wage, τ the income tax, and θ the labor disutility or disability. $\mathbb{1}_a$ is an indicator function that equals one when the firm provides accommodation and zero otherwise, and v is the utility stemming from accommodation, which is the same for all workers. This means that disability reduces total utility from work, but accommodation can improve utility from work. The second state is receiving DI benefits, with utility $u(b)$, where b denotes the fixed DI benefit. The final state is receiving social assistance, also fixed for all workers, denoted by s, with utility $u(s)$. I assume that $w - \tau > b > s$.

Workers enter the game when the government already set the DI policy parameters (experience rating η, DI benefits b, DI eligibility threshold θ^e) and the level of social assistance s, and know whether they have been hired and whether they receive accommodation by the firm. I consider hired workers and non-hired workers separately, as the optimization problem for hired workers is different from that of non-hired workers.

If a worker is hired, their first choice is whether to apply to DI ($\gamma \in \{0, 1\}$). The worker optimally chooses γ by comparing the expected utility of DI application, which yields DI benefits $u(b)$ with probability $p(\theta)$ and utility from work $u(w-\tau) - \theta + \mathbb{1}_a v$ with probability $1-p(\theta)$, against the utility of remaining employed, yielding $u(w-\tau)-\theta+\mathbb{1}_a v$. Their first optimization problem is therefore:

$$\max_{\gamma \in \{0,1\}} \gamma \left[p(\theta)u(b) + (1-p(\theta)) \left[u(w-\tau) - \theta + \mathbb{1}_a v\right]\right] + (1-\gamma) \left[u(w-\tau) - \theta + \mathbb{1}_a v\right]. \tag{2.1}$$

If a worker is rejected for DI, their second choice is to stay employed ($l = 0$), with utility $u(w-\tau) - \theta + \mathbb{1}_a v$ or to withdraw and collect social insurance ($l = 1$) with utility $u(s)$. So, the worker optimally chooses $l \in \{0, 1\}$ to maximize:

$$\max_{l \in \{0,1\}} lu(s)] + (1-l) \left[u(w-\tau) - \theta + \mathbb{1}_a v\right]. \tag{2.2}$$

If a worker is not hired, they always apply to DI since $u(b) > u(s)$, with expected utility $p(\theta)u(b) + (1-p(\theta))u(s)$.

2.3.3 Firms

Risk-neutral identical firms maximize expected profits and are randomly matched to one worker, of whom they observe the disability level.[3] When the firm hired a worker, fixed revenues S are earned and the firm pays the fixed wage w. Disability of the worker reduces revenues by a fraction ϕ, i.e., disability leads to a productivity loss. The firm can reduce this productivity loss by accommodating, which increases productivity by χ, again equal for all firms, at cost e. I assume that χ does not cover all disability,

[3]The firm being able to observe the disability level of the worker appears to be a strong assumption. However, empirical evidence shows that selective hiring as a result of experience rating does take place. Prinz and Ravesteijn (2020) find that after experience rating, newly hired workers are 4.2% less likely to be in the top quartile and 3% less likely to be in the top decile of predicted DI receipt. Hawkins and Simola (2024) shows experience rating shifts hiring away from higher-disability-risk groups based on observable characteristics. Hence, firms appear able to form accurate expectations of a worker's future DI receipt based on observable characteristics. In the model, allowing firms to observe disability with error (like the government) would place firm thresholds on a different scale than worker thresholds, preventing closed-form derivations of the optimality conditions. The intuition, however, would remain, but the firm's expectations of the worker's decisions would no longer exactly coincide with the actual worker decisions, since the disability level of the worker and the observed disability level by the firm are different.

reflecting the fact that accommodation could not realistically cover all health issues. Thus, I assume:

Assumption 1. *Accommodation does not fully offset the largest productivity loss of disability.*

$$\chi < \phi\bar{\theta}.$$

Moreover, I assume that the cost of accommodation e is larger than its immediate gain χ.

Assumption 2. *The productivity gain of accommodation is smaller than its cost.*

$$\chi - e < 0.$$

When the firm does not hire the worker, profits are zero. When the firm employs the matched workers, profits are $\pi = S - w - \phi\theta + \mathbb{1}_a[\chi - e]$, depending on whether the firm provides accommodation. Moreover, if a worker who received accommodation leaves, the firm can recover the accommodation costs e. When a hired worker successfully applies for DI, the firm earns no revenue but must pay an experience rating fee, η, which covers part of the government DI expenditures. Thus, when the worker applies to DI ($\gamma = 1$), expected firm profits are $-\eta$ with probability $p(\theta)$ and with probability $1 - p(\theta)$, either $S - w - \phi\theta + \mathbb{1}_a v$) if the worker stays at the firm ($l = 0$) or zero if the worker leaves and collects social assistance. If the worker does not apply to DI ($\gamma = 0$), profits are $S - w - \phi\theta + \mathbb{1}_a v$. Therefore, the optimization problem of the firm is given by:

$$\max_{h \in \{0,1\}, a \in \{0,1\}} hE(\pi) \tag{2.3}$$

with

$$\begin{aligned} E(\pi) = &\gamma \left[-p(\theta)\eta + (1 - p(\theta)) \left[(1 - l)(S - w - \phi\theta + \mathbb{1}_a(\chi - e))\right]\right] \\ &+ (1 - \gamma) \left[S - w - \phi\theta + \mathbb{1}_a(\chi - e)\right]. \end{aligned}$$

Moreover, I assume that firm profits remain positive in the absence of experience rating. Hence, even with the highest disability level, firm profits are positive when the worker is employed: $S - w - \phi\bar{\theta} + \chi - e \geq 0$. This assumption will restrict any non-hiring decisions to be caused by experience rating only.

Assumption 3. *Profits are non-negative when the worker is employed.*

$$S - w - \phi\bar{\theta} + \chi - e \geq 0.$$

Combining these decisions, Table 2.1 summarizes the final payoffs of the worker and the firm.

Table 2.1: *Employer and employee payoffs*

Hire	Apply	DI awarded	Leave firm	Employee utility	Employer profit
$h = 0$	$\gamma = 1$	Yes with $p(\theta)$		$u(b)$	0
		No with $1 - p(\theta)$		$u(s)$	0
$h = 1$	$\gamma = 0$			$u(w - \tau) - \theta + \mathbb{1}_a v$	$S - w - \phi\theta + \mathbb{1}_a[\chi - e]$
$h = 1$	$\gamma = 1$	Yes with $p(\theta)$		$u(b)$	$-\eta$
		No with $1 - p(\theta)$	$l = 0$	$u(w - \tau) - \theta + \mathbb{1}_a v$	$S - w - \phi\theta + \mathbb{1}_a[\chi - e]$
			$l = 1$	$u(s)$	0

2.3.4 Government and DI system with experience rating

The government maximizes social welfare subject to a government budget constraint. The government sets the level of experience rating η, the DI benefit level b, and the DI eligibility threshold θ^e. The government cannot perfectly observe the worker's type θ, instead it observes a noisy signal $\tilde{\theta} = \theta + e(\theta)$, in which $e(\theta)$ is the noise. When $\tilde{\theta}$ surpasses the eligibility threshold θ^e that is set by the government, DI applications are accepted. If $\tilde{\theta} < \theta^e$, applications will be rejected. Hence, $p(\theta)$ can be specified as $p(\theta, \theta^e)$ with $\partial p(\theta; \theta^e)/\partial\theta \geq 0$ and $\partial p(\theta; \theta^e)/\partial\theta^e \leq 0$.

Taking into account the optimal behavior of the employers and employees, the government optimizes social welfare consisting of aggregate worker utility (equally weighted) $V_w(\eta, b, \theta^e)$ subject to the government budget constraint ($G(\eta, b, \theta^e \geq \bar{G})$).[4] The government budget deficit is constraint by a maximum deficit: $\bar{G}$. Government income consists of labor tax income and the experience rating fee from the firms whose

[4] In Section 2.6 I show the government solution when the social welfare function also includes firm profits.

hired employer leaves to DI. Government expenditures consist of DI benefits and social assistance. The government optimization problem is given by:

$$\max_{\eta,b,\theta^e} V_w(\eta, b, \theta^e), \tag{2.4}$$

subject to the government budget constraint:

$$G(\eta, b, \theta^e) = \tau L + \eta ER - bDI - sSA \geq -\bar{G},$$

in which L denotes the mass of people employed, ER the number of firms paying the experience rating fee, DI the mass of DI recipients, and SA the mass of social assistance recipients.

2.4 Model solution

The model is solved by backward induction I first derive the worker's best responses, then those of the worker, and finally the government's optimal policy choices on experience rating, DI eligibility, and benefit generosity, which determine the socially optimal DI parameters.

2.4.1 Workers's best responses

Workers enter the game at points IIa, IIb, or IIc of the game tree (Figure 2.1), knowing whether they were hired, ($h \in \{0, 1\}$) and whether they are accommodated ($a \in \{0, 1\}$), if hired. The worker then decides whether to apply to DI ($\gamma \in \{0, 1\}$) (*Optimization problem* 2.1), and if rejected for DI, whether to leave the firm ($l \in \{0, 1\}$) (*Optimization problem* 2.2).

Following a backward induction strategy, the labor supply decision l is solved first. This decision only occurs in the scenario where a worker was hired but unsuccessfully applied to DI. A worker with disability level θ^l is indifferent between working ($l = 0$) or collecting social assistance ($l = 1$) when the two utilities are the same:

$$u(w - \tau) + \mathbb{1}_a v - \theta^l = u(s),$$

which defines the disability level of the marginal social assistance recipient, θ^l:

$$\theta^l = u(w - \tau) + \mathbb{1}_a v - u(s).$$

When $\theta \geq \theta^l$, a worker prefers collecting social assistance over working, and the reverse for $\theta < \theta^l$.

The next decision, (or in chronological order, the previous decision) is whether to apply to DI. This decision must be made both by workers that were hired and workers that were not hired. Yet, since I assume that DI benefits are more generous than social assistance ($b > s$), all non-hired individuals will apply to DI, so I disregard the option that they do not apply:

Proposition 1. *When $h = 0$, the worker's best application response is $\gamma = 1$.*

A worker with disability level θ^γ is indifferent between applying or not when the utility of working equals the expected utility of applying:

$$u(w - \tau) + \mathbb{1}_a v - \theta^\gamma = p(\theta)u(b) + (1 - p(\theta))(u(w - \tau) + \mathbb{1}_a v - \theta^\gamma)$$

which defines the disability level of the marginal applicant, θ^γ:

$$\theta^\gamma = u(w - \tau) + \mathbb{1}_a v - u(b).$$

Thus, a worker with $\theta \geq \theta^\gamma$ applies to DI, whereas workers with $\theta < \theta^\gamma$ do not.

To summarize, optimal employee behavior depends on two thresholds: workers with disability higher than θ^γ apply to DI, while workers with even higher disability levels, $\theta > \theta^l$ would not return to the firm when rejected for DI. Yet, employee behavior can be decomposed even further, as the current thresholds still depend on the accommodation choice of the firm. I derive the following Proposition.

Proposition 2. *Let $\theta^1, \theta^2, \theta^3, \theta^4$ be defined as*

$$\theta^1 = u(w - \tau) - u(b), \theta^2 = u(w - \tau) - u(b) + v,$$

$$\theta^3 = u(w - \tau) - u(s), \theta^4 = u(w - \tau) - u(s) + v.$$

The best responses of a hired worker with disability θ are given by:

DI application $\gamma(\theta)$:

$$\gamma(\theta) = \begin{cases} 0 & \textit{if } 0 \leq \theta < \theta^1 \quad \textit{(never-appliers)}, \\ 1 - \mathbb{1}_a & \textit{if } \theta^1 \leq \theta < \theta^2 \quad \textit{(application compliers)}, \\ 1 & \textit{if } \theta^2 \leq \theta \leq \theta^3 \quad \textit{(always-appliers)}. \end{cases}$$

Leave the firm if DI application rejected $l(\theta)$:

$$l(\theta) = \begin{cases} 0 & \textit{if } 0 \leq \theta < \theta^3 \quad \textit{(always-suppliers)}, \\ 1 - \mathbb{1}_a & \textit{if } \theta^3 \leq \theta < \theta^4 \quad \textit{(labor compliers)}, \\ 1 & \textit{if } \theta^4 \leq \theta \leq \bar{\theta} \quad \textit{(never-suppliers)}. \end{cases}$$

Table 2.2 summarizes the best responses of hired workers. Workers with disability $0 \leq \theta < \theta^1$ do not apply to DI, regardless of accommodation, since their disutility from work is so minor that it does not weigh against the lower income of DI benefits, even without accommodation. Workers with disability $\theta^1 \leq \theta < \theta^2$ are compliers with respect to DI application: when accommodated, they do not apply to DI, when they are not accommodated, they do apply. If the disability is even higher, $\theta^2 \leq \theta < \theta^3$, individuals always apply for DI and stay employed when the application is rejected. Workers with disability $\theta^3 \leq \theta < \theta^4$ are compliers with respect to labor supply: when rejected for DI, they would stay only at the firm when accommodated. Individuals with the highest disability level, $\theta^4 \leq \theta \leq \bar{\theta}$ always apply and would not stay employed, regardless of accommodation.

The relative sizes of the thresholds are established by Lemma 1 and Assumption 4:

Lemma 1. *Since $v > 0$, it holds that $0 < \theta^1 < \theta^2$ and that $\theta^3 < \theta^4 < \bar{\theta}$. Yet, $\theta^2 = u(w-\tau) - u(b) + v$ is not necessarily smaller than $\theta^3 = u(w-\tau) - u(s)$. Under Assumption 4 ($v < u(b) - u(s)$), $\theta^2 < \theta^3$.*

Assumption 4. *The utility difference between receiving DI benefits and receiving social assistance is larger than the utility gain from accommodation when working.*

$$0 < v < u(b) - u(s).$$

Table 2.2: *Optimal employee behavior for each disability level*

Disability	Description	Application	Labor supply
$[0; \theta^1]$	Never-appliers	$\gamma = 1$	$l = 0$
$[\theta^1; \theta^2]$	Compliers w.r.t. application	$\gamma = 1$ or $\gamma = 0^*$	$l = 0$ (if applied and rejected for DI)
$[\theta^2; \theta^3]$	Always-appliers	$\gamma = 1$	$l = 0$ (if rejected for DI)
$[\theta^3; \theta^4]$	Compliers w.r.t. labor supply	$\gamma = 1$	$l = 1$ or $l = 0^*$ (if rejected for DI)
$[\theta^4; \bar{\theta}]$	Never-suppliers	$\gamma = 1$	$l = 1$ (if rejected for DI)

* conditional on whether accommodation is provided by the firm or not

2.4.2 Firms' best responses

Firms optimize expected profits conditional on employee's best responses, which they can perfectly predict as they observe the disability level. Following the same structure, I start with the last decision of the employer: conditional on having hired ($h = 1$), should the firm accommodate the worker or not ($a = 1$ or $a = 0$)? If the firm did not hire the worker ($h = 0$), no accommodation choice has to be made.

Accommodation. For the firm to invest in accommodation, expected profits when accommodation is provided must be larger than when accommodation is not provided. Hence, to deduct the best accommodation responses, I compare $\pi_{a=1} - \pi_{a=0}$ for each disability type of the worker, conditional on the firm employing a worker. Only if the profit difference is positive, the firm will accommodate. From the employee perspective, utility is maximized when accommodation is provided. Yet, the firm does not take worker utility directly into account, nor the effect of not-accommodating on the government budget constraint. Therefore, accommodation will be inefficiently low: this can be seen as employer moral hazard. The employer optimization problem regarding accommodation can be described by *Optimization problem* 2.3, subject to the employer's best responses (Proposition 2). In Appendix A.1.1, I derive Proposition 3:

Proposition 3. *Conditional on hiring the worker, the firm's optimal accommodation decision a for each of the worker's types is:*

Never-appliers ($0 \leq \theta < \theta^1$)***:***	$a = 0$
Application compliers ($\theta^1 \leq \theta < \theta^2$)***:***	*If ϕ is large:* $a = 1$ *for* $0 \leq \theta \leq \theta^*$, *otherwise* $a = 0$. *If ϕ is small:* $a = 0$ *for* $\theta \leq \theta^*$, *otherwise* $a = 1$.
Always-appliers/suppliers ($\theta^2 \leq \theta < \theta^3$)***:***	$a = 0$
Labor compliers ($\theta^3 \leq \theta < \theta^4$)***:***	$a = 1$
Never-suppliers ($\theta^4 \leq \theta \leq \bar{\theta}$)***:***	$a = 0$

Here, a large ϕ means $\phi > \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta+p(\theta)}$, and small ϕ means $\phi < \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta+p(\theta)}$.

Proof. See Appendix A.1.1.

In the following, I make two assumptions which I relax in Section 2.6.

Assumption 5. *The productivity loss caused by disability ϕ is assumed to be relatively large.*

$$\phi > \frac{p'(\theta)(S - w + \eta)}{p'(\theta)\theta + p(\theta)}.$$

The implication of this assumption is that accommodation will be provided up to the threshold value for compliers with respect to accommodation, θ^*. Moreover, I assume

Assumption 6. *The employer threshold θ^* lies strictly within the employee thresholds that it is based on.*

$$\theta^1 < \theta^* < \theta^2.$$

Proposition 3 can be understood as follows. The workers whose application or labor supply behavior cannot be affected by the firm will not be accommodated, while a fraction of the workers whose behavior can be affected by the employer, the compliers, will be accommodated. Workers who are not compliers will not be accommodated because the direct gain of accommodation of firms is negative, due to Assumption 2 which says that the cost of accommodation e is larger than the productivity gain χ.

For compliers, however, accommodation does not only lead to a direct productivity gain but also to a behavioral response of the worker. Regarding compliers with respect to application, accommodation prevents DI application, causing the firm to earn $S - w - \phi\theta + \chi - e$. Because of Assumption 3, this is always positive. If, however, the firm does not accommodate, the worker will apply to DI. With probability $1 - p(\theta)$, the firm earns $S - w - \phi\theta$, but with probability $p(\theta)$, the worker receives DI and the firm has no revenues, while having to pay the experience rating fee η. These expected profits can both be negative and positive because of the experience rating fee. In Appendix A.1.1, I derive that with a relatively large ϕ, namely $\phi > \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta+p(\theta)}$, $\pi_{a=1} > \pi_{a=0}$ for values of θ lower than $\theta^* = \frac{\chi-e}{p(\theta^*)\phi} + \frac{S-w+\eta}{\phi}$. Intuitively, a higher disability level θ reduces both $\pi_{a=1}$ and $\pi_{a=0}$. θ reduces expected profits of $\pi_{a=1}$ only through the productivity loss ϕ whereas it reduces $\pi_{a=0}$ through multiple channels. When, however, ϕ is relatively large, disability has a more severe impact on $\pi_{a=1}$ than on $\pi_{a=0}$, meaning that workers will be accommodated up to θ^* but not beyond that.

Finally, compliers with respect to labor supply will all be accommodated. These workers all apply to DI, and by accommodating them, the firm can prevent the worker from leaving when the DI application was rejected which increases profits from zero to $S - w - \phi\theta + \chi - e > 0$.

Optimal hiring. The final step in the backward induction order is the first decision of the firm: the hiring decision. The firm knows its optimal accommodation choice upon hiring, and can hence compare the expected profits of hiring under its optimal accommodation decision ($\pi_{h=1}$) to the profits of not-hiring, which will always be zero ($\pi_{h=0} = 0$). If $\pi_{h=1} - \pi_{h=0} > 0$, which is equivalent to saying that $\pi_{h=1} > 0$, the firm will hire the worker. Thus, only when expected profits under the optimal firm accommodation choice are positive, the firm hires. In Appendix A.1.2 I derive that optimal hiring can be described by Proposition 4.

Proposition 4. *Define the hiring threshold θ^h as the disability level at which expected profits under the firm's optimal accommodation turn negative. Expected profits can become negative only in $[\theta^*, \theta^3]$ or $[\theta^3, \theta^4]$.*

Then,

$$\theta^h = \begin{cases} \frac{S-w}{\phi} - \frac{p(\theta^h)\eta}{(1-p(\theta^h))\phi}, & \textit{low profitability: } \theta^h \in [\theta^*, \theta^3], \\ \frac{S-w+\chi-e}{\phi} - \frac{p(\theta^h)\eta}{(1-p(\theta^h))\phi}, & \textit{high profitability: } \theta^h \in [\theta^3, \theta^4]. \end{cases}$$

For $\theta > \theta^h$, the firm does not hire the worker.

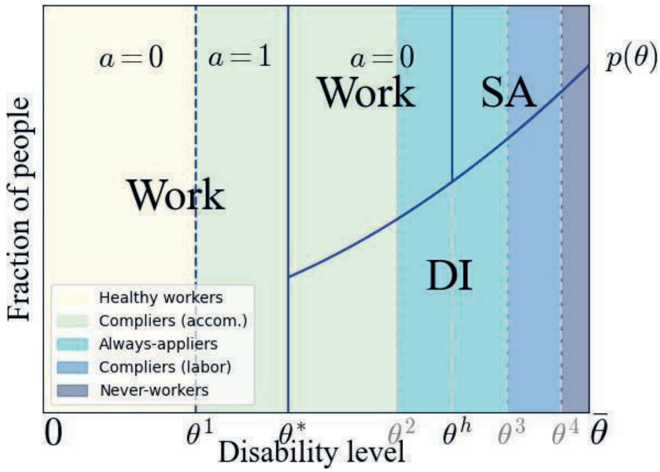
Proof. See Appendix A.1.2

Proposition 4 can be interpreted as follows. With relatively low disability levels, workers either do not apply to DI ($\theta \in [0, \theta^1]$) because they are never-appliers or accommodated compliers with respect to application, meaning that expected profits are positive since there is no risk of experience rating. Yet, from disability level θ^* on, which is when firms do not accommodate these compliers anymore, workers all apply to DI, which therefore creates an experience rating risk for firms: when a worker obtains DI, firms have no income but have to pay the experience rating fee η. At an even higher level, from θ^4 on, workers do not return to the firm when rejected for DI, so expected profits are negative with certainty: profits are either 0 or $-\eta$. In between these values, θ^* and θ^4, expected profits must turn negative at some disability level, depending on the parameterization of the model. At that disability level, firms no longer hire workers.

In the main text, I carry out my analyses under the assumption that the economy is a low profitability economy. This implies that workers are no longer hired at disabilituy level $\theta^h \equiv \frac{S-w}{\phi} - \frac{p(\theta^h)\eta}{(1-p(\theta^h))\phi}$, which lies in between θ^* and θ^3. In Section 2.6 I relax this assumption.

Combined optimal responses of firms and workers. Figure 2.2 displays the best responses of both firms and workers, which together describe the economy. Relatively healthy workers (never-appliers) are not accommodated but do not apply to DI. Compliers with respect to application are accommodated up to disability level θ^*, beyond which workers are no longer accommodated and therefore apply to DI. A fraction $p(\theta)$ of them is successful and claims DI benefits b, in which case the employer has to pay the experience rating fee η. Always-appliers are also not accommodated, since firms cannot change their behavior and the direct net gain of accommodation is negative for firms, since the cost of accommodation e is larger than its productivity gain χ. From disability level θ^h on, expected profits from hiring turn negative, meaning that the firm will not hire anymore. These workers either obtain DI or have to resort to social assistance.

Figure 2.2: *Firms' and workers' best responses*



2.4.3 Government solution: optimal policy parameters

The government maximizes social welfare following a utilitarian social welfare function, meaning that the government equally sums all workers' utilities. The government chooses the level of the experience rating fee η, the DI benefit level b, and the eligibility threshold θ^e, while taking the firm and worker's best responses and the government's own budget constraint into account. As explained before, I consider the government problem in the case of low profitability ($\theta^* < \theta^h < \theta^3$). In Appendix A.2.1, I solve the other scenarios, which all result in effectively the same optimality conditions.[5] The

[5] In Appendix A.2.1, I consider the cases when θ^* is outside of the θ^1 and θ^2 bounds. When $\theta^1 > \theta^*$, θ^1 becomes the effective bound. This means that the outcomes are governed by a threshold that comes from the employee optimization problem (θ^1, the threshold beyond which workers are compliers with respect to accommodation - who will all be accommodated) rather than the employer problem. Since η does not affect the employee directly, the threshold does not shift. Therefore, there is no effect on accommodation and the people that apply to DI. There only is an effect on θ^h, the employer hiring threshold. Therefore, the $A'(\eta)$ and $DI'(\eta)$ terms drop out of the optimality condition. The same logic applies to when $\theta^2 < \theta^*$: $A'(\eta)$ and $DI'(\eta)$ also drop out there.

government's Lagrangian is the following:

$$\max_{\eta,b,\theta^e} \mathcal{L}(\eta, b, \theta^e) = V_w(\eta, b, \theta^e) + \lambda(G(\eta, b, \theta^e) - \bar{G})$$

$$s.t.$$

$$\theta^1 = u(w-\tau) - u(b), \theta^* = \frac{\chi - e}{p(\theta)\phi} + \frac{S - w + \eta}{\phi},$$

$$\theta^h = \frac{S-w}{\phi} - \frac{p(\theta)\eta}{(1-p(\theta))\phi}, \theta^h \in [\theta^*; \theta^3], \phi > \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta + p(\theta)}.$$

Aggregate worker utility, V_w, sums up all different utility levels of the different types of workers: workers who do not apply to DI and work, of whom only a fraction is accommodated, and workers who apply to DI of whom only a fraction p gets DI and the others return to work, and workers who apply to DI but do not return to work if they do not receive DI. Hence, the aggregate utility function is given by:

$$\begin{aligned} V_w(\eta, b, \theta^e) = & \underbrace{\int_0^{\theta^*} (u(w-\tau) - \theta) dF(\theta)}_{\text{healthy workers who all work}} + \underbrace{\int_{\theta^1}^{\theta^*} v dF(\theta)}_{\text{accommodated workers}} \\ + & \underbrace{\int_{\theta^*}^{\theta^h} (p(\theta; \theta^e) u(b) + (1 - p(\theta; \theta^e))(u(w-\tau) - \theta)) dF(\theta)}_{\text{workers who applied to DI, a fraction } p \text{ gets DI, the other fraction works, unaccommodated}} \\ + & \underbrace{\int_{\theta^h}^{\bar{\theta}} (p(\theta; \theta^e) u(b) + (1 - p(\theta; \theta^e) u(s)) dF(\theta).}_{\text{workers who applied to DI, a fraction } p \text{ gets DI, the others get social assistance}} \end{aligned}$$

The government budget constraint, $G(\eta, b, \theta^e) \geq -\bar{G}$, is given by:

$$\begin{aligned} G(\eta, b, \theta^e) = & \tau \cdot \Big[\int_0^{\theta^*} dF(\theta) + \int_{\theta^*}^{\theta^h} (1 - p(\theta; \theta^e)) dF(\theta) \Big] \\ & - b \cdot \int_{\theta^*}^{\bar{\theta}} p(\theta; \theta^e) dF(\theta) + \eta \cdot \int_{\theta^*}^{\theta^h} p(\theta; \theta^e) dF(\theta) \\ & - s \cdot \int_{\theta^h}^{\bar{\theta}} (1 - p(\theta; \theta^e)) dF(\theta) \geq -\bar{G}. \end{aligned}$$

In the following parts, I derive the first-order conditions with respect to the experience rating fee η, disability benefits b and the DI eligibility threshold θ^e, to define the government's optimal policy parameters.

Optimal level of experience rating

The first-order condition with respect to the level of the experience rating fee η is given by:

$$\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \eta} = \frac{\partial V_w(\eta, b, \theta^e)}{\partial \eta} + \lambda \frac{\partial G(\eta, b, \theta^e)}{\partial \eta} = 0. \tag{2.5}$$

In Appendix A.1.3, I derive the partial derivatives of Equation 2.5 and show that the first-order condition with respect to η can be written as:

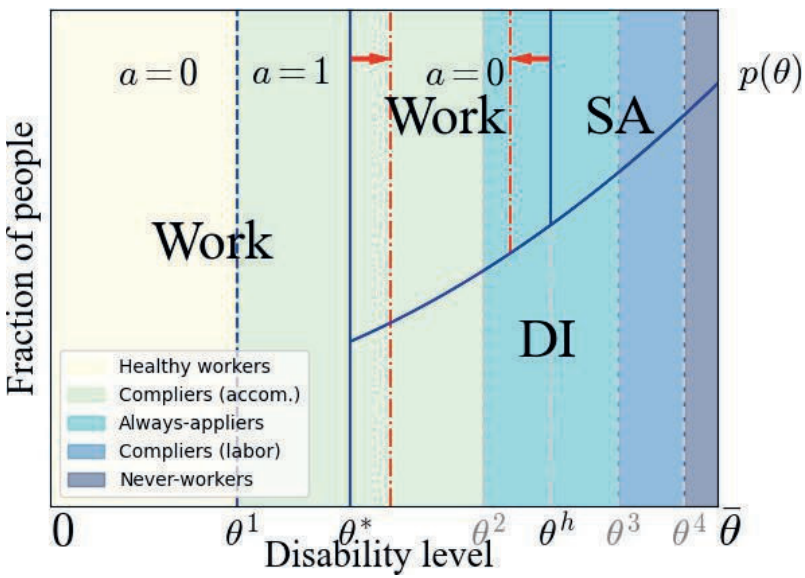
$$\begin{aligned} &\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \eta} = \\ &\underbrace{A'(\eta)v + DI'(\eta)[u(b) - u(w-\tau) + \theta^*] + SA'(\eta)[u(s) - u(w-\tau) + \theta^h]}_{\text{utility effect of increasing experience rating fee}} \\ &+ \lambda \left[\underbrace{B(\eta) + M(\eta)}_{\text{fiscal cost effect}} \right]. \end{aligned} \tag{2.6}$$

in which I define $M(\eta) \equiv E$ as the mechanical fiscal effect of increasing η and $B(\eta) \equiv \tau L'(\eta) - bDI'(\eta) + \eta E'(\eta) - sSA'(\eta)$ as the behavioral fiscal effect, following the notation of Haller et al. (2024). I also used here that the number of people who are accommodated is defined as A: $A \equiv \int_{\theta^1}^{\theta^*} dF(\theta)$. The first terms of this condition are the utility changes caused by increasing experience rating, and the final terms comprise the fiscal implications. Both effects are ambiguous: neither the utility effect nor the fiscal effect has a predetermined sign.

The intuition behind Condition 2.6 is illustrated in Figure 2.3, which depicts the comparative statics of increasing the experience rating fee. On the one hand, experience rating creates a financial incentive for firms to accommodate more workers as accommodation can prevent compliers with respect to application from applying to DI, which eliminates the risk of having to pay the experience rating fee. Thus, the employer accommodation threshold θ^* shifts to the right. This implies that more workers will be accommodated ($A'(\eta) > 0$), who gain accommodation utility v. These workers now refrain from applying to DI. A fraction p of them ($DI'(\eta) < 0$) would otherwise have received DI benefits, but are now employed.

However, for workers with severe disabilities, experience rating can create such a high financial risk that firms will no longer hire them due to negative expected profits. The hiring threshold θ^h shifts to the left. Hence, fewer people are hired. Among them, a fraction $1-p$ now receives social assistance rather than working ($SA'(\eta) > 0$), while for the remaining fraction p, little changes as they would obtain DI regardless of whether they were hired.

Figure 2.3: *Comparative statics of an increase in the level of experience rating*



Notes: This figure shows comparative statics of increasing the level of the experience rating fee η. The accommodation threshold θ^* shifts to the right, increasing accommodation and reducing the number of DI applicants. At the same time, the hiring threshold θ^h shifts to the left, leaving more workers unemployed.

Next to the impacts on the utility of workers, the government must take the impact on the taxpayer's costs into account. This can be divided into a mechanical ($M(\eta)$) and behavioral effect ($B(\eta)$). The mechanical effect of increasing the experience rating fee by 1 euro is E: for each worker at a firm that was hired but now receives DI, the firm has to pay a higher fee, which is collected by the government. The behavioral fiscal effect consists of three components. First, the number of working people who pay the labor tax changes ambiguously, as there will be fewer people applying to DI but also more people unemployed because of selective hiring. Hence, the fiscal impact can be either positive or negative, and will be $\tau L'(\eta) \gtreqless 0$. Next, fewer people will apply to DI, so there will be fewer DI recipients. The fiscal impact is $-bDI < 0$. Finally, the experience rating fee has to be paid for fewer workers, so the fiscal impact is negative and is given by $\eta E'(\eta) < 0$.

The first-order condition with respect to η can be rewritten so that it indicates whether increasing experience rating increases social welfare or not:

Proposition 5. *In an economy with information asymmetries, low profitability, and a relatively high productivity loss caused by disability, the welfare-optimizing level of experience rating is determined by:*

$$\begin{aligned}
\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \eta} &\gtreqless 0 \Leftrightarrow \\
&\frac{1}{\lambda M(\eta)}\Big(A'(\eta)v + DI'(\eta)(u(b) - u(w-\tau) + \theta^*) \\
&+ SA'(\eta)(u(s) - u(w-\tau) + \theta^h)\Big) \gtreqless -\Big(1 + \frac{B(\eta)}{M(\eta)}\Big).
\end{aligned}$$

Proof. See Appendix A.1.3.

The left-hand side of this condition is the total utility change for workers caused by increasing the experience rating fee by 1 euro. This is converted to monetary units per mechanically saved euro for the government by increasing the experience rating fee, by dividing the utility changes by λ and $M(\eta)$. The right-hand side is the total fiscal impact of increasing the experience rating fee by 1 euro, consisting of the behavioral and mechanical effect. Note that theoretically, both sides are ambiguous: experience rating does not necessarily increase utility, nor does it necessarily increase or decrease the fiscal position of the government.

Optimal level of DI benefits

The government also determines the DI benefit level to maximize social welfare. I focus on the effects of a decrease in DI benefits, following Haller et al. (2024) in their argumentation that most policy debates concern decreasing the generosity of DI benefits to curb DI inflow. The first-order condition with respect to $-b$ is:

$$\frac{\partial\mathcal{L}(\eta,b,\theta^e)}{\partial(-b)} = \frac{\partial V_w(\eta,b,\theta^e)}{\partial(-b)} + \lambda\frac{\partial G(\eta,b,\theta^e)}{\partial(-b)}. \tag{2.7}$$

In Appendix A.1.4, I derive that the first-order condition with respect to $-b$ can be written as:

$$\frac{\partial\mathcal{L}(\eta,b,\theta^e)}{\partial(-b)} = \underbrace{u'(-b)DI + A'(-b)v}_{\text{utility effect of decreasing benefit level}} + \lambda\left[\underbrace{M(-b)}_{\text{fiscal cost reduction}}\right] = 0. \tag{2.8}$$

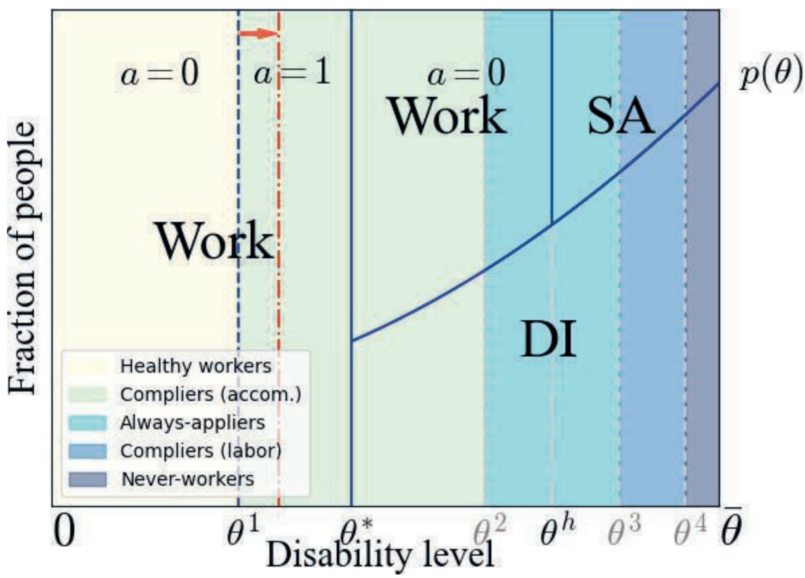
in which the mechanical fiscal effect of $-b$ is defined as $M(-b) = DI$. The condition comprises a negative utility effect: DI recipients lose utility from benefits and fewer workers will be accommodated, but a positive impact on the government budget, as the DI system becomes less costly.

Condition 2.8 can be interpreted as follows. Figure 2.4 shows comparative statics of a DI benefit reduction. When DI benefits become less generous, the share of people receiving DI (DI) lose utility ($u'(-b) < 0$). Moreover, fewer people will be accommodated because more workers become never-appliers. This can be explained as follows. Since DI becomes less attractive, more people would never apply to DI, regardless of accommodation, implying that θ^1 shifts to the right. Firms anticipate this and do not accommodate this group of workers ($A'(-b) < 0$) since they do not accommodate never-appliers, and these workers lose utility of accommodation v. Thus, the utility effect is negative: fewer workers are accommodated, and DI recipients lose a part of their benefits.

Intuitively, one would expect an increase in the number of DI applicants, as happens in the Diamond and Sheshinski (1995) model. Yet, in this regime of low profitability, compliers with respect to application are governed by the employer threshold instead: since $\theta^1 < \theta^* < \theta^2$, the threshold that determines from which point on people will apply to DI is θ^*, which does not change when b changes. Yet, if, instead θ^* is smaller than θ^1 or larger than θ^2, there will be a change in employee moral hazard (fewer applicants since DI is less attractive), and a term $DI'(b)[u(b) - u(w-\tau) + \theta^*]$ will be added to the first-order condition, while the $A'(b)(v)$ term (change in employer behavior) drops out. I show this in Appendix A.2.1.

The fiscal effect of reducing DI benefits is purely mechanical, as the only behavioral change concerns a change in accommodation, which does not influence the government budget constraint. The mechanical effect is a reduction in the government's DI expenditures, resulting in a fiscal cost decrease of size DI.

Figure 2.4: *Comparative statics of increase in the disability benefit level*



Notes: This figure shows the comparative statics of a reduction in the DI benefit level. The threshold that determines whether a worker is a never-applier or a complier with respect to accommodation, θ^1 shifts to the right, to which employers respond by not accommodating these workers anymore.

Rewriting the first-order condition gives the optimality condition for the benefit level b:

Proposition 6. *In an economy with information asymmetries, low profitability, and a relatively high productivity loss caused by disability, the welfare-optimizing level of DI benefit generosity is determined by:*

$$\frac{\partial \mathcal{L}}{\partial(-b)} \gtrless 0 \Leftrightarrow \frac{u'(-b)DI + A'(-b)v}{\lambda M(-b)} \gtrless -1.$$

Proof. See Appendix A.1.4

The left-hand side of this equation represents the total utility change per mechanically saved dollar from lowering DI benefits, expressed in monetary terms through λ. Individuals receiving DI lose utility due to the reduction in benefit generosity $u'(-b)$, while fewer workers are accommodated, losing utility from accommodation v. The right-hand side captures the total fiscal effect per mechanically saved dollar, which equals one, since there is no behavioral fiscal effect in this case, as the mechanical effect simply reflects the reduction in DI expenditures. Thus, policymakers should trade off fiscal cost reduction against utility losses.

Optimal level of the DI eligibility threshold

Finally, the government wants to set the optimal level of the eligibility rule θ^e, determining which applicants obtain DI. The first-order condition with respect to θ^e can be found by:

$$\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \theta^e} = \frac{\partial V_w(\eta, b, \theta^e)}{\partial \theta^e} + \lambda \frac{\partial G(\eta, b, \theta^e)}{\partial \theta^e}. \tag{2.9}$$

I derive the individual partial derivatives of this first-order condition in Appendix A.1.5. This yields the following first-order condition for θ^e:

$$\begin{aligned}
&\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \theta^e} = \\
&\underbrace{DI'_B(\theta^e)(u(b) - u(w-\tau) + \theta^*) + SA'_B(\theta^e)(u(s) - u(w-\tau) + \theta^h) + A'(\theta^e)v}_{\text{utility effect of increasing } \theta^e} \\
&\quad + \underbrace{[DI'_M(\theta^e) + SA'_M(\theta^e)](u(b) - u(w-\tau) + \theta) + SA'_M(\theta^e)(u(s) - u(b))}_{\text{utility effect of increasing } \theta^e} \\
&\quad + \lambda \underbrace{[B(\theta^e) + M(\theta^e)]}_{\text{fiscal cost effect}} = 0.
\end{aligned} \tag{2.10}$$

in which SA'_B and DI'_B refer to the behavioral impacts of increasing the eligibility criteria: shifting the accommodation threshold θ^* to the left and shifting the hiring threshold θ^h to the right. SA'_M and DI'_M refer to the mechanical impact of increasing the eligibility criterial: $p(\theta)$ is shifted downward. See Appendix A.1.5 for the derivations. Moreover, I define the mechanical fiscal impact of increasing θ^e and the behavioral fiscal effect of increasing θ^e as follows:

$$M(\theta^e) \equiv -\int_{\theta^*}^{\theta^h} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta)(b+\tau-\eta) - \int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta)(b-s).$$

$$M(\theta^e) \equiv \tau L'_M(\theta^e) - bDI'_M(\theta^e) + \eta E'_M(\theta^e) - sSA'_M(\theta^e).$$

$$B(\theta^e) \equiv \tau L'_B(\theta^e) - bDI'_B(\theta^e) + \eta E'_B(\theta^e) - sSA'_B(\theta^e).$$

in which the subscript M and B also indicate the mechanical (M) and behavioral (B) impacts for the number of people for whom experience rating is paid (E) and the number of people working (L).

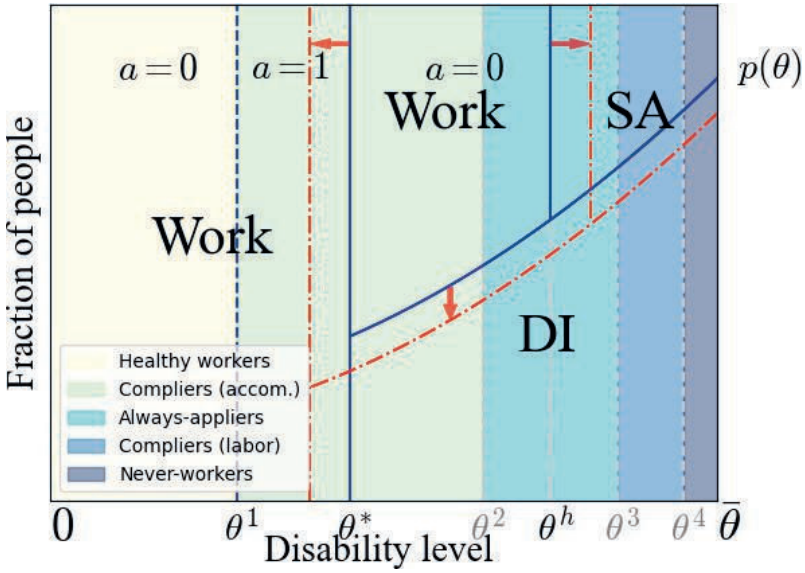
The following intuition lies behind Condition 2.10. Figure 2.5 displays comparative statics of increasing the eligibility threshold θ^e. Increasing θ^e means that entering disability becomes stricter and less accessible. It causes three shifts in Figure 2.5: *i*) for a given disability level θ it becomes less likely that a worker receives DI, so $p(\theta)$ shifts down, *ii*) the accommodation threshold θ^* shifts to the left, and *iii*) the hiring threshold θ^h shifts to the right.

The first shift is mechanical: a smaller fraction of DI applicants receives DI when the eligibility threshold is set higher ($DI'_M < 0$). These workers now now either have to work or receive SA ($SA'_M > 0$).

Intuitively, a decrease in the likelihood of a worker getting into DI means that the threat of experience rating for the firm is lower. As a consequence, firms will feel less incentivized to accommodate compliers with respect to accommodation to prevent them from applying to DI, since the risk of having to pay the experience rating fee is not as high as before. Thus, θ^* shifts to the left and fewer people will be accommodated ($A'(\theta^e) < 0$), who lose utility of accommodation v. This implies that these workers, who are compliers with respect to application, will now start to apply to DI. Of them, a fraction gets in ($DI'_B(\theta^e) > 0$) and receives $u(b)$ instead of working.

An opposite shift occurs regarding hiring behavior. Firms will hire more workers due to the reduced experience rating fee, meaning that θ^h shifts to the right. The affected workers, $SA'_B < 0$, will now work, rather than receive social assistance. Because the change in the number who receive DI is ambiguous, the change in the number of people for whom the experience rating fee is paid is also ambiguous: more hires increases the

Figure 2.5: *Comparative statics of an increase in the eligibility threshold*



Notes: This figure shows the comparative statics of an increase in the eligibility criteria strictness. The firm accommodation threshold θ^* shifts to the left, causing fewer people to be accommodated. As a response, these people apply to DI and a fraction $p(\theta)$ of them receives DI benefits. The hiring threshold θ^h shifts to the right, meaning that more workers will be employed. Mechanically, the probability of receiving DI benefits $p(\theta)$ shifts down for all DI applicants.

number, but the likelihood of obtaining DI going down decreases the number.

These changes also affect the government budget constraint. The mechanical effect of increasing θ^e is that a part of the people who applied to DI and previously would get DI but would work if they do not receive DI, now has to work instead. For these people, no DI benefits have to be paid by the government, labor tax income is now earned, and no experience rating fee is paid by the firm to the government. The people who previously would get DI but would not work if they do not receive it, now receive social assistance. This results in a spendings reduction of DI benefits, but additional social assistance government spending. The behavioral effect of increasing θ^e is an ambiguous effect on the number of people employed, who pay labor tax. Moreover, there also is an ambiguous effect on the people of DI and the number of workers for whom the experience rating fee is paid.

The first-order condition can be rewritten into the optimality condition for the DI eligibility rule:

Proposition 7. *In an economy with information asymmetries, low profitability, and a relatively high productivity loss caused by disability, the welfare-optimizing level of the DI eligibility threshold is determined by:*

$$
\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial(\theta^e)} \gtrless 0 \Leftrightarrow \\
&\frac{1}{\lambda M(\theta^e)}\Big(DI'_B(\theta^e)(u(b)-u(w-\tau)+\theta^*) + SA'_B(\theta^e)(u(s)-u(w-\tau)+\theta^h) \\
&+ A'(\theta^e)v + [DI'_M(\theta^e) + SA'_M(\theta^e)](u(b)-u(w-\tau)+\theta) \\
&+ SA'_M(\theta^e)(u(s)-u(b))\Big) \gtrless -\Big(1+\frac{B(\theta^e)}{M(\theta^e)}\Big).
\end{aligned}
$$

Proof. See Appendix A.1.5.

Again, the left-hand side is the total utility change per mechanically saved dollar by increasing θ^e converted to monetary terms by λ. The right-hand side is the total fiscal effect per mechanically saved dollar. Both the sign of the utility effect and the sign of the fiscal cost effects are theoretically ambiguous.

What can be learned from endogenizing employer behavior. The Diamond and Sheshinski (1995) model characterizes optimal benefits and eligibility while accounting only for worker behavior, abstracting from the impact of firms through hiring and accommodation responses.

Regarding the former policy instrument, their framework predicts that a reduction in benefit generosity leads to fewer DI applicants and hence recipients. This prediction changes when employer behavior is endogenized. Under Assumption 6, a benefit reduction now causes more workers not to apply for DI, regardless of accommodation. Firms, in turn, stop accommodating these workers, whereas previously, they would have done so to prevent applications, but the overall number of DI applicants remains unchanged.

However, when the hiring threshold lies outside the worker thresholds θ^1 and θ^2, compliers with respect to accommodation are either all accommodated and start to apply from θ^2 on, or, all unaccommodated, applying from disability θ^1 on. These thresholds depend on benefit generosity b and shift leftward as benefits become less generous. In that case, outcomes resemble the baseline Diamond and Sheshinski (1995) setting without employer behavior.

Turning to eligibility strictness, the Diamond and Sheshinski (1995) model predicts that tighter screening reduces DI applications and recipients, by lowering the expected utility of applying and by a mechanical reduction in the award rate. In contrast, when firm behavior and experience rating are considered, stricter eligibility can have the opposite effect on applications. A tighter eligibility threshold reduces firms' expected DI costs, leading them to accommodate more workers who then do not apply to DI. Firms also increase hiring, as the threat of experience rating declines.

Overall, these results show that firm responses can substantially alter the effects of standard DI policy instruments, such as benefit generosity and eligibility strictness, that are typically designed with only worker incentives in mind. Accounting for employer behavior is therefore crucial for the optimal design of disability insurance and other social insurance programs.

2.4.4 Social planner solution

To illustrate how the information asymmetries in the main model, where the government cannot observe disability θ or accommodation a, give rise to behavioral responses by workers and firms, I consider the social planner economy.

In this benchmark setting, the social planner observes θ and can directly choose the benefit level b, the eligibility threshold θ^e, and the level of firm accommodation a. Because disability is observable, the planner can fully determine which workers receive DI benefits. Hiring decisions follow mechanically from the eligibility threshold: firms do not employ workers with disability levels above θ^e so there is no need for the planner to separately specify a hiring rule.

The planner maximizes a utilitarian social welfare function of aggregate indirect utility $V_w(\theta^e, b, a)$, subject to a balanced budget equating total taxes and total DI expenditures. The corresponding Lagrangian is given by:

$$\max_{\theta^e, b, a} \mathcal{L}(\theta^e, b, a) = V_w(\theta^e, b, a) + \lambda(G(\theta^e, b)),$$

where aggregate worker utility $V(\theta^e, b, a)$ is given by:

$$V(\theta^e, b, a) = \underbrace{\int_0^{\theta^e} (u(w-\tau) - \theta + \mathbb{1}_a v) dF(\theta)}_{\text{utility of employed workers}} + \underbrace{\int_{\theta^e}^{\bar{\theta}} u(b) dF(\theta)}_{\text{utility of DI recipients}},$$

and total fiscal revenue is given by:

$$G(\theta^e, b) = \tau \cdot \int_0^{\theta^e} dF(\theta) - b \cdot \int_{\theta^e}^{\bar{\theta}} dF(\theta).$$

To solve the model, I take the first-order conditions with respect to a, θ^e, $-b$, and λ.

Regarding accommodation a, since it increases worker utility by $v > 0$, the optimal level is $a = 1$ for all hired workers, as shown in Appendix A.1.6. Hence, when $v > 0$, which can be reasonably assumed, all firms employing workers who do not receive DI ($\theta < \theta^e$) should provide accommodation. In the first-best scenario, accommodation has no fiscal impact because it affects only workers' utility and does not generate behavioral spillovers on the fiscal side; there is no moral hazard from either firms or workers. Therefore, when information asymmetries are absent, it is optimal that all employed workers are accommodated.

The first-order condition with respect to the eligibility threshold θ^e is given by:

$$u(w-\tau) - \theta^e + \mathbb{1}_a v - u(b) = -\lambda(\tau + b),$$

while the first-order condition with respect to the negative of the benefit level $-b$ equals:

$$\int_{\theta^e}^{\bar{\theta}} u'(-b) dF(\theta) = -\lambda \int_{\theta^e}^{\bar{\theta}} dF(\theta).$$

Finally, the first-order condition with respect to λ repeats the balanced budget constraint:

$$\tau \int_0^{\theta^e} dF(\theta) = b \int_{\theta^e}^{\bar{\theta}} dF(\theta).$$

Combining them yields the final optimality condition:

$$u(w-\tau) - \theta^e + v - u(b) = -u'(b) b \left[1 + \frac{DI}{L}\right]. \tag{2.11}$$

This condition shows that increasing θ^e, which shifts workers from DI receipt to employment, involves several trade-offs. Workers who move from DI to employment gain utility from working rather than receiving benefits. To maintain budget balance, this change must equal the marginal utility effect of the corresponding fiscal adjustment: higher labor tax revenues allow for higher DI benefits. However, those who transition to employment lose the indirect utility gain that results from the reduced fiscal pressure enabling higher benefits. Importantly, in this first-best setting, all effects are purely mechanical: workers switch states because the planner dictates it, not due to behavioral responses.

Overall, this analysis illustrates that in the social planner economy, where disability and accommodation are observable, a single disability threshold determines DI receipt, fully eliminating worker-side moral hazard. Employer moral hazard is also absent, as it is socially optimal for all employed workers to be accommodated.

2.5 Experience rating: The economy without it, and its welfare impact

In the main model, the experience rating fee is positive. What would happen to the economy and the optimality conditions when experience rating is set to zero? In this section, I describe the economy without experience rating and show which parameters determine if and how experience rating can affect social welfare.

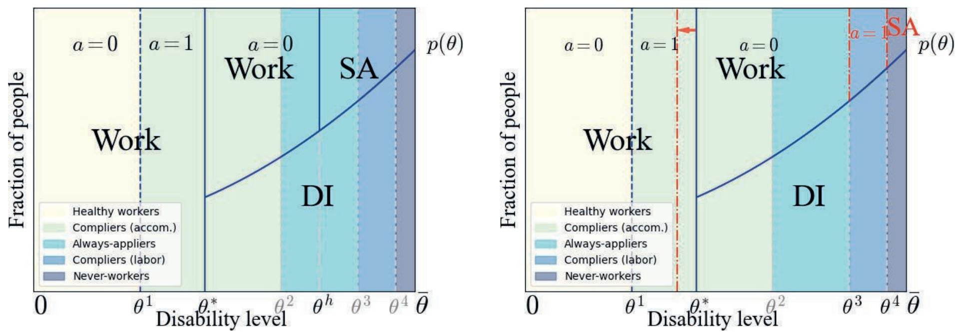
Economy without experience rating. I consider the economy when the experience rating fee η is set to zero. Again following the backwards induction strategy, I start by the best responses of the worker. The worker's optimization problems for DI application (Equation 2.1) and labor supply (Equation 2.2) do not depend on η because the worker does not take experience rating into account. Therefore, the best responses of the worker remain unchanged.

The firm, however, does take experience rating into account, implying that the firm's best responses are different without experience rating. With $\eta = 0$, the optimization problem of the firm becomes:

$$\max_{h\in\{0,1\},a\in\{0,1\}} hE(\pi)$$

Figure 2.6: *The economy with and without experience rating*

(a) *Experience rating* (b) *No experience rating*



Notes: Panel (a) shows the economy when experience rating is present, under a low profitability regime. Panel (b) shows the economy without experience rating, also under low profitability. The accommodation threshold θ^* is lower when there is no experience rating, while the hiring threshold no longer exists without experience rating - firms only stop hiring when the worker would never stay at the firm, i.e., when disability is larger than θ^4.

with

$$E(\pi) = \gamma\left[(1-p(\theta))\left[(1-l)(S-w-\phi\theta+\mathbb{1}_a v)\right]\right]+(1-\gamma)\left[S-w-\phi\theta+\mathbb{1}_a v\right].$$

I derive the firm's accommodation and hiring thresholds in an economy without experience rating in Appendix A.3.1, by comparing expected profits with and without accommodation and identifying when profits turn negative to obtain the new accommodation and hiring threshold. I find that the employer accommodation threshold θ^* loses its η-term: $\theta^* = \frac{\chi-e}{p(\theta)\phi} + \frac{S-w}{\phi}$ instead of $\theta^* = \frac{\chi-e}{p(\theta)\phi} + \frac{S-w+\eta}{\phi}$. Intuitively, Figure 2.6 illustrates that the accommodation threshold θ^* shifts leftward in the absence of experience rating, meaning fewer workers are accommodated. With experience rating, firms have a large incentive to accommodate to avoid DI costs; without it, firm profits are zero rather than $-\eta$ when a worker receives DI. Hence, expected profits when a worker applies to DI are higher without experience rating, reducing firms' incentives to accommodate.

Regarding the hiring threshold, I again consider the disability level beyond which expected profits turn negative. Without experience rating, however, expected profits never become negative for employed workers because of Assumption 3, which states that profits are always positive when employment occurs. This assumption ensures that negative labor demand-side effects arise only when experience rating is present. Consequently, the hiring threshold coincides with disability threshold θ^4: workers who are never-suppliers and would never choose to work are not hired. In Figure 2.6, this is reflected by the absence of θ^h; instead, θ^4 marks the disability level beyond which individuals receive social assistance after DI rejection. To summarize, without experience rating, no individuals who wish to work are left unhired, since I abstract from other market frictions that could create mismatches between labor demand and supply.

To summarize, relative to the economy with experience rating, *(i)* the firm's accommodation threshold is lower, and *(ii)* the hiring threshold coincides with the employee threshold θ^4, beyond which individuals would never choose to work.

The government optimization problem changes to:

$$
\begin{aligned}
&V_w(\eta, b, \theta^e) = \\
&\underbrace{\int_0^{\theta^*} (u(w-\tau)-\theta)dF(\theta) +}_{\text{healthy workers who all work}} \underbrace{\int_{\theta^1}^{\theta^*} v dF(\theta)}_{\text{accommodated workers}} \\
&+ \underbrace{\int_{\theta^*}^{\theta^4} (p(\theta;\theta^e)u(b) + (1-p(\theta;\theta^e))(u(w-\tau)-\theta))dF(\theta)}_{\text{workers who applied to DI, a fraction } p \text{ gets DI, the other fraction works, unaccommodated}} \\
&+ \underbrace{\int_{\theta^4}^{\bar{\theta}} (p(\theta;\theta^e)u(b) + (1-p(\theta;\theta^e)u(s))dF(\theta).}_{\text{workers who applied to DI, a fraction } p \text{ gets DI, the others get social assistance}}
\end{aligned}
$$

with

$$
\theta^* = \frac{\chi - e}{p(\theta^*)\phi} + \frac{S-w}{\phi}, \theta^1 = u(w-\tau) - u(b), \text{ and } \theta^4 = u(w-\tau) - u(s) + v.
$$

The new government budget constraint is:

$$
\begin{aligned}
G(\eta, b, \theta^e) = \tau \cdot \Big[\int_0^{\theta^*} dF(\theta) + \int_{\theta^*}^{\theta^4} (1 - p(\theta; \theta^e))dF(\theta)\Big] \\
- b \cdot \int_{\theta^*}^{\bar{\theta}} p(\theta; \theta^e)dF(\theta) + \eta \cdot \int_{\theta^*}^{\theta^4} p(\theta; \theta^e)dF(\theta) \\
- s \cdot \int_{\theta^4}^{\bar{\theta}} (1 - p(\theta; \theta^e))dF(\theta) \geq -\bar{G}.
\end{aligned}
$$

The first-order conditions for eligibility and benefit generosity change slightly. Specifically, the optimality condition for the eligibility criterion θ^e changes, while that for the DI benefit level b remains the same. That is, the behavioral effect of θ^e on the number of social assistance recipients disappears, as θ^e no longer affects the hiring threshold θ^h. With experience rating, the eligibility level θ^e influenced θ^h through the firm's expected chance of having to pay the experience rating fee. This effect vanishes without experience rating. See Appendix A.3.1 for the new optimality condition.

Welfare impact of experience rating. The previous exercise again shows that experience rating increases accommodation, reducing DI applications, but also discourages hiring, pushing more people towards social assistance. To quantify whether and under which conditions these opposing effects raise or lower welfare, the relative magnitudes of the terms in the optimality condition for experience rating (Proposition 5) must be compared. The condition equates the utility impact (left-hand side) to the negative of the fiscal impact (right-hand side).

In Appendix A.3.2, I derive the signs of the individual terms of the optimality condition for experience rating. Without empirical evidence, both sides remain ambiguous: whether experience rating improves welfare is ultimately an empirical question. Still, some qualitative insights can be drawn. A higher v strengthens the utility gain from increased accommodation without fiscal cost. A lower disability benefit b raises utility (by reducing the loss of accommodated workers who would otherwise receive DI) but reduces the fiscal gain from fewer DI payments. A smaller social assistance benefit s limits the fiscal loss from higher social assistance inflow but amplifies the negative utility effect from lower employment. Finally, the distribution of disability levels matters: when $f(\theta^*)$ is much larger than $f(\theta^h)$, more weight is placed on the accommodation effect and its impact on DI inflow than on the hiring effect.

2.6 Discussion

In the baseline model, I make several assumptions on parameter values, which I assess in the next subsections. I also consider a social welfare function that includes firm profits and discuss several possible model extensions.

2.6.1 High profitability economy

In the baseline model, I assume that expected profits turn negative over the disability range $[\theta^2, \theta^3]$, representing a *low profitability* economy. However, profits could also become negative in a higher disability range $[\theta^3, \theta^4]$, corresponding to a *high profitability* economy.

In Appendix A.2.1, I analyze this case. Here, the hiring threshold θ^h lies between θ^3 and θ^4. The economy shifts slightly (fewer workers are hired, and these workers either work unaccommodated or receive DI) but the optimality conditions remain the same as in the low profitability regime, except for the redefined hiring threshold.

2.6.2 The employer accommodation threshold outside its bounds

In the main model, I assume that the employer accommodation threshold θ^* lies strictly within the employee thresholds θ^1 and θ^2, which separate never-appliers, compliers with respect to application, and always-appliers. This implies that the disability level where accommodation is no longer profitable lies within the range where workers are compliers: those with a lower disability than θ^* are accommodated, while those with a higher level are not. When $\theta^* < \theta^1$, all compliers with respect to application are accommodated, and when $\theta* > \theta^2$, none of them are. In Appendix A.2.2, I derive the optimality conditions for these cases.

When $\theta^* < \theta^1$, none of the compliers with respect to application are accommodated. Relative to the main model, two terms drop from the optimality condition for experience rating: the utility changes from a rightward shift in θ^* (more accommodation) and the accompanying change in DI inflow ($A'(\eta)$ and $DI'(\eta)$). These terms drop out because the accommodation threshold is not effective under this parameterization as none of the compliers with respect to accommodation will be accommodated - so a marginal change in experience rating will not affect accommodation. This can be interpreted as a situation in which there are workers who would respond to accommodation efforts by not applying to DI anymore, yet, for the firm, the relative costs of accommodating are so high that the potential benefit of them not applying to DI does not weigh up to the cost, not even with experience rating.

When $\theta^* > \theta^2$, all compliers with respect to application are accommodated. By the same logic, marginal changes in experience rating again have no effect on accommodation, and the same two terms drop out of the optimality condition: $A'(\eta)$ and $DI'(\eta)$. This corresponds to the situation in which the people who would respond to accommodation by not applying are already all accommodated because the net cost of accommodation is so low that firms accommodate regardless of experience rating.

Together, one of these regimes may provide an explanation for the empirical finding that experience rating is not always effective in increasing accommodation efforts and reducing DI inflow, as found by e.g. Jansen et al. (2025) who find no effect of experience rating on accommodation of long-term sick listed workers in the Netherlands, Kyyrä and Paukkeri (2018) who find no effect of experience rating on DI inflow using Finnish data and Koning et al. (2025) who find the same using Dutch data.

2.6.3 Relatively low productivity loss caused by disability

In the baseline model, I assume that the productivity loss caused by disability ϕ is relatively large $(\phi > \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta+p(\theta)})$. When the opposite is true, employers do not accommodate compliers with respect to accommodation up to the θ^* threshold, but do accommodate them after. This changes the allocation of workers regarding work and DI. In Appendix A.2.3, I derive the corresponding optimality conditions.

The key difference compared to the case with a relatively high productivity loss ϕ is that employer behavior around the accommodation threshold θ^* switches. With high ϕ, firms accommodate from θ^1 up to θ^* but stop thereafter, so employees apply to DI only beyond θ^*. With low ϕ, firms do not accommodate from θ^1 to θ^* (these workers apply to DI) but do accommodate those between θ^* and θ^2, who thus remain employed. Consequently, θ^2 becomes an effective threshold affecting the allocation of workers.

This behavioral reversal changes the composition of workers and accommodation, and therefore alters both total utility and the government budget. Regarding the optimality condition for the level of experience rating, the included terms remain as in Proposition 5. Yet, the signs of the key effects reverse. The accommodation threshold still shifts to the right, but now, fewer people will be accommodated and more apply to DI.

The optimality condition for the level of DI benefits gains additional terms. Because both θ^1 and θ^2 are now effective, benefit generosity affects the number of DI applicants and recipients. A shift in θ^1 now indicates a shift in behavior (from θ^1 to θ^*, people apply to DI while before θ^1 they do not), and θ^2 has also become effective: from that point on, everyone applies to DI. When DI benefit generosity is decreased, θ^1 shifts to the right: DI is less attractive so fewer people apply and fewer become recipients. θ^2 also shifts to the right, so there are more compliers with respect to accommodation and fewer always-appliers. This also reduces the number of DI applicants and recipients.

Finally, the optimality condition for the eligibility threshold includes the same terms in the baseline model but again reverses the signs of accommodation and DI application effects due to the behavioral switch around θ^*.

Ultimately, whether ϕ is relatively high or low is an empirical question. Observing that workers with lower disability levels are accommodated while those only slightly more disabled are not would be consistent with the model version featuring a low productivity loss.

2.6.4 Social welfare function that includes firm profits

As in Itskhoki and Moll (2019), who model entrepreneurs and workers and combine their respective utility functions in a single social welfare function, I also consider a welfare function that explicitly includes firm profits. This captures a policy environment in which the government places weight on firm profitability in addition to worker welfare. Assuming risk-neutrality of firms, the utility of the firm equals its profits. When firm profits are included, the government Lagrangian changes to:

$$\max_{\eta,b,\theta^e} \mathcal{L}(\eta,b,\theta^e) = V_w(\eta,b,\theta^e) + V_f(\eta,b,\theta^e) + \lambda(G(\eta,b,\theta^e) - \bar{G}),$$

subject to the same constraints as the main model. Aggregate firm profits are given by:

$$\begin{aligned} V_f(\eta,b,\theta^e) = &\int_0^{\theta^1} (S - w - \phi\theta)dF(\theta) + \int_{\theta^1}^{\theta^*} (S - w - \phi\theta + \chi - e)dF(\theta) \\ &+ \int_{\theta^*}^{\theta^h} (p(\theta;\theta^e) \cdot -\eta + (1 - p(\theta;\theta^e))(S - w - \phi\theta))dF(\theta). \end{aligned}$$

The optimality conditions with respect to the three policy parameters, derived in

Appendix A.2.4, now contain the partial derivative of $V_f(\eta, b, \theta^e)$ with respect to each policy parameter.

The intuition of the optimality conditions remains similar: they now additionally account for changes in firm profits. For instance, when accommodation increases as a response to a higher experience rating fee, this corresponds not only to a utility change of $A'(\eta)$ times v but also to an additional profit component $\chi - e$.

2.6.5 Other possible model extensions

To keep the model tractable and analytically solvable, I make several simplifying assumptions regarding firm and worker behavior. While these assumptions abstract from some real-world complexities, the model still captures the key mechanisms through which experience rating affects accommodation, DI applications, and employment. Below, I discuss the main assumptions and their implications.

For tractability, I assume that information between employer and employee is perfectly symmetric: the employer can fully observe the worker's disability shock. In reality, this is not entirely observable, though employers may infer disability levels from observable characteristics, as documented by Hill et al. (2016), who find that certain disabilities are more likely to be accommodated. Moreover, since there is empirical evidence of selective hiring, this signals that firms are able to infer disability risk (Hawkins and Simola, 2024; Prinz and Ravesteijn, 2020).

I also abstract from heterogeneous accommodation cost and gain functions across firms and assume that the direct accommodation cost exceeds the productivity gain in the main model. This implies that the modeled accommodation level serves as a lower bound: in practice, when the productivity gain exceeds the cost for some workers, accommodation would be higher.

Finally, the model is static and does not account for repeated interactions or on-the-job bargaining over accommodations. In reality, employees' health may evolve over time, leading to renegotiation of workplace accommodation, and firms may adjust accommodations gradually in response to these changing needs. The model also abstracts from short-term sick leave dynamics, where temporary absences could interact with accommodation decisions and DI applications. Despite these simplifications, the model captures the key immediate effects of employer incentives on accommodation, hiring, and DI inflow, and these dynamic aspects could be explored in future research.

2.7 Conclusion

Given today's high DI expenditures of many OECD countries, policymakers seek ways to curb costs without creating large insurance losses for its recipients. Standard social insurance theory balances insurance value with workers' incentives to work, but largely overlooks employer behavior. Firms can reduce DI inflow by accommodating workers after health shocks, yet may refrain from doing so when they are not responsible for DI costs. Policies that place this responsibility on firms may also lead to selective hiring, where workers with higher perceived disability risk are not hired. In this chapter, I develop a model of optimal DI that accounts for both employer and employee behavior to evaluate the socially optimal level of experience rating, a policy that forces firms to internalize the DI costs of their employees. This framework not only identifies the optimal level of employer incentives such as experience rating, but also demonstrates how standard worker-side policy parameters, eligibility rules and benefit generosity, depend on employer behavior.

The analysis yields three key findings. First, experience rating simultaneously promotes accommodation and discourages hiring, and both forces are balanced in the optimal level. Second, endogenizing employer behavior in the sufficient-statistics framework reveals additional disability thresholds on which employers base their accommodation and hiring decisions and highlights how these interact with worker's DI application decisions. Third, even standard employee-side policy parameters, eligibility and benefit generosity, trigger employer responses. This implies that optimal DI design, even without policies aimed specifically at employees, must account for firm behavior.

This chapter also offers several broader policy implications. While the analysis centers on experience rating, the findings extend to countries without employer incentives. A key result is that even worker-side policy parameters depend on employer responses. For countries considering the introduction of employer incentives to address unmet accommodation needs (see Maestas et al. (2019) for evidence on the US), it is important to weigh potential gains in accommodation against possible reductions in hiring. Complementary measures, such as hiring subsidies (see Aizawa et al. (2025)), may help counteract these unintended effects. Finally, to inform concrete policy design in countries with experience rating, such as the Netherlands, the sufficient-statistics formula I derive for experience rating needs to be estimated empirically, following approaches similar to Haller et al. (2024).

Chapter 3

Do Stronger Employer Responsibilities Enhance Work Accommodation for Sick-Listed Workers? Evidence From a Dutch Reform

This chapter is based on Jansen et al. (2025). It is joint work with Viola Angelini, Max Groneck and Raun van Ooijen. We thank Lieke Beekers, Arthur van Soest, Stefan Pichler, Pierre Koning, Jochen Mierau, Terhi Ravaska, Esmée Zwiers, and seminar participants at various conferences (EUHEA 2024, EUHEA PhD & Supervisor Conference 2024, 2nd Dutch Health Econometrics Workshop 2024, Netspar Pension Day 2023, RUG PhD Conference 2023) for their valuable comments and suggestions. Funding from Netspar for the project 'Work in old age and when disabled: The role of employer responsibility' is gratefully acknowledged.

3.1 Introduction

Disability in the workforce negatively impacts employees' well-being and career prospects while imposing a substantial financial burden on public finances through sick leave and disability benefits. In 2019, individuals with disabilities in the OECD faced a 27-percentage-point employment gap compared to their non-disabled counterparts. Concurrently, public spending on sickness and disability benefits accounted for a significant 2% of GDP (OECD, 2022, 2023a). Employers can play a pivotal role in improving labor market outcomes for disabled workers, ultimately reducing public spending. They can do so by offering workplace accommodations such as task modifications, flexible scheduling, job coaching, training, or physical adjustments (e.g., ramps, accessible restrooms). Research shows that such accommodations facilitate a return to work, delay disability insurance (DI) applications, and support sustained employment (Burkhauser et al., 1995b, 1999; Campolieti, 2005; Everhardt and de Jong, 2011; Hill et al., 2016).

A key policy to encourage employers to provide accommodations is experience rating, which ties employers' insurance premiums to employees' sick leave and DI costs. While numerous studies have examined the effects of experience rating on labor market outcomes (De Groot and Koning, 2016; Koning et al., 2025; Prinz and Ravesteijn, 2020; Kyyrä and Paukkeri, 2018; Kyyrä and Tuomala, 2023; Van Sonsbeek and Gradus, 2013), its direct influence on workplace accommodations—the mechanism it aims to activate—remains underexplored.

This chapter investigates the impact of experience rating on workplace accommodations for long-term sick-listed workers. We leverage a 2013 Dutch reform, the Modernization Act for Sick Leave Benefits (BeZaVa), which introduced exogenous variation in experience rating. This reform extended experience rating to non-permanent employees and tied its level to firm size, creating a natural experiment for a difference-in-differences (DID) analysis. Unique survey data from the National Social Insurance Institute (NSII, known as UWV in Dutch) targeted to nine-month sick-listed workers, allows us to examine workplace accommodations and employers' decisions to opt out of public sick leave insurance.

We focus on two key outcomes: the likelihood of workplace accommodations and firms' decisions to self-manage sick leave benefits and reintegration processes for non-permanent employees. Opting out of public insurance shifts the responsibility for disability benefit payments and reintegration from the NSII to the firm, although most firms choose to privately insure this risk after opting out. Firms that are well-equipped to provide accommodations may find this approach more cost-effective or efficient (Groenewoud et al., 2015).

We find three main results. We find no significant effect of experience rating on the likelihood of workplace accommodations for long-term sick-listed employees, regardless of their employment type, even though the financial incentives, especially for non-permanent employees were substantial. One possible explanation is that employers perceive limited benefit from accommodation at such late stage compared to earlier interventions or preventative measures. Other reasons could include limited employer awareness of the reform or that the effect requires a longer time horizon to materialize. Since prior studies generally find that experience rating reduces DI inflow,[1] it may also be that firms adopt other cost-reducing strategies such as selective hiring of healthier workers or discouraging employees from calling in sick or applying to DI. One possibility we cannot rule out is that the effect is too small to detect with our sample size, even though all nine-month sick-listed workers in the Netherlands over a two-month period were invited to participate in the survey by the NSII. The 2015 wave, in particular, was fielded to monitor the BeZaVa reform.

Second, we find that experience rating significantly increases the likelihood of non-permanent employees being employed by firms that opt out of public sick leave insurance. This suggests that firms may prefer self-management or private insurance when public premiums are tied to reintegration outcomes. Opting out is positively associated with accommodation, either due to selection, i.e., firms that already prioritize accommodate being more likely to opt out, or due to stronger financial incentives to reduce sickness costs that come with opting out itself, which may encourage firms to accommodate more. Finally, we observe that non-permanent employees are less frequently accommodated than their permanent counterparts. For both groups, younger age, higher education, and employment at larger firms are positively correlated with workplace accommodations,

[1]The NSII also used the same survey as we do and found that for long-term sick-listed non-permanent employees, the employment rate of agency workers 1,5 years after the start of sick leave increased between 2012 and 2015, while no change was observed other non-permanent workers (Rijnsburger, 2017). Although this study does not employ a causal identification strategy, it provides suggestive evidence that experience rating may have improved employment outcomes.

while heart or vascular conditions are negatively associated.

This chapter contributes to the literature in three key ways. First, it estimates the direct effect of experience rating on workplace accommodations and firms' sick leave insurance choices. Second, it expands on the limited research on experience rating and firms' insurance choices, which has only been examined in the studies by Groenewoud et al. (2015) and Hassink et al. (2018) for DI, while it has been researched more often for worker's compensation, see e.g. Morantz (2010). Understanding these choices is crucial, as they determine how reintegration is managed. Finally, we address a significant gap by including non-permanent employees, a vulnerable group often excluded from such analyses despite their weaker labor market attachment and lower likelihood of receiving accommodations (Koning et al., 2025; Van der Burg et al., 2011). Little evidence exists on the effectiveness of employer incentives for non-permanent employees, even though they represent a large share of the workforce and are known to have substantially higher DI application risks than permanent employees (Koning et al., 2025). Unlike permanent employees, their contracts often end before the full sickness and reintegration trajectory is completed, reducing the potential payoff of firm investments in reintegration. Whether experience rating can improve employer behavior for this group of workers is therefore not self-evident and an important policy question.

Our findings are relevant beyond the Netherlands and Finland, where experience rating is already implemented, as many countries face rising sick leave and disability challenges, especially with aging populations. In the United States, for instance, research suggests that nearly half of workers who would benefit from accommodations do not receive them, and about 20% of individuals in the disability system have remaining work capacity that could be utilized with proper accommodations (Maestas et al., 2014, 2019). Additionally, the US disability recipiency rate has risen over the past four decades (Burkhauser et al., 2016). Proposals to introduce employer incentives for addressing these challenges have been made on multiple occasions (Autor and Duggan, 2010; Autor, 2011; Burkhauser and Daly, 2011; Liebman and Smalligan, 2013). Thus, our results are relevant for countries exploring employer incentives to address workforce disability challenges. Moreover, while experience rating is limited in DI systems, it has a long history in unemployment insurance and worker's compensation programs (providing financial support and medical benefits to employees who are injured or become ill as a direct result of their job), particularly in the US, Canada, and Australia (see Koning (2016)). In these programs, the link between employer actions and total benefit claims is typically more direct (Autor, 2011). For example, layoffs immediately affect unemployment claims, and workplace safety management directly influences the likelihood of injury-related claims. By contrast, in DI systems, employers have more limited influence over whether employees develop work-limiting health conditions in the first place. However, they can still influence DI entry by offering accommodations.[2]

The remainder of this chapter is structured as follows: Section 3.2 reviews the literature on experience rating, while Section 3.3 outlines the Dutch institutional context and research design. Section 3.4 presents the data, and Section 3.5 introduces the empirical strategy. Section 3.6 details the results, which are discussed in Section 3.7 with robustness checks in Section 3.8. Finally, Section 3.9 concludes the chapter.

3.2 Literature

Few studies theoretically analyze the employer's role in DI.[3] A key assumption is employer moral hazard, where firms underinvest in retaining employees' work capacity due to public disability insurance. Experience rating aims to mitigate this by imposing costs on firms whose employees enter disability schemes, incentivizing accommodation efforts such as modifying tasks or equipment. However, as argued by Koning (2016), this can expose firms to significant financial risks, leading to selective hiring (as found by Hawkins and Simola (2024)), potential under-reporting of disability, or even bankruptcies (De Groot and Koning, 2022). Prinz and Ravesteijn (2020) and Jansen (2025) examine the optimal experience rating level, balancing these trade-offs.

Empirical studies generally find that experience rating improves labor market outcomes, with no studies assessing its impact on accommodation. Studies on earlier Dutch reforms (Koning, 2009; Van Sonsbeek and Gradus, 2013) find that the introduction of experience rating reduces sick leave and DI inflow. De Groot and Koning (2016) find that the 2003 removal of experience rating for small firms increased DI inflow, but they find no effect

[2]For a review of experience rating in Worker's Compensation, see e.g. Tompa et al. (2012, 2013); and for experience rating in Unemployment Insurance, see e.g. Anderson and Meyer (2000), Auray and Fuller (2020), and Mongrain and Roberts (2005).

[3]Most of the literature focuses on workers' moral hazard, where key policy parameters are screening strictness and the generosity of sick leave and DI benefits. See e.g., Godard et al. (2024) or Ahammer and Packham (2025) on screening and Böckerman et al. (2018) and Mullen and Staubli (2016) on replacement rates.

from its reintroduction in 2008. They argue that this may be due to the earlier (2005) extension of the employer's obligation to cover sick pay for two years, which already introduced strong reintegration incentives. Koning et al. (2025), analyzing the BeZaVa reform, find that the reform as a whole had a large impact on DI inflow of non-permanent employees, but estimate that the part of this effect attributable to experience rating is close to zero. Prinz and Ravesteijn (2020) also analyze the BeZaVa as a whole by comparing agency workers to permanent workers and find a large reduction in DI inflow. Finnish studies also find mainly positive effects of experience rating on labor market outcomes (Hawkins and Simola, 2024; Kyyrä and Tuomala, 2023; Korkeamäki and Kyyrä, 2012), while Kyyrä and Paukkeri (2018)) finds no significant effect, although moderate-sized effects could not be ruled out.

If accommodation is the main mechanism for these effects, it has to improve employment. Reviews (Jansen et al. (2021), Nevala et al. (2015)) generally find workplace accommodation reduces DI inflow and improves employment. Several studies have used survey data from the same source as the current study. Everhardt and de Jong (2011) found that vocational interventions by employers reduce the duration until reemployment of long-term sick-listed workers. More recently, Van Ooijen et al. (2024) showed that implemented disability-related policies improve sustained employment among partially disabled workers. While these studies examine the effects of specific employer practices, our study focuses on whether financial incentives via experience rating influence firms' workplace accommodation behavior.

We also study the effect on opting out of public insurance. Groenewoud et al. (2015) find that 25% of employment agencies and 60% of other firms claims to have opted out of public sick leave insurance due to experience rating after the BeZaVa, anticipating lower costs through better reintegration. Hassink et al. (2018) show that Dutch firms with low DI risk are much more likely to opt out to private insurance, indicating firm self-selection. Yet, no studies have quantitatively considered the impact of experience rating on this choice.

Although DI experience rating is unique to the Netherlands and Finland, similar employer incentives have been studied elsewhere. In Sweden, Hall et al. (2024) find more generous firm insurance increases sickness absence but does not affect selective hiring. In Austria, Böheim and Leoni (2020) find that abolishing compulsory sick leave insurance for blue-collar workers reduces sickness absence without affecting hiring.

Finally, our study aligns with research on accommodation determinants. Hill et al. (2016) and Høgelund and Holm (2014) show that worker characteristics like age, education, tenure, and disability type influence accommodation provision. However, no research has examined whether these factors persist under strong employer incentives.

3.3 Institutional context and potential effects of the reform

3.3.1 Sick leave and disability insurance in the Netherlands

In the Netherlands, employees who become sick—whether due to work-related or non-work-related causes—are entitled to at least 70% of their gross wages for up to two years. After this period, they may apply for DI benefits. Employers cannot dismiss workers or reduce wages during sick leave.[4]

The sick leave period differs for permanent and non-permanent employees. For *permanent employees*, employers are responsible for both reintegration efforts and sick leave benefits. As public coverage is not available, they have the option to either self-insure or purchase private insurance, transferring payment and reintegration responsibilities to insurers. For *non-permanent employees*, the system differs. This group includes *agency workers*, whose employment terminates upon sickness, and *temporary workers*, whose contracts expire while on sick leave. Employers can use public sick leave insurance via the NSII, paying premiums while the NSII manages benefits and reintegration. Alternatively, firms can opt out of public insurance and take on direct responsibility both for payments and reintegration.

During the sick leave period, the legally required reintegration activities follow the Gatekeeper Protocol, which was introduced in 2002. After six weeks of sick leave, a problem assessment must be conducted. This involves an evaluation of the disability, how it affects the worker's tasks, which tasks can still be performed, and the goals of the upcoming reintegration activities. This assessment is conducted by the occupational health physician for permanent employees and by the NSII for non-permanent employees. Two weeks later, an action plan based on this assessment must be created by both the employee and either the employer or the NSII. After 52 weeks, a first-year assessment

[4] If an employee on a temporary contract reaches the end of their contract during sick leave, the National Social Insurance Institute (NSII) assumes responsibility for benefits.

takes place. During this meeting, the employee and the employer or the NSII evaluate whether the reintegration is proceeding according to the action plan and whether new agreements need to be made.

After two years of sick leave, both permanent and non-permanent employees may apply for DI benefits. The NSII's insurance physicians assess applicants' levels of disability and categorize them as eligible for partial DI benefits, full DI benefits, or ineligible. For partial DI, firms can opt out of public insurance for permanent employees but not for non-permanent employees. We refer to the Dutch WGA scheme as partial DI for simplicity, although it includes both partial and permanent disability (35-80% disability) and full but temporary disability (80-100% disability). We refer to the Dutch IVA scheme as full DI (80-100%) with no prospect of recovery, including only full and permanent DI. In most cases, firms choose to privately insure this risk rather than directly paying the benefits themselves (Koning, 2016). All firms must insure full DI publicly.

3.3.2 The reform and its expected effects on accommodation

The 2013–2014 Modernization Act of Sick Leave Benefits (BeZaVa) aimed to align financial incentives for permanent and non-permanent employees (Tweede Kamer der Staten-Generaal, 2012). The reform had two key measures in 2014. A third measure affected non-permanent employees exclusively and is not relevant to our difference-in-differences estimates. It involved stricter reintegration requirements and health criteria for extended sick leave. One of these measures is the introduction of the first-year sick leave evaluation for non-permanent employees, where the NSII assesses whether the employee still fulfills the requirements to be granted benefits (Tweede Kamer der Staten-Generaal, 2012).

Table 3.1 provides an overview of the different insurance options for permanent and non-permanent employees by firm size and how this differs before and after the reform. The first measure of the reform is the extension of experience rating to public sick leave and partial DI premiums for *non-permanent employees*, which were previously sector-based and non-individual. Experience rating incentivizes firms to internalize sick leave and partial DI costs, potentially encouraging workplace accommodations (Tweede Kamer der Staten-Generaal, 2012). These may range from additional breaks to workplace adjustments, task modifications, or job coaching. (Jansen et al., 2023).

Experience-rated premiums are based on the firm's sick leave or DI risk relative to

Table 3.1: *Insurance types by employee and firm size before and after reform.*

Firm Size / Type of contract	**Small firm**	**Medium firm**	**Large firm**
Permanent			
Before reform	Same rules for all firms: 1. No public sick leave insurance; employer pays benefits. Option to privately insure. 2. Public partial DI with experience-rated premiums; option to opt out. 3. Obligatory full DI with non-experience-rated premiums.		
After reform	*Partial DI premiums no longer experience-rated.*	*Partial DI premiums partially experience-rated.*	*No changes.*
Non-perm.			
Before reform	Same rules for all firms: 1. Public sick leave insurance available; option to opt out. 2. Obligatory public partial DI with non-experience-rated premiums. 3. Obligatory full DI.		
After reform	*No changes.*	*Public sick leave and partial DI premiums partially experience-rated.*	*Public sick leave and partial DI premiums fully experience-rated.*

the national average using data from two years prior. The DI risk is based on the total sick leave or DI benefit costs attributed to the firm two years prior, divided by the 5-year average social insurance wage sum of the firm two years ago, compared to the average costs of all firms. The premium is calculated as follows, where the *calculation rate* and *correction rate* are set by the NSII (UWV, 2014)[5] :

$$premium_{i,t} = calculation\ rate_t + markup_{i,t}$$

$$markup_{i,t} = correction\ rate_t \times (individual\ risk_{i,t} - average\ DI\ risk_t)$$

$$individual\ risk_{i,t} = \frac{benefit\ costs_{i,t-2-s},}{\sum_{s=0}^{5} total\ insurance\ wage_{i,t-2-s}/5}$$

These premiums are capped by a minimum and maximum premium and can reach up to 9% of total labor costs (De Groot and Koning, 2016).

The second measure of the reform was to link the degree of experience rating to firm size. Before the reform, experience rating applied only to partial DI premiums for permanent employees, regardless of firm size. However, in practice, experience rating had larger financial consequences for large firms because their premiums could adjust over a wider range in response to DI inflow. The cutoff for being classified as a small

[5]The social insurance wage is the portion of wages subject to social insurance contributions.

firm was defined as 25 times the average social insurance wage. In 2013, the DI premium for small firms ranged from the minimum cap of 0.47% to the maximum cap of 1.56% of the wage sum, while for large firms the caps were 0.13% and 2.08% (UWV, 2013). Hassink et al. (2015) show that between 2007 and 2011, small firms bore only 20% of the DI costs through increased premiums when a worker entered the DI scheme, due to the premium caps. In contrast, larger firms (with more than 25 workers) faced nearly the full cost, up to 100%. As a result, the removal of experience rating for permanent employees had a limited financial impact on small firms. Nevertheless, covering 20% of DI costs could represent a substantial financial burden for small firms. After the reform, these firms no longer had to bear this cost when a worker transitioned into DI.

Since the reform, experience rating has been based on firm size, defined by the annual social insurance wage bill relative to the national average. *Large firms* (wage bill >100 times the national average) pay fully experience-rated premiums based on their own risk. *Medium firms* (10–100 times the national average) pay a weighted average of the sector-wide and of the individual experience-rated premiums. *Small firms* (<10 times the national average) pay only sector-wide premiums.

The reform provides treatment variation to estimate the effects of introducing or removing experience rating (see Table 3.2). For non-permanent employees, we compare those at large and medium firms (treatment group) to those at small firms (control group) to assess whether experience rating increases workplace accommodation. Firms internalizing sick leave and DI costs may reduce moral hazard and improve accommodations to shorten sick leave or prevent DI transitions.

For permanent employees, we compare small and medium firms (treatment group) to large firms (control group) to examine the effects of removing experience rating. Since experience rating applied only to partial DI premiums for permanent employees, observed effects stem only from employer responses to anticipated financial consequences of DI transitions. Moreover, for permanent employees, the reform had a more modest financial impact, as the premium spread was already wider for larger firms pre-reform (more than 25 times the average social insurance wage). By contrast for non-permanent employees, the reform newly introduced experience rating and applied it to both sick leave and DI benefits, resulting in a much larger change in financial incentives.

Table 3.2: *Treatment and control groups for the introduction and removal of experience rating.*

	(Partial) introduction experience rating, sick leave, and partial DI premiums	**(Partial) removal experience rating partial DI premiums**
Treatment group	Non-permanent employees at *medium* and *large* firms	Permanent employees at *small* and *medium* firms
Control group	Non-permanent employees at *small* firms	Permanent employees at *large* firms

3.3.3 The reform's expected effects on employer sick leave insurance choices

Experience rating may also influence firms' decisions to opt out of public sick leave insurance. Under the public scheme, firms pay experience-rated premiums while reintegration is managed by the NSII, creating a potential misalignment between financial incentives and control over reintegration and costs. Opting out allows firms to avoid this misalignment. While some may resume reintegration responsibilities themselves, most contract private insurers to manage both reintegration and financial risks. These insurers often apply risk-rated premiums, based on a large set of information elicited from the firms with the aim to align incentives more directly with reintegration outcomes. Premia for basic insurance vary greatly: the highest premium is four times higher than the lowest premium. In addition, private insurances can and do reject insurance applications (Aarts et al., 2018).

The decision to opt out is likely influenced by firms' risk characteristics. Firms with lower sick leave or DI risk, and those with more effective internal reintegration processes, may find private insurance cheaper and more efficient. In particular, low-risk firms may view private insurance as more cost-effective because it can offer full ex-ante risk-rating, unlike the public scheme that applies only partial experience rating due to minimum and maximum premium thresholds. Empirical evidence supports this: Groenewoud et al. (2015) found that 65% of employers who opted out after the BeZaVa reform did so with the expectation of improved reintegration outcomes, while Hassink et al. (2018) found that low-risk firms were more likely to opt out and buy private insurance. Based on this, we hypothesize that experience rating increases opting out among medium and large firms, particularly for non-permanent workers, due to the potential for lower costs and more efficient reintegration management by private insurers or the firm itself.

3.4 Data and summary statistics

3.4.1 Data

We use data from the Pathway to DI (Weg naar de WIA) survey, conducted in three waves (2008, 2012, 2015) administered by APE and Astri in collaboration with NSII. Each wave surveyed all eligible long-term sick-listed workers in the Netherlands over a two-month period. The final wave was specifically implemented to monitor the BeZaVa reform, which our study exploits. Each wave includes a follow-up survey 18 months after sick leave began. The *full population* of nine-month sick-listed individuals was invited to participate, with a net response rate of about 35%. The survey, available on paper or online, includes permanent and non-permanent employees as well as unemployed individuals. It provides detailed data on health, demographics, labor market outcomes, and employer accommodation.

Selection issues may arise as the survey occurs nine months into sick leave, before any DI application, but after potential employer accommodations. If well-accommodated workers return to work sooner, our sample could over-represent firms less willing to accommodate. Additionally, voluntary participation may skew responses toward those with strong opinions on employer accommodations, though only 3.1% of cases are dropped for missing responses. However, since our identification strategy relies on a difference-in-differences design, any selection into survey participation should not bias the results as long as it does not vary systematically across survey waves between the treatment and control groups.

3.4.2 Sample selection

We include only the main survey waves, excluding follow-up responses, as early accommodations might reduce later sick leave duration. The sample consists of employed respondents aged 18-67, yielding an initial sample of 15,080 individuals, reduced to 12,523 after applying restrictions (Table 3.3). Details of the sample selection process are in Appendix B.1.

Table 3.3: *Sample restrictions and sample size*

Sample	Nr. of respondents	% of initial sample
Initial sample of the population of interest in the three waves of the survey (employed individuals aged between 18 and 67).	15,080	100%
Sample restrictions		
1. Excluding respondents with missing key covariates.	13,679	90.7%
2. Excluding respondents who are in the 'other' firm sector category.	13,673	90.7%
3. Excluding respondents who filled in the permanent survey as non-permanent employee.	13,312	88.3%
4. Excluding respondents who answered that they became sick more than one month off from the inclusion period.	13,040	86.5%
5. Excluding respondents who did not answer the employer accommodation questions.	12,575	83.4%
6. Removing conflicting or missing values of firm size.	12,523	83.0%
Subsamples per employment type	Nr. of respondents	% of final sample
Non-permanent employee.	3,011	24.0%
Permanent employee.	9,512	76.0%

Notes: This table reports the sample restrictions and the accompanying sample sizes. It also reports the sample sizes of the two subsamples of non-permanent and permanent employees.

3.4.3 Variables

The main dependent variables are employer accommodation, satisfaction with accommodation, and whether or not the firm opted out of public sick leave insurance for non-permanent employees. Employer accommodation is a binary variable indicating whether any accommodation option was provided. The relevant survey question asks: *"What has your employer/employment agency done to get you either back to work or to retain you at work since you reported sick?"*. Response options include modified tasks, gradual return-to-work, workplace adjustments, other, or no accommodation. Since accommodations often involve multiple measures, we do not analyze them separately. Opting out is a binary variable that indicates whether a firm chose to opt out of public sick leave insurance for non-permanent employees. This measure is not based on survey responses but derived from administrative records from NSII. Data on opting out are only available for the 2015 wave. Before 2015, all non-permanent employees are coded as not opted out, while permanent employees are always missing in this variable.

Satisfaction with accommodation, used only in the descriptive analysis, measures whether respondents believe their employer did enough to facilitate their return. It is binary and considered only for accommodated individuals.

Independent variables include non-permanent contract type (agency vs. temporary), demographics, disability type, firm characteristics, and year-fixed effects. Demographics cover binary gender (male/female), education level (low, medium, high), migration background (binary), and age classes (18-35, 36-55, 56-60, 61-67). Education is categorized as low (primary/lower vocational), medium (secondary/senior vocational), or high (university/applied sciences).

Disability types include musculoskeletal, psychological, cardiovascular, and other conditions, with multiple responses allowed. A key firm characteristic considered is firm size, categorized as small (0–10 employees), medium (10–100 employees), and large (100+ employees). Since direct firm size data is unavailable for waves 2 and 3, this variable is derived from survey responses regarding the branch's size and whether it is part of a larger firm. Data from the first wave, where firm size information is available, confirms that 89% of such firms were large. Further details on the determination of firm size and robustness analyses using imputed measures are provided in Appendix B.1.

Firm sector (industry, transport, trade, services, public) is based on NSII records.

3.4.4 Descriptive statistics

The upper panel of Table 3.4 presents summary statistics for non-permanent (N=3,011), permanent (N=9,512), and total (N=12,523) workers. Employer accommodation is more frequent among permanent employees (79%) than non-permanent employees (29%). Additionally, non-permanent employees are less satisfied with accommodations (58%) compared to permanent employees (81%), suggesting differences in both frequency and quality of accommodations.

Women make up 56% of the sample, and most respondents (57%) are aged 36-55. Permanent employees are more often 55+ (31%) than non-permanent employees (16%). Higher education levels are more common among permanent employees (32%) than non-permanent employees (17%). The most prevalent disability type concerns musculoskeletal issues (41%), especially among non-permanent employees (51%) compared to permanent employees (38%).

Table 3.4: *Summary statistics by type of employment contract*

	Non-permanent workers	Permanent workers	Total
Sample size	3,011 (24.0%)	9,512 (76.0%)	12,523 (100.0%)
Workplace accommodation			
Workplace accommodation	0.303 (0.459)	0.793 (0.405)	0.675 (0.468)
Satisfaction with accommodation, conditional on being accommodated	0.576 (0.494)	0.808 (0.394)	0.785 (0.411)
Type of non-permanent contract			
Agency worker	0.214 (0.410)	–	–
Demographic variables			
Female	0.536 (0.499)	0.564 (0.496)	0.557 (0.497)
Migration background	0.227 (0.419)	0.122 (0.328)	0.148 (0.355)
Age class			
18–35	907 (30.1%)	1,056 (11.1%)	1,963 (15.7%)
36–55	1,612 (53.5%)	5,524 (58.1%)	7,136 (57.0%)
56–60	356 (11.8%)	1,990 (20.9%)	2,346 (18.7%)
61–67	136 (4.5%)	942 (9.9%)	1,078 (8.6%)
Education level			
Low education	1,306 (43.4%)	3,406 (35.8%)	4,712 (37.6%)
Medium education	1,179 (39.2%)	3,086 (32.4%)	4,265 (34.1%)
High education	526 (17.5%)	3,020 (31.7%)	3,546 (28.3%)
Disability type			
Musculoskeletal disability	0.507 (0.500)	0.376 (0.485)	0.408 (0.491)
Psychological disability	0.427 (0.495)	0.352 (0.478)	0.370 (0.483)
Heart/vascular disability	0.097 (0.296)	0.127 (0.333)	0.120 (0.325)
Other disability	0.307 (0.461)	0.375 (0.484)	0.359 (0.480)
Firm characteristics			
Opted out of public sick leave insurance	0.275 (0.447)	–	–
Firm size			
Small firm	332 (14.8%)	646 (6.8%)	978 (8.3%)
Medium firm	482 (21.6%)	1,551 (16.3%)	2,033 (17.3%)
Large firm	1,422 (63.6%)	7,315 (76.9%)	8,737 (74.4%)
Firm sector			
Industry	395 (13.1%)	1,528 (16.1%)	1,923 (15.4%)
Transport	238 (7.9%)	526 (5.5%)	764 (6.1%)
Trade	412 (13.7%)	1,116 (11.7%)	1,528 (12.2%)
Services	1,371 (45.5%)	1,810 (19.0%)	3,181 (25.4%)
Public	595 (19.8%)	4,532 (47.6%)	5,127 (40.9%)

Continued on next page

Table 3.4 continued

Accommodation rates before and after reform		
Non-permanent workers	Before reform	After reform
Small firms (control)	0.283 [0.217, 0.350]	0.250 [0.180, 0.320]
Medium/large firms (treatment)	0.268 [0.241, 0.294]	0.318 [0.287, 0.350]
Permanent workers		
Large firms (control)	0.699 [0.688, 0.710]	0.802 [0.786, 0.817]
Medium/small firms (treatment)	0.659 [0.647, 0.672]	0.767 [0.735, 0.799]

Notes: The upper panel of this table presents summary statistics of our final sample of non-permanent workers (column 1), permanent workers (column 2) and total sample (column 3). The mean and standard deviation (in brackets) are displayed for continuous variables, while the group frequencies and percentages (in brackets) are displayed for categorical variables. Data on opting out of public sick leave insurance is only provided for non-permanent employees in wave 3 (2015). Disability types are not mutually exclusive, so percentages do not sum to 100%. The bottom panel presents mean accommodation rates before and after the reform by control and treatment group. The 95% confidence intervals are shown in brackets.

Further descriptive statistics about firm characteristics shows that in 2015, 28% of non-permanent employees worked at firms that opted out of public sick leave insurance. Permanent employees are more likely to work at large firms (77% vs. 64%), while non-permanent employees are more common in the services sector (46% vs. 19%). Conversely, permanent employees are more often in the public sector (48% vs. 20%).

The bottom panel of Table 3.4 reports the average accommodation rates before and after the reform for both the treatment and control group. Among non-permanent workers, for the treatment group (who were newly subject to experience rating) accommodation rates increased from 26.8% to 31.8%. In contrast, the control group (already exposed to experience rating) showed a decline. Yet, note that the confidence intervals of the mean appear wide which reflects the limited precision of these estimates. Among permanent workers, for the treatment group (for whom experience rating was removed or reduced), accommodation rates increased from 65.9% to 76.7%, while the accommodation rate of the control group increased from 69.9% to 80.2%. These figures suggest that the introduction of experience rating for non-permanent employees may have had a positive effect on accommodation, while the removal or reduction of experience rating for permanent employees had no clear effect.

3.5 Empirical framework

Our empirical analysis consists of three parts. First, we provide correlational evidence on the determinants of workplace accommodation of long-term sick-listed non-permanent and permanent employees using OLS regression. Next, we estimate the causal effects of the (partial) introduction and removal of experience rating on workplace accommodation and the chance of being employed at an employer who opted out of public sick leave insurance.

3.5.1 Determinants of accommodation

To determine which types of workers are more likely to be accommodated and whether they are satisfied with it, we regress workplace accommodation and satisfaction with accommodation on our set of potential determinants. For the satisfaction regression, we only included respondents who indicated that they had been accommodated. We separate non-permanent and permanent employees since their sick leave trajectories can be quite different, and therefore, we can expect these determinants to have a different impact.

3.5.2 Difference-in-differences analysis workplace accommodation

We use a DID strategy to estimate the effect of experience rating on workplace accommodation, focusing on the extensive margin. We employ two separate models for non-permanent employees and permanent employees. To assess the impact of the (partial) introduction of experience rating, we compare non-permanent employees at large and medium-sized firms (treatment group) to non-permanent employees at small firms (control group). For the removal of experience rating in partial DI premiums, we compare permanent employees at small and medium-sized firms (treatment group) to permanent employees at large firms (control group). We assess the following linear probability models for our estimations of the effect of experience rating:

$$\begin{aligned} \mathit{Accom}_{i,t} = \beta_0 + \beta_1 \cdot \mathit{After}_t + \beta_2 \cdot \mathit{Large/medium\text{-}sized}_{i,t} \\ + \beta_3 \cdot \mathit{After}_t \cdot \mathit{Large/medium\text{-}sized}_{i,t} + \boldsymbol{X}'_{i,t}\delta + \theta \cdot \mathit{Agency} + \varepsilon_{i,t} \end{aligned} \tag{3.1}$$

$$\begin{aligned} \mathit{Accom}_{i,t} &= \beta_0 + \beta_1 \cdot \mathit{After}_t + \beta_2 \cdot \mathit{Small/medium\text{-}sized}_{i,t} \\ &\quad + \beta_3 \cdot \mathit{After}_t \cdot \mathit{Small/medium\text{-}sized}_{i,t} + \boldsymbol{X}'_{i,t}\delta + \tau \cdot \mathit{Wave\ 2}_t + \varepsilon_{i,t} \end{aligned} \tag{3.2}$$

with Equation 3.1 relating to non-permanent employees and Equation 3.2 to permanent employees. The key coefficient of interest in both models, β_3, measures the causal effect of either the introduction or removal of experience rating. In these models, *Accom* is employer accommodation, *After* is a dummy that takes on the value of one if the observation took place after the reform (wave 3, 2015) and zero otherwise, *Large/medium-sized* is a dummy that equals one if the respondent reports to have been employed at a large or medium-sized firm and zero if the respondent is employed at a small firm, and the other way around for *Small/medium-sized*. ***X*** is the vector of controls, consisting of our socio-demographic variables (gender, migration background, age, and education level), disability type, and firm characteristics (firm size, firm sector). Next to these controls, the first Equation includes *Agency*, a dummy that equals one if the non-permanent employee is an agency worker and zero if the employee is a temporary worker. For Equation 3.2 only, we include the dummy for wave 2 (2012) as we have two pre-treatment waves.

The parallel trend assumption can only be tested for permanent employees, not for non-permanent employees. The reason is that firm size is only recorded in two pre-reform waves (2008 and 2012) for permanent employees but only once for non-permanent employees (in 2012). For permanent employees, we can assess the parallel trends assumption both graphically and analytically by estimating the DID model on the pre-reform data. While we cannot empirically test this assumption for non-permanent employees, there were no policy or contextual changes during the study period that would plausibly have affected non-permanent employees differently based on firm size.

3.5.3 Difference-in-differences analysis opting out of public sick leave insurance

Next to potentially influencing accommodation, experience rating could also have had unintended effects on other outcomes, such as firms opting out of public sick leave insurance to circumvent the influence of NSII behavior on their now experience-rated premiums. We test this by running a DID analysis on the likelihood of being employed at a firm that opted out, using non-permanent employees at large and medium-sized firms as treatment group and at small firms as control group. We estimate the following model:

$$\begin{aligned} \textit{Opted out}_{i,t} = \beta_0 + \beta_1 \cdot \textit{After}_t + \beta_2 \cdot \textit{Large/medium-sized}_{i,t} \\ + \beta_3 \cdot \textit{After}_t \cdot \textit{Large/medium-sized}_{i,t} + \boldsymbol{X}'_{i,t}\delta + \theta \cdot \textit{Agency} + \varepsilon_{i,t} \end{aligned} \tag{3.3}$$

in which all the terms have the same meaning as Equations 3.1 and 3.2. In this analysis, as we have no data on opting out before the reform, we assume that no firms opted out before the reform. This assumption is reasonable as only 3% of all firms in the Netherlands had opted out in 2012 (Dumhs and Van Deursen, 2017). Unfortunately, the lack of data on opting out before the reform also implies that we cannot assess the parallel trend assumption.

3.6 Results

3.6.1 Determinants of accommodation rates and satisfaction

Table 3.5 presents the results of our analysis on the factors influencing the likelihood of receiving accommodation and satisfaction with accommodation. Columns 1 and 2 display OLS estimates for non-permanent employees, focusing on the probability of receiving accommodation (column 1) and satisfaction with accommodation, conditional on receiving it (column 2). Columns 3 and 4 report similar results for permanent employees.

The findings reveal notable differences in accommodation rates between non-permanent and permanent employees, with non-permanent employees being accommodated less frequently. However, the determinants of accommodation are broadly similar for both groups. For non-permanent employees, those with agency contracts are less likely to receive accommodation than those with temporary contracts. Gender has no significant effect on accommodation likelihood for either group, but among permanent employees, women report greater satisfaction with accommodation than men when it is provided. Migration background does not significantly impact the likelihood of accommodation for either group, although satisfaction appears somewhat lower among employees with a migration background.

Table 3.5: *Determinants of the rate of workplace accommodation and the satisfaction with it*

	Sample			
	Non-perm.	Non-perm.	Perm.	Perm.
	Dependent variable			
	accom	satisfaction	accom	satisfaction
Employment contract (base = temporary)				
Agency contract	-0.1173***	0.1245**		
	(0.0229)	(0.0557)		
Worker characteristics				
Female	0.0127	0.0405	0.0092	0.0263***
	(0.0182)	(0.0377)	(0.0090)	(0.0099)
Migration background	0.0015	-0.0650	-0.0180	-0.0249*
	(0.0199)	(0.0418)	(0.0130)	(0.0145)
Age class (base = 36–55)				
18–35	0.0165	0.0740*	0.0372***	-0.0171
	(0.0197)	(0.0378)	(0.0124)	(0.0151)
56–60	-0.0225	-0.0317	-0.0168	0.0121
	(0.0259)	(0.0575)	(0.0108)	(0.0116)
61–67	-0.0477	-0.0858	-0.0752***	0.0440***
	(0.0398)	(0.1002)	(0.0160)	(0.0160)
Education level (base = medium)				
Low	-0.0153	0.0576	-0.0504***	0.0021
	(0.0186)	(0.0406)	(0.0105)	(0.0111)
High	0.0794***	0.0960**	0.0173*	-0.0145
	(0.0254)	(0.0451)	(0.0100)	(0.0114)
Disability type				
Musculoskeletal	-0.0176	-0.0597	0.0018	-0.0544***
	(0.0192)	(0.0400)	(0.0107)	(0.0118)
Psychological	-0.0236	-0.1217***	-0.0068	-0.1064***
	(0.0188)	(0.0398)	(0.0105)	(0.0120)
Heart/vascular	-0.0562**	-0.1490**	-0.0281**	0.0290**
	(0.0281)	(0.0702)	(0.0141)	(0.0132)
Other	-0.0079	-0.0344	-0.0576***	0.0102
	(0.0199)	(0.0410)	(0.0103)	(0.0114)
Firm characteristics				
Opted out of public	0.1081***	-0.0796		
sick leave insurance	(0.0341)	(0.0644)		

Continued on next page

Table 3.5 continued

	Sample			
	Non-perm.	Non-perm.	Perm.	Perm.
	Dependent variable			
	accom	satisfaction	accom	satisfaction
Firm sector (base = industry)				
Transport	-0.0585	0.0190	-0.0293	-0.0397*
	(0.0369)	(0.0788)	(0.0210)	(0.0227)
Trade	0.0128	-0.0358	-0.0261	-0.0338*
	(0.0338)	(0.0661)	(0.0166)	(0.0173)
Services	-0.0307	-0.0025	-0.0348**	-0.0077
	(0.0288)	(0.0610)	(0.0146)	(0.0150)
Public	0.0437	-0.0084	0.0015	-0.0262*
	(0.0329)	(0.0644)	(0.0126)	(0.0134)
Firm size (base = medium)				
Small			-0.0357*	0.0000
			(0.0207)	(0.0203)
Large			0.0358***	-0.0166
			(0.0118)	(0.0121)
Wave dummies (base = wave 1)				
Wave 2 (2012)	-0.0928***	-0.2750***	0.0049	-0.0986***
	(0.0211)	(0.0406)	(0.0102)	(0.0111)
Wave 3 (2015)	-0.0986***	-0.2594***	0.0066	-0.0928***
	(0.0244)	(0.0478)	(0.0101)	(0.0109)
Constant	0.4093***	0.7936***	0.8176***	0.9422***
	(0.0377)	(0.0729)	(0.0188)	(0.0194)
Observations	3,011	821	9,512	7,443

Notes: This table presents OLS estimates for the likelihood of employer accommodation and, conditional on accommodation, binary employee satisfaction. Firm size is excluded as a regressor for non-permanent employees due to its absence in wave 1, to avoid reducing the sample size. Heteroskedasticity-robust standard errors are in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

An age-related pattern emerges, with younger workers more likely to receive accommodation than older workers. This may suggest that employers perceive a lower return on accommodating workers closer to retirement. Conversely, older permanent employees report lower satisfaction with accommodation. Educational attainment also plays a significant role: individuals with lower levels of education are less likely to be accommodated and are less satisfied when accommodation is provided. These results align with Hill et al. (2016), who found that higher education positively influences employer accommodation.

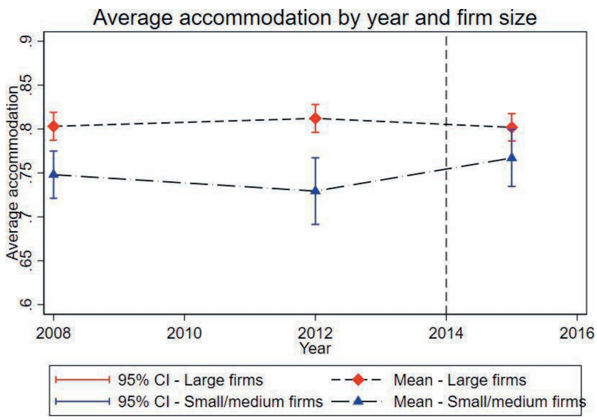
Disability characteristics further influence accommodation and satisfaction outcomes, with similar patterns for both contract types. Workers with heart and vascular conditions are least likely to receive accommodation and are least satisfied when accommodations are made. This may be due to the inherent difficulty of accommodating such conditions. Employees with psychological issues also report lower satisfaction with accommodations.

Firm characteristics and timing additionally play a role. While the sector of the firm has no significant effect, smaller firms are less likely to accommodate their employees. Non-permanent workers employed by firms that opted out of public sick leave insurance are more likely to receive accommodation. Interestingly, reported accommodation rates were higher in 2008 compared to 2012 or 2015, despite the financial crisis in 2008, which might have been expected to negatively impact accommodation practices.

In conclusion, older, less-educated workers, and those with specific disabilities are less likely to receive accommodations, a pattern seen in both permanent and non-permanent employees. While not causal, these findings highlight significant disparities in accommodation practices, with some groups receiving more favorable treatment.

3.6.2 Effect of experience rating on workplace accommodation

Figure 3.1: *workplace accommodation rate trends of permanent employees*



Notes: This figure displays the average accommodation rate and its 95% confidence interval of permanent employees at large versus small and medium-sized firms in the three waves (2008, 2012 and 2015).

Parallel trend accommodation To inspect the parallel trend assumption of our DID analysis, we plot pre-treatment trends and perform a placebo test on our sample

Table 3.6: *Placebo test DID model permanent employees*

	Dependent variable	
	accom	accom
	Sample	
	Perm.	Perm.
Wave 2 (2012)	0.0090	0.0101
	(0.0114)	(0.0114)
Small/medium-sized	-0.0551***	-0.0433***
	(0.0159)	(0.0161)
Wave 2 × Small/medium-sized	-0.0277	-0.0273
	(0.0262)	(0.0259)
Wave 3 (2015)	-0.0012	0.0036
	(0.0113)	(0.0115)
Wave 3 × Small/medium-sized	0.0202	0.0129
	(0.0242)	(0.0243)
Constant	0.8031***	0.8533***
	(0.0080)	(0.0170)
Controls	No	Yes
2008 included	Yes	Yes
Observations	9,512	9,512

Notes: This table reports the DID results of Equation 3.2 for permanent employees, but includes the placebo-treatment coefficient Wave 2 × Small firm. The controls in column 2 are the same as column 3 of table 3.5, excluding firm size as a separate control as this is already in the treatment indicator, and wave 3 is included as After, while wave 2 is included as separate wave dummy. Heteroskedasticity-robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

of permanent employees at large and small firms. Figure 3.1 shows the average accommodation levels of the treated and untreated permanent workers from 2008 to 2015. The average accommodation rates do not diverge significantly, and treated workers (at small and medium-sized firms) even show an upward trend in accommodation. Table 3.6 reports the placebo test estimates. The estimate of the placebo treatment indicator (Wave 2 × Small or medium firm) is statistically insignificant. Hence, the parallel trend assumption appears to hold for permanent employees. As noted earlier, we cannot test the parallel trend assumption for non-permanent employees, but we have no reason to believe it differs from them, as we are not aware of any major policies or other factors that could have affected the relative difference between non-permanent workers at large versus small and medium-sized firms.

Difference-in-differences results Now, we examine the effect of experience rating on workplace accommodation. The difference-in-difference regressions confirm what we see in Table 3.4, yet find no significant effects. Columns 1 and 2 of Table 3.7 present the results for the introduction of experience rating for non-permanent employees (Equation 3.1). Since the inclusion of controls does not significantly alter the coefficients, we focus on the model with controls. The estimated effect of introducing experience rating is 6.24 percentage points, a notable figure given the average accommodation rate for non-permanent employees is around 30%. However, this effect is not statistically significant. The imprecision arises from the large standard errors associated with our limited sample size. Although we do not find a statistically significant effect, we cannot rule out the possibility of a limited effect due to the statistical power of our analysis.

Columns 3 and 4 of Table 3.7 report the results of removing experience-rated partial DI premiums for permanent employees at small firms (Equation 3.2). Once again, the inclusion of controls (column 4) does not materially affect the coefficients in column 3, so we focus on the controlled model. This analysis estimates a 2.32 percentage point *increase* in the likelihood of accommodation when employers are no longer required to pay experience-rated partial DI premiums. However, this effect is also statistically insignificant, though the standard errors are somewhat smaller due to the larger sample size. Since the removal of experience rating has smaller financial consequences for firms employing permanent workers than the introduction of experience rating had for those employing non-permanent workers, this result is less surprising. Small and medium-sized firms already faced less complete experience rating for their permanent employees before the reform, due to stricter caps on the premiums. Additionally, the introduction of experience rating for non-permanent employees applied not only to partial DI but also to sick leave premiums.

Overall, we do not find significant evidence that either the introduction or removal of experience rating has a meaningful impact on workplace accommodation for long-term sick-listed workers. However, these findings should not be interpreted as evidence that experience rating is always ineffective at encouraging employers to increase accommodation efforts. Our study focuses on workers who have been sick for at least nine months, a group for which employers may not perceive accommodation as likely to reduce sick leave duration or DI inflows. For other categories of workers—such as

Table 3.7: *Main DID results of the introduction and removal of experience rating*

	Dependent variable			
	accom	accom	accom	accom
	Sample			
	Non-perm.	Non-perm.	Perm.	Perm.
After	-0.0333	-0.0257	-0.0056	0.0006
	(0.0486)	(0.0486)	(0.0098)	(0.0112)
Large/medium-sized	-0.0155	-0.0155		
	(0.0362)	(0.0359)		
After × Large/medium-sized	0.0837	0.0624		
	(0.0530)	(0.0528)		
Small/medium-sized			-0.0660***	-0.0536***
			(0.0125)	(0.0128)
After × Small/medium-sized			0.0311	0.0232
			(0.0222)	(0.0222)
Constant	0.2833***	0.3594***	0.8075***	0.8559***
	(0.0336)	(0.0478)	(0.0057)	(0.0169)
Controls	No	Yes	No	Yes
2008 included	No	No	Yes	Yes
Observations	2,236	2,236	9,512	9,512

Notes: The first two columns show DID results on the *introduction* of experience rating (Equation 3.1) for long-term sick-listed *non-permanent* employees at small and large firms in waves 2 and 3 (wave 1 is excluded due to missing firm size data). The last two columns present DID results on the *removal* of experience rating (Equation 3.2) for *permanent* employees at small and large firms in waves 1–3. The dependent variable is a binary indicator of employer accommodation. For columns 1 and 2, controls match those in column 1 of Table 3.5, excluding opting out and separate wave dummies (except for the 2015 dummy "After"). For columns 3 and 4, controls follow column 3 of Table 3.5, omitting firm size (since it is in the treatment indicator) and including wave 3 as "After" with wave 2 as a separate dummy. Heteroskedasticity-robust standard errors are in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

those at risk of becoming sick-listed or those newly sick-listed—experience rating might be more effective. This aligns with previous research showing a negative relationship between experience rating and sick leave or DI inflows (De Groot and Koning, 2016; Hawkins and Simola, 2024; Korkeamäki and Kyyrä, 2012; Kyyrä and Paukkeri, 2018; Prinz and Ravesteijn, 2020; Van Sonsbeek and Gradus, 2013), suggesting that experience rating can indeed enhance accommodation efforts. In Section 3.7, we explore possible alternative explanations for why accommodation rates do not increase, even though prior research generally finds that experience rating reduces DI inflow and increases employment.

Finally, in Appendix B.3 we explore the effects of the reform on specific types of accommodation. Generally, we find insignificant results on the grouped categories of accommodation. We do find evidence of substitution from workplace or equipment adjustments toward adjustments in work hours following the removal of experience rating for permanent employees.

3.6.3 Effect of experience rating on public sick leave insurance choice

Table 3.8, column 1, reports the estimated treatment effect of introducing experience rating on the likelihood of having an employer who opted out of public sick leave insurance. We only observe whether a firm opted out of public sick leave insurance for non-permanent employees, but not out of public partial DI or for permanent employees. The estimated effect is 28 percentage points, statistically significant at the 1% level. This is a substantial effect, especially considering that only 3% of firms had opted out in 2012 (Dumhs and Van Deursen, 2017).

One potential concern is that the survey data are collected at the employee level, while the decision to opt out is made at the firm level and applies to all employees. However, if the focus is on the number of employees working for an employer that opted out, rather than the number of firms opting out, the analysis remains appropriate. This is further supported by the fact that the survey targeted the entire population of nine-month sick-listed workers. Moreover, data from the NSII indicate that 31% of the total wage sum in 2015 was associated with employers who had opted out, compared to only 7% in 2013. These aggregate figures align with our estimate, further reinforcing the validity of the results.

The findings suggest that experience rating creates a strong incentive for employers to opt out of public insurance. This could reflect dissatisfaction with the reintegration services provided by the NSII, or a belief among firms that either they or private insurers can manage reintegration more effective and cost-efficient.

Relating this finding to accommodation, we observe that opting out and the likelihood of accommodation are positively associated. The regression coefficient for opting out is 10.8% (see Table 3.5), suggesting that being employed at a firm that has opted out is associated with a 10.81 percentage points higher likelihood of being accommodated. However, this association should be interpreted with caution, as we cannot disentangle whether the relationship reflects a causal effect of opting out or selection effects, that is,

Table 3.8: *DID results on opting out of public sick leave insurance*

	Dependent variable	
	opted out	opted out
	Sample	
	Non-perm.	Non-perm.
After	0.0724***	0.0790***
	(0.0210)	(0.0206)
Large/medium-sized	0.0000	-0.0109*
	(0.0000)	(0.0061)
After $\times$ Large/medium-sized	0.2398***	0.2352***
	(0.0265)	(0.0258)
Constant	-0.0000	-0.0081
	(0.0000)	(0.0213)
Controls	No	Yes
2008 included	No	No
Observations	2,236	2,236

Notes: The table reports the estimated coefficients of Equation 3.3, i.e., the DID analysis of the introduction of experience rating on being at an employer who opted out of public sick leave insurance. The control group consists of non-permanent employees at small firms and treatment of non-permanent employees at large and medium-sized firms. The controls are the same as column 1 of table 3.5, except for the exclusion of opting out as a control and the exclusion of separate wave dummies (except for After, the wave dummy for 2015). We assume that no firms had opted out before the reform (2012). Heteroskedasticity-robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

whether firms that already prioritize accommodation are more likely to opt out.

While we do not classify the increase in firms opting out as inherently positive or negative, it could have significant implications for the public insurance system. If low-risk firms predominantly opt out, high-risk firms remain in the public sick leave system, potentially increasing its financial strain. Conversely, if firms that opt out provide better reintegration and accommodation than those that remain, this could lead to improved workplace environments for employees.

3.7 Discussion: alternative explanations unchanged accommodation rates

Although most literature finds an effect of experience rating on DI inflow or employment, we do not find a significant effect of experience rating on the likelihood of accommodation for long-term sick-listed employees. Here, we explore different reasons as to why this may be the case.

A first explanation could be that experience rating is ineffective for long-term sick-listed workers because employers view accommodation measures as less effective at this stage than in the early phases of sickness or during prevention. By nine months of sick leave, many of the initial reintegration or accommodation activities, such as the legally required problem assessment and the action plan, may already have taken place. Employers of non-permanent employees may also be more concerned with the newly introduced first year sick leave evaluation, which occurs at 12 months, rather than with introducing further or adjusted accommodation at this late phase of sick leave.

Another possibility is limited employer awareness of the financial consequences of long-term sick leave or DI inflow. For instance, Koning (2009) found that a rise in DI premiums due to experience rating led to a 15% reduction in DI inflow the following year, suggesting that employers may not have been well informed either about the system of experience rating or the firm's disability risk exposure. Although this study was based on data from 2000-2002, shortly after the initial introduction of experience rating in the Netherlands in 1998, more recent findings suggest that awareness remained limited years later. Groenewoud et al. (2015) reported that in 2014-2015, 21% of employment agencies and 50% of other firms were not or minimally familiar with the experience rating system for non-permanent employees. The limited awareness may have weakened the potential effect of the reform, particularly for non-permanent employees. A counterargument can, however, be made here as Prinz and Ravesteijn (2020) and Koning et al. (2025) find that the BeZaVa reform as a whole had a large and immediate impact on DI inflow. This would imply that employers were clearly aware of the reform and adjusted accordingly to reduce DI inflow. Yet, these papers focus on the reform as a whole, including the stricter reintegration and monitoring requirements for non-permanent employees. Therefore, it could be that the awareness or understanding of the other measures exceeded that of experience rating, and that the responses to these measures resulted in lower DI inflow. Koning et al. (2025) also show evidence that most of their observed effect is driven by the monitoring measures rather than experience rating.

Related to employer awareness, it is also possible that the effect of the reform emerges only in the long term. This may be because employers were initially unaware of the reform and became informed over time, or because they were aware from early on but needed time to adapt their accommodation policies and practices. Yet again, the same counterargument applies, as the reform was found to have an immediate impact on DI inflow. However, it is possible that the reintegration and monitoring measures produced immediate effects, while the effects of experience rating through accommodation may take longer to become visible.

Yet, since the general literature finds a reduction in the DI inflow as response to experience rating, if there is no effect on accommodation, this could suggest that firms find other behaviors to reduce costs. Such behaviors could be selective hiring of healthier workers or putting more pressure on workers not to call in sick or apply to DI. As argued by Koning (2016), experience rating could lead to underreporting of sickness as a result of pressure by the employer. For worker's compensation, it has also recently been found that employer responsibility and experience rating can lead to claim suppression in Canada (Premji et al., 2025).

Finally, it remains possible that a small effect exists that falls below the detection threshold given our sample size, even though all nine-month sick-listed workers were invited to participate by the NSII. Given the careful study design to monitor the BeZaVa reform, issues of limited statistical power were not expected.

3.8 Robustness checks

We check the robustness of our DID results in a variety of ways. A first concern might be that in our analyses, we pool two types of non-permanent workers together: agency workers and workers with an ending temporary contract. It could be that this decision drives our results as these two types might have a different relation to their employer. This would mean that pooling them into one specification is not appropriate. To address this concern, we split the main DID analysis on non-permanent employees by type of contract. We do this for both dependent variables (accommodation and opted out). Table B.2 in Appendix B.2 reports all robustness checks on the DID analysis on workplace accommodation, while Appendix Table B.3 covers those on opting out of public sick leave insurance. In Appendix Table B.2, the first column reports the DID estimate on accommodation using the subsample of workers with an ending contract and the second column reports those of workers with an agency contract. This does not affect our results – our DID estimate remains insignificant. In Appendix Table B.3, we do the same but now with opting out of public sick leave insurance as dependent variable.

Column 1 reports the DID results on the sample of workers with an ending temporary contract and column 2 on the sample of agency workers. The DID coefficient remains statistically significant at the 1% level. The effect size remains relatively stable, as it is 21.75 percentage points for temporary workers and 25.6 percentage points for agency workers, compared to the pooled DID estimate of 23.52 percentage points. Hence, we do not see a substantial difference between temporary and agency workers.

Another potential limitation could arise from people who switch employers or become self-employed during the sick leave period, as this can cause confusion about the firm accommodation question and change the employer's incentives. In Table B.2 of Appendix B.2, column 3 (non-permanent workers) and column 4 (permanent workers) report the DID estimate on accommodation without these employees. The DID coefficient remains statistically insignificant. In Appendix Table B.3, column 3, we also take these employees out of the sample for the analysis on opting out of public sick leave insurance. Our DID estimate virtually remains the same.

During the nine months of sick leave, some employees may have received a different contract type. This might distort the accuracy of our results since this changes the employer incentives. Specifically, this concerns permanent employees who stayed at their initial employer during the nine months but received a non-permanent contract, and non-permanent employees who changed to a permanent contract. The first group is not recorded in our data, but the second group is. To safeguard against this distortion, we exclude these individuals from our analysis. We do this for our DID on accommodation for non-permanent employees in Appendix Table B.2, column 5 and for opting out in Appendix Table B.3 column 4. This exercise does not have any sizable affect our previously found results.

Finally, to verify that our results are not driven by our model specification in terms of treatment group selection, we use alternative specifications based on Koning et al. (2025) and Prinz and Ravesteijn (2020). Koning et al. (2025) estimate the effect of experience rating on DI inflow comparing non-permanent employees at small firms to large firms. When we apply this treatment group definition - excluding the medium firms and comparing large and small firms - our DID analyses on accommodation and opting out show again no significant effect of introducing experience rating on accommodation (see Appendix Table B.2, column 6, and Appendix Table B.3, column

5. For accommodation, we find a larger point estimate (9.25 percentage points) that is significant but only at the 10% level. For opting out, we also find an even larger point estimate of 30.2 percentage points. This seems to show that the effect is even larger for firms who are exposed to full rather than partial experience rating.

Koning et al. (2025) also examine the effect of the total reform (so the alignment of financial incentives and the monitoring measures) by comparing all non-permanent employees to all permanent employees in a DID analysis. Column 7, Appendix Table B.2 shows that the point estimate of the effect of the total reform on the accommodation rate of non-permanent workers compared to permanent workers is even slightly negative, but remains insignificant.[6]

Prinz and Ravesteijn (2020) compare agency workers at large firms to all permanent workers to estimate the effect of experience rating on DI inflow, also exploiting the BeZaVa reform. In column 8, Appendix Table B.2 the estimates of a DID analysis imitating their treatment and control groups are reported.[7] We find a significant (at the 1% level) and very sizeable positive effect: a 15.14 percentage points increase in the average accommodation rates of agency workers at large firms, compared to permanent workers. However, this result should be interpreted with caution. First, the sample of agency workers at large firms is very small, especially compared to the control group. Second, the control group is not a clean control as the incentives for employers of permanent employees were also altered during this period—experience rating was partially eliminated for small and medium-sized firms.

To summarize, our results remain robust against a variety of robustness checks. On one occasion, our results are not the same. Replicating the model specifications of Prinz and Ravesteijn (2020) does change our results, but we argue that this specification is not suited to our research question.

3.9 Conclusion

The employment rate of disabled individuals in OECD countries remains significantly lower than that of individuals without disabilities, while public expenditure on sickness and disability accounts for a substantial portion of GDP (OECD, 2022, 2023a). Em-

[6]We cannot run this robustness check for opting out as it involves permanent employees, who do not have public sick leave insurance.

[7]Again, we cannot run this robustness check for opting out as it involves permanent employees.

ployers play a crucial role in addressing these challenges by creating disability-inclusive workplaces to enhance the labor market outcomes of disabled workers. This chapter examines the impact of extending a government-mandated employer incentive—experience rating—to non-permanent employees on workplace accommodation efforts for long-term sick-listed employees.

Our analysis reveals no statistically significant effect of shifting the costs of sick leave and partial DI toward or away from firms through experience rating on employer accommodation for nine-month sick-listed workers, regardless of whether they hold permanent or non-permanent contracts. However, we find a significant increase in the number of employers of non-permanent employees (specifically, those at large and medium-sized firms) opting out of public sick leave insurance after the reform. Additionally, our results highlight notable patterns in the determinants of accommodation. While non-permanent employees are less frequently accommodated, the factors influencing accommodation for both non-permanent and permanent employees are largely similar.

These findings carry important implications for countries grappling with firm moral hazard—namely, the reluctance of firms to support sick-listed and partially disabled workers. Our results suggest that experience rating does not achieve the desired effect of increasing accommodation rates for long-term sick-listed workers. This raises questions about whether employer responsibility should extend to such workers or perhaps only to the initial stages of sickness or disability. This holds particularly given that the severity of their disabilities may limit the effectiveness of accommodation efforts and that in response, employers may seek other measures to reduce DI inflow such as selective hiring or pressuring workers not to apply. Further research is needed to determine whether experience rating improves preventive accommodation efforts or reintegration measures for short-term sick-listed workers. Moreover, further research could examine how BeZaVa affected DI inflow and employment for long-term sick-listed workers changed as result of experience rating. This would help clarify whether employers responded to the reform through alternative channels other than accommodation. Additionally, the limited effectiveness of experience rating may stem from a lack of awareness among firms, highlighting the potential benefit of initiatives aimed at increasing employer understanding of the system or simplifying the system. Simplifying the system is also one of the major recommendations of a recent policy report covering the entire Dutch

DI system (OCTAS, 2024).

Moreover, our findings indicate that firms opting out of public sick leave insurance are more likely to provide accommodations, reflecting possible dissatisfaction with the public reintegration process. This suggests that a system in which firms bear financial responsibility through experience rating while reintegration is managed by public entities may not be optimal. Transferring both financial responsibility and reintegration efforts to firms could merit consideration.

Finally, policymakers should carefully consider our findings on the determinants of accommodation, which suggest disparities in the likelihood of employees receiving accommodations. Ensuring equitable access to accommodation should remain a priority in designing policies to address these issues, for instance through providing accommodation subsidies or more support for firms that deal with workers with sickness or disability.

Chapter 4

Application and Employment Effects of Reduced Screening for Disability Insurance Benefits of Older Workers

This chapter is based on Jansen et al. (2026). It is joint work with Max Groneck, Pierre Koning, Marcel Spijkerman, and Raun van Ooijen. A summary of this study has been published as an UWV-Kennisverslag (in Dutch) (Jansen and Spijkerman, 2025). We are grateful for the comments and suggestions by Lieke Beekers, Anne Gielen, Jan Möhlmann, Bram Wouterse, Martin Salm, and participants of the 3rd Dutch Health Econometrics Workshop. We also acknowledge UWV for providing data. This project was financially supported by Netspar through the theme grant 'Work in old age and when disabled: The role of employer responsibility' (2022).

4.1 Introduction

Across many OECD labor markets, employment rates of older workers remain considerably lower than those of prime-age workers (OECD, 2025). With rising pensioning ages, these gaps in employment rates are often used to justify age-specific eligibility rules that lower the threshold for disability insurance (DI) among older workers. For example, in Austria, DI eligibility above age 60 is assessed relative to a similar prior occupation rather than any reasonable occupation, as applies to those below age 60 (Haller et al., 2024; Ahammer and Packham, 2025), and DI benefits formulas in many systems are dependent on age and contributing years (OECD, 2022). These age-specific eligibility rules obviously come with a clear policy dilemma: weaker labor market prospects at older ages may raise the welfare value of benefits and argue for reduced screening or higher coverage, but a full assessment must also consider moral hazard: i.e., higher applications (ex-ante moral hazard) and lower employment (ex-post moral hazard).

This chapter examines the ex-ante and ex-post moral hazard effects of reduced DI screening for older workers in the Netherlands. In October 2022, the Dutch government implemented a policy reform for DI applicants aged 60 years and older; at the end of the two-year sickness period this group can opt for a so-called ‘fast-track’ DI application procedure with reduced screening. Although this measure was prompted by persistent shortages of insurance physicians and the resulting long waiting times for applications, there was a broad consensus that the fast track should be targeted at the group of elderly workers who are close to retirement. Under the regular route, after two years of sick leave, applicants are assessed by an insurance physician and a vocational expert who determine the degree and permanence of disabilities. Under the fast-track process, however, no medical assessment is conducted, and the award decision depends solely on the degree of recovery as reported in the reintegration report at the end of the sickness period. Specifically, when workers have resumed their work for less than 65% of the pre-sickness earnings, they are automatically granted full DI benefits until retirement. This implies that, in practice, the reform functions as an early-retirement scheme, weakening older workers’ attachment to the labor market and potentially conflicting with goals for sustainable employment. Given that work incentives under the full DI scheme are much weaker than under the partial DI scheme, work incentives for (former) partially disabled workers are lowered substantially. Overall, the policy reform thus combines reduced screening with higher benefits for older workers with remaining earnings capacity.

We use unique administrative records from the Dutch National Social Security Institute (NSII) with information on long-term sick-leave spells (42 weeks and above) and DI applications and awards, data not typically available in the standard Statistics Netherlands micro-data. We use a difference-in-differences (DiD) framework comparing workers aged 60–64 (treated) to those aged 55–59 (control) at the end of the sickness period, across pre- and post-reform cohorts of 42-week sick-listed workers. The pre-reform sample includes spells starting between January 1, 2019 and September 30, 2020, ensuring that the end of the sick leave period falls before October 2022. The post-reform sample includes spells starting between May 1, 2021 and December 31, 2021. Because DI applications can be filed only in weeks 88-93 of sick leave and fast-track registration was incomplete through December 2022, the first affected applications in our sample occurred in January 2023, and the final affected applicants in August 2023. As about a quarter of this sample of 42-week sick-listed workers apply after two years of sickness, our estimates are intention-to-treat effects.

To interpret our estimates, we distinguish mechanical from behavioral moral hazard effects. The mechanical effect arises holding application behavior fixed. Among applications, the award rate increases automatically because individuals eligible for the fast-track measure bypass the medical assessments and are directly granted full temporary DI if they meet the $<65\%$ earnings resumption requirement. This mechanically raises the award rate and reallocates cases from partial and full permanent DI to full temporary DI. Behavioral (moral hazard) effects operate along two margins. First, ex-ante moral hazard (application responses): lower screening costs and greater certainty may raise applications after two years of sick pay. Second, ex-post moral hazard (labor supply responses): more sick-listed workers receive DI benefits due to the reform, which in turn lowers work incentives. In addition, workers with residual earning capacity who might have pursued partial DI instead selected into full DI, which also imply negative labor supply incentives potentially reducing employment and hours worked. We expect ex-ante application responses to emerge only after implementation, due to learning by applicants, employers, and caseworkers. Since the first affected applications in our sample occurred in January 2023, we report results for the full post-reform period, as well as for two separate windows: an early window (January-April 2023) and a later window (May-August 2023).

Our results show that the reform substantially increased the number of full DI awards, with only modest application responses. In the early window (January-April 2023), the increase is driven by mechanical effects: applications remain essentially unchanged, while the award rate rises by 5.3 percentage points, relative to the pre-reform baseline of 28.7%. In the later window (May-August 2023), applications respond; the application rate increases by 2.4 percentage points relative to the pre-reform baseline of 39.6%, and awards rise further, resulting in a total increase of 7.5 percentage points compared to non-treated individuals. Consistent with the mechanism, the fast-track shifts awards away from partial and full permanent DI toward full temporary DI. Evidence consistent with moral hazard responses are more pronounced in labor supply than in DI application behavior. One year after the end of the sick leave period, employment falls by 2.1 percentage points, and the earnings response implies a 31% crowd-out effect, consistent with weaker work incentives under full temporary DI. Effects differ substantially across subgroups: application rates increase for women but not for men, and awards increase most among workers in the lowest pre-disability earnings quintile.

This chapter makes two major contributions. First, we provide the first evidence on a reform that reduced DI screening targeted at older workers.[1] Prior studies examined stricter DI screening via medical reviews (Campolieti, 2002; Liebert, 2019), procedural requirements (such as compulsory dialogue meetings with family doctors and employers) (Markussen et al., 2017), or reintegration requirements (De Jong et al., 2011; Godard et al., 2024)[2] and find reduced inflows and higher labor force participation. We complement this literature by showing how reduced screening increases both inflows and the composition of awards, and also reduces labor supply among older workers at the gateway to DI. In doing so, we speak directly to the role of administrative capacity in aging societies facing rising disability inflows and physician shortages. Second, by separating mechanical from moral-hazard effects and quantifying impacts on applications, award composition,

[1]An exception is Autor and Duggan (2003), who studied a 1984 U.S. reform that reduced screening strictness and, together with more generous benefits, substantially increased the likelihood of high school dropouts seeking employment.

[2]The evidence on reintegration obligations for the Netherlands points in the same direction for non-medical tightening: intensified screening in the sickness period before the DI award decision reduced long-term sick leave and DI applications, and the 2002 Gatekeeper Protocol, which added checks and required reintegration, reduced applications by about 40 percent (Godard et al., 2024).

and employment in a single empirical framework, we clarify how screening policies shape take-up and employment near retirement in an aging labor market.

With our analysis, we also add to broader and related strands of literature. The first one examines the effects of changes in eligibility rules on benefit take-up and employment outcomes. Theoretical work argues that tightening eligibility rules leads not only to a mechanical DI award reduction, but also a behavioral one: fewer individuals apply to DI (see e.g. Haller et al., 2024; Jansen, 2025). Empirically, it is found that consistently tightening eligibility criteria leads to lower DI use and higher employment rates. For Austria, Staubli (2011) and Ahammer and Packham (2025) show that stricter eligibility reduces take-up and raises employment; Karlström et al. (2008) report analogous effects for Sweden. A separate set of papers varies statutory generosity and estimates earnings offsets among recipients. Dutch evidence indicates large offsets of tighter eligibility rules: one euro less in DI benefits increases earnings by roughly 60-65 cents (Borghans et al., 2014; Garcia-Mandicó et al., 2020). US estimates are smaller, with a one-dollar increase in DI reducing earnings by about 20 cents (Gelber et al., 2017). Our setting maintains a fixed generosity level but varies the assignment across different types of DI, with varying work incentives, allowing us to isolate the effect of screening-induced reallocation on behavior.

The second strand of literature estimates the labor-supply effects of DI receipt. A substantial literature uses quasi-experimental variation to measure the employment response to receiving DI. Bound (1989) proposed using the labor supply of denied applicants as an upper bound on the counterfactual for recipients, an approach extended by Von Wachter et al. (2011). Other studies exploit variation in rules and adjudication processes (Gruber and Kubik, 1997; Deshpande, 2016; Moore, 2015; Autor et al., 2019) or examiner leniency (French and Song, 2014; Maestas et al., 2013). Across these designs, US employment crowd-out ratios typically range from 20 to 26 percent. We provide the first corresponding estimate for the Netherlands in a context of reduced screening, linking take-up and work responses within a single empirical framework.

The rest of this chapter proceeds as follows. Section 4.2 describes the institutional details of the Dutch DI system and the fast-track measure. Section 4.3 presents the data, and Section 4.4 our DiD-approach. Section 4.5 reports estimation results and heterogeneity analyses. Section 4.6 concludes.

4.2 The Dutch DI system and the fast-track for older workers

The Dutch system distinguishes a two-year period of sick leave (weeks 0-104) from subsequent DI assignment. During sick leave, the employer (or, in specific cases, the National Social Insurance Institute; NSII)[3] pays at least 70% of the worker's pre-illness wage and both parties must follow a legally codified reintegration trajectory (the Gatekeeper Protocol). Taken together, these checkpoints constitute an elaborate, compliance-intensive procedure that demands sustained effort, documentation, and coordination from both employer and workers:regular medical assessments, written plans, progress logs, and formal notifications, with potential sanctions for non-compliance. If full return to work has not occurred by the end of 104 weeks, the sick-listed worker reaches the DI gateway: a reintegration report is reviewed and, if complete, the sick-listed worker proceeds to DI assessment; if reintegration efforts are insufficient, sick leave can be extended by up to one year. A detailed timeline appears in Appendix C.2.

4.2.1 DI application, assignment, and work incentives

In the Netherlands, DI comes after a mandatory two-year period of employer-paid sick leave. Around week 88, sick-listed workers receive an invitation from the NSII and must submit their DI application within six weeks. The actual eligibility assessment then takes place at the end of the two-year waiting period (EWT) at week 104. At that point, the reintegration report is reviewed and, if complete, the case proceeds to a medical and vocational assessment to determine eligibility and benefit type.

Under the regular route, an NSII insurance physician and a vocational expert jointly determine the permanence and degree and of work disability, defined as the expected income loss relative to pre-disability wages, based on detailed examination of functional limitations, prognosis, and job opportunities. Unlike the United States, where Social Security disability is essentially binary, the Dutch system is tiered. Cases with an assessed loss below 35% receive no DI; losses between 35-80% qualify for partial DI; losses between 80-100% qualify for full DI, split into full temporary (reassessment possible)

[3]In certain cases, the NSII pays sick leave benefits directly, such as for non-permanent workers whose contract expires, employment-agency workers, and for specific groups of workers, including pregnant workers. For an overview of the cases in which the NSII pays sick leave benefits, see for instance Jansen et al. (2025).

and full permanent (no reassessment). These tiers embed distinct work incentives.

Across DI types, recipients may work, and earnings interact with benefits through a wage-related schedule: each euro of earnings reduces the benefit by 0.70 euros, so total income still rises with work but the implicit tax rate is high. Eligibility ends once earnings exceed about 65% of the pre-disability wage under partial DI and full temporary DI, and 20% under full permanent DI. Partial DI embeds the strongest, so-called, use capacity requirement. After the initial wage-related entitlement period, the continuation phase conditions access to the wage-related formula on earning at least 50% of residual capacity; otherwise the award switches to a flat amount linked to the minimum wage. Full temporary DI applies the same wage-related schedule but removes the 50% condition, weakening intensive-margin incentives relative to partial DI. Full permanent DI pays slightly more at a given earnings level but imposes the tight 20% cap, leaving little scope for work without loss of eligibility. Reassessments are possible under partial and full temporary DI and not under full permanent DI, but not uncommon due to shortages of insurance physicians. Exact schedules are provided in Appendix C.3.

4.2.2 The 60+ fast-track measure

Between October 2022 and December 2024, workers aged 60 and older who reached the end of the two-year sick-leave period could be routed to a simplified DI assessment. This is relevant for both workers with permanent contracts who are still formally employed and workers whose fixed-term contracts have ended during sick leave or were unemployed at the start of sick leave. Instead of the usual medical examination, a vocational expert could grant DI if current (actual) earnings were no more than 65% of pre-sickness earnings. Permanent disability cases could still be medically reviewed, but in practice this was rare.

In this context, current earnings are inferred from the mandatory reintegration reports that are handed to the NSSI and assessed by a vocational expert only. Suspected full-permanent cases can still be examined for permanence, but in practice fast-tracked cases are rarely reassessed later. The measure therefore removes the much more extensive and time demanding physician-vocational-expert allocation step at the DI gateway, shortens delays, and reduces uncertainty about the award.

The reform operates essentially through two channels. The first is mechanical: replacing screening with a uniform default at week 104 should raise acceptance among applicants and shift awards away from partial and full permanent DI toward full temporary DI. The second is incentive-based and takes the form of moral hazard on two margins. On the application margin, lower screening costs and greater certainty can encourage more sick-listed workers to file a claim (application or ex-ante moral hazard). On the type margin, workers with residual capacity who would have pursued partial DI may select into full temporary DI, which does not require earning at least half of residual capacity (type-substitution moral hazard).[4]

Overall, the fast-track thus implies testable predictions. Mechanically, acceptance should rise at the week-104 gateway and the award mix should tilt from partial or full permanent DI toward full temporary DI. On incentives, applications should increase where screening costs were highest, and labor supply should fall for claimants who, absent the reform, would have been placed on partial DI. Because counterfactual DI types are unobserved, we infer these margins from compositional shifts at the gateway and from heterogeneity across groups with different ex-ante probabilities of partial versus permanent assignment, and we report intention-to-treat effects.

4.3 Data

4.3.1 Data sources and sample selection

We combine several unique administrative data sources provided by the NSII. Our main data sources are the sick leave register of the Sickness Act and the 42-week administration records, in which employers report sick-listed employees after 42 weeks of sick leave. These datasets record the job sector and the start date of sick leave, as well as demographic information, including gender, date of birth, and if applicable, date of death. The sick leave records are linked to the DI application register of the NSII. This register contains the DI award decision (approval or denial), the decision date, and the type of DI granted (partial, full temporary, full permanent or full temporary via the fast-track procedure). We merge this with employment records from the NSII labor income register, which report monthly total labor income and monthly hours worked.

[4]There is also a potential offset: for claimants who would have been placed on full permanent DI, the earnings cap is higher under full temporary DI (65% versus 20%), which can increase work at the intensive margin. Given that employment rates in both schemes are comparably low, however, these effects are most likely negligible.

We construct our sample by restricting to sick leave spells lasting at least 42 weeks. Left-censoring at this cutoff yields consistent samples of permanent workers and workers covered by the Sickness Act.[5] Depending on the start of the sick leave period, we distinguish between pre- and post-reform samples.[6] The pre-measure sample includes all sick leave spells starting between January 2019 and up to and including September 2020; this means that that all end-of-waiting time (EWT) dates in this sample (exactly two years after the start of sick leave) are before October 2022, when the fast-track procedure started. The post-measure sample includes spells starting between May 2021 up to and including December 2021. To examine whether behavioral responses emerged immediately or only after workers had time to adjust, we split the post-reform sample into *early* and *late* cohorts. The early cohort consists of sick leave spells starting between May 1 and August 31, 2021. These individuals had completed at least 17 months of sickness when the reform was introduced in October 2022 and could first apply for DI from January 2023 onward, implying about three to six months to adjust their behavior. The late cohort includes spells starting between September 1 and December 31, 2021. These individuals had been sick for about 13–16 months at reform onset and reached the end of waiting time between May and August 2023, allowing roughly seven to ten months of adjustment.

Ideally, for the post-reform sample, we would have included all sick leave spells applying from October 2022 onward. However, the NSII registration of the fast-track measure was inconsistent until January 2023. To avoid including cases that may have been (mis-)assessed before 2023, we only include sickness spells that started on or after May 1, 2021. DI applications can be submitted between week 88 and 93 of a sickness spell, so spells starting from May 2021 onwards could not have reached the DI assessment stage before January 2023. By restricting the sample in this way, we ensure that all observed fast-track cases are assessed in the period with complete and consistent fast-track registration. Given these administrative assurances and our sample restriction, we do not expect remaining measurement issues in the fast-track variable for the analysis

[5]As explained earlier, permanent workers are registered by the NSII following the 42-week absence notification, whereas workers covered by the Sickness Act must report sick to the NSII within two days.

[6]By taking starting dates to determine the end of the two-year sick leave period, we avoid overlap between treatment groups. We also account for inconsistent recordings of fast-track procedure cases in the initial months.

sample.

Moreover, since we have employment data up to December 2024, we only select sick leave spells starting before 2022, implying at least three years of employment records and at least one year of post-EWT data.

To make treatment and control groups more comparable, we also restrict our sample to sick leave spells of workers aged 55 or older at the EWT moment. In addition, we apply several other sample restrictions related to missing key covariates. All sample restrictions are reported in Table 4.1, along with their effects on sample size. For a more detailed description of the sample selection and cleaning process, we refer to Appendix C.4. The final sample comprises 128,172 sick leave spells.

Table 4.1: *Sample restrictions*

Sample restrictions	Observations	Difference	% initial sample
1. All unique sick leave spells and DI applications in initial dataset	1 322 456	−150 536	100.00
2. Excluding sick leave spells outside of time period restrictions	505 496	−816 960	38.22
3. Excluding sick leave spells without income records although recorded as permanent employee	505 368	−128	38.21
4. Excluding sick leave spells without date of birth recorded	501 903	−3 465	37.95
5. Deleting sick leave spells where fast-track procedure was recorded in the pre-measure sample or for individuals < 60	501 889	−14	37.95
6. Excluding sick leave spells without gender recorded	501 878	−11	37.95
7. Excluding sick leave spells where individual's age at EWT is < 55 or ≥ 65	128 172	−373 706	9.69

Notes: Stepwise sample restrictions. *Observations* report the number of spells remaining after each restriction; *Difference* reports the change relative to the previous row; Percentages give the share of the initial sample remaining.

4.3.2 Descriptive evidence

Table 4.2 reports summary statistics for the two samples, before (column 1) and after (column 2) the fast-track measure was introduced, respectively. The sample size of the pre-reform sample (92,729 sick leave spells) is larger than that of the post-reform sample (35,443 sick leave spells), due to the longer inclusion period of the former. The top panel of Table 4.2 focuses on our dependent variables: *i*) DI application and award outcomes, *ii*) DI benefit types, and *iii*) employment outcomes. Regarding the DI application and

Table 4.2: *Summary statistics of pre- and post-reform samples*

	Pre-reform		Post-reform	
	Mean	SD	Mean	SD
Main Outcome Variables				
DI outcomes				
DI Application	0.396	0.489	0.379	0.485
DI Award	0.287	0.452	0.290	0.454
Employment outcomes, one year after EWT				
Monthly labor earnings (euros)	1 634	2 301	2 044	2 774
Monthly work hours	68.16	76.22	72.63	85.24
Employed	0.526	0.499	0.550	0.497
DI benefit type (in %)	*100.0*		*100.0*	
No DI	17.8		12.4	
Partial DI	15.0		7.1	
Full temporary DI	24.2		13.0	
Full permanent DI	33.2		26.4	
Full temporary via fast-track	0.0		30.0	
Unknown outcome	9.7		11.1	
Background characteristics				
Age at EWT	60.0	2.855	60.1	2.860
Female	0.509	0.500	0.528	0.499
Registration (in %)	*100.0*		*100.0*	
Sickness Act	26.8		22.9	
42-weeks registration	73.2		77.1	
Job sector, one year before sick leave (in %)	*100.0*		*100.0*	
Industry	19.4		18.0	
Wholesale and retail	10.2		10.3	
Transport	8.0		7.5	
Services	17.3		17.1	
Public	45.1		47.1	
Observations				
Sick leave spells	92 729		35 443	
Early			19 242	
Late			16 201	

Notes: Summary statistics for the pre- and post-reform cohorts. The upper panel presents the main outcome variables: DI outcomes, employment outcomes one year after the end of the waiting period, and the distribution of DI benefit types. The lower panel reports background characteristics, including demographics (age and gender), registration type, and job sector. Percentages within categorical variables sum to 100 in each category. The post-reform cohort is further split into *early* (sick leave spells starting May 1–August 31, 2021) and *late* (September 1–December 31, 2021) groups, as defined in the main text.

award outcomes, 39.6% of the sick leave spells resulted in a DI application before the procedure was introduced, compared to only 37.9% after. The DI award variable equals zero when no type of DI is awarded, including cases with an unknown application outcome (9.7% before and 11.1% after the implementation of the fast-track, as a share of all DI applications). It equals one when any type of DI is awarded. The total award percentage increased slightly after the procedure was introduced, from 28.7% to 29.0%. This pattern suggests that any behavioral effect of the measure on DI applications is not visible at the aggregate level, and the modest increase in awards may instead reflect a mechanical effect on the acceptance rate.

Turning to the benefit outcomes, we find that full permanent DI was most often awarded before the fast-track procedure (33.2%). However, its frequency decreased thereafter to 26.4%. Instead, full temporary DI awarded through the fast-track measure became the most common type after the policy change, accounting for 30.0% of all applications. The proportion of cases with no DI awarded declined significantly, from 17.8% to 12.4%. Finally, employment outcomes show significant increases in total labor earnings, hours worked, and employment rate. This likely reflects wage inflation and favorable labor market trends at the end of the COVID-pandemic.

The bottom panel of Table 4.2 presents summary statistics for our controls and demographic variables. Before the fast-track measure was implemented, 50.9% of sick leave spells comprised women, increasing slightly to 52.8% afterward. Average age at EWT remains stable at approximately 60 years. Most sick leave spells originate from the 42-weeks registration (of permanent workers) rather than the Sickness Act registration, with 73.2% before the measure and 77.1% after the measure. The most common job sector of the (previous) employment position of sick-listed workers in the calendar year before sick leave was the public sector (45.1% before and 47.1% after the measure).

4.4 Empirical strategy

The fast-track measure was introduced exclusively for workers who are at least 60 years old at their EWT date, enabling the use of a difference-in-differences (DiD) design. We compare individuals above and below this age threshold, and in cohorts with EWT dates before and after the reform. We use our data on long-term sick leave spells from our pre-and post-measure samples as defined in the previous section. We estimate the following general equation:

$$y_i = \alpha + \beta_1 I\,(age_i \geq 60) + \beta_2 I\,(t_i + 24 \geq t^*) + \beta_3 I\,(age_i \geq 60) \cdot I(t_i \geq t^*) + \beta_4 I(t_i > 2020) + \epsilon_i, \quad (4.1)$$

where y_i represents the outcome variable for an individual i with a sick leave period beginning at time (in months) t_i and with age_i at the time of the EWT (exactly two years after the start of sick leave, i.e., $t_i + 24$). t^* corresponds to October 2022, the month the reform was implemented. Only 2.2% of individuals in our sample has multiple spells in the time period under investigation.[7] The treatment group dummy takes on the value of one for individuals aged 60-64 at their EWT date, and is zero otherwise; the corresponding parameter is β_2. The time dummy corresponding to parameter β_2 equals one for sick leave spells in the post-measure period, and is zero otherwise. β_3 resembles the treatment effect of the fast-track procedure. Finally, β_4 is a dummy capturing sick leave spells that started in 2020, capturing possible year-specific effects, and ϵ_i denotes the error term of the sick leave spell of individual i which is assumed to be identically and independently distributed.

Our DiD approach relies on three identifying assumptions: parallel trends, no spillovers, and exogeneity of treatment status. The parallel trends assumption states that, when the fast-track procedure would not have been introduced, the treatment and control group would have followed the same outcome trends in the post-measure time period. While this assumption cannot be formally tested, we eyeball for all relevant outcome variables whether the trends of the treatment and control group were similar before the introduction of the measure. Alongside this, we conduct placebo treatment tests: instead of defining our post dummy as being zero for sick leave spells that start on or after the 1st of May 2021, we define two placebo dummies for sick leave spells that started in or after May 2019 and May 2020. We interact these dummies with the treatment indicator and re-estimate the DiD model using only the pre-measure data. Significant interaction terms in these placebo tests would suggest violations of the parallel trends assumption prior to the introduction of the measure.

The second assumption underlying our causal interpretation is that there were no

[7] To assess the impact of multiple spells per individual on our results, we performed robustness checks excluding individuals with multiple spells, as well as analyses including them but clustering standard errors at the individual level. Neither approach altered our findings.

spillovers of the measure to the control group of individuals between the age of 55 and 60. We argue that these spillovers are unlikely to have occurred, as insurance physicians were instructed to keep the same medical review for DI applications going through the normal screening procedure. Given that the macro-impact on labor supply of workers was limited, general equilibrium effects on the labor market were most likely negligible as well.

Finally, we assume that treatment status is an exogenous outcome. While age is exogenous in this context, the key question is whether the timing of sick leave, which in turn determines the EWT date, could be manipulated. This is not the case: all individuals in our sample had sick leave spells starting before October 2022. Accordingly, they were unaware of the measure when they called in sick initially. Moreover, it was not possible to manipulate the EWT date by voluntarily extending sick leave, as the original EWT date determined access to the measure.

4.5 Results

4.5.1 DI applications and awards

This subsection examines whether the introduction of the fast-track procedure increased the number of DI applications through behavioral responses, or whether the observed rise in DI awards primarily stemmed from the mechanical effect of reduced screening. An increase in DI applications would suggest ex-ante moral hazard, with individuals who previously did not expect to qualify now choosing to apply. In contrast, if DI awards increased mainly because the fast-track made benefits easier to obtain for existing applicants, this suggests that the current reintegration process, particularly the Gatekeeper Protocol, effectively deterred additional individuals from applying.

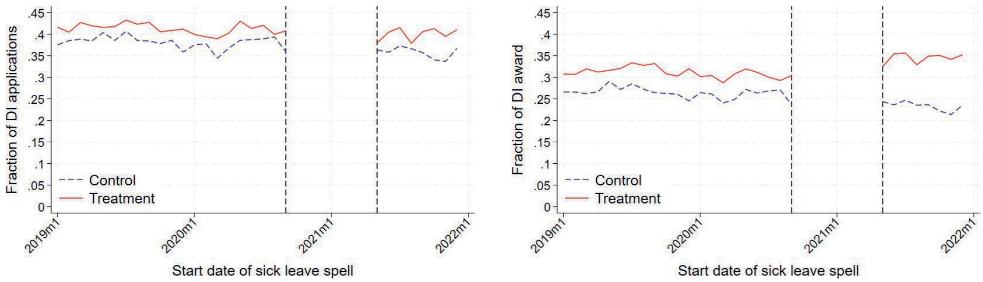
Since DI applications can only be filed after two years of sick leave (the end of the waiting period, EWT) and award decisions follow with some delay, we do not expect immediate behavioral responses to the fast-track reform. Ex-ante moral hazard in the form of increased applications can only materialize once sick-listed workers have had time to adjust their expectations and behavior. To capture this, we distinguish between the full post-reform sample and two subsamples that differ in the adjustment period available at the time of reform. The early window (sick leave spells starting May–August

2021) reached the EWT between January and April 2023, implying three to six months to adjust after the reform's introduction in October 2022. The later window (spells starting September–December 2021) reached the EWT between May and August 2023, leaving seven to ten months to adjust.

For our DiD estimates to be interpreted as causal, the parallel trends assumption must hold for both DI applications and awards. Therefore, Figure 4.1 shows the fraction of long-term sick leave periods (longer than 42 weeks) that result in DI applications and awards of individuals 55-59 years of age (control group, blue line) and 60-64 years of age (treatment group, red line). Recall that accurate data on applications and awards are missing between October 2022 and December 2022, explaining the 'donut hole' in the figures of both panels. Both outcomes appear to display parallel pre-reform trends and the widening difference indicates a slight increase in the application rate. The rise in the award rate following the reform appears much more substantial. As a more formal test, we conduct a placebo analysis on the pre-reform data, assigning placebo treatment dates to sick leave spells starting in or after May 2019 and May 2020. Appendix Table C.1 reports the results, which show that the placebo treatment indicators are statistically insignificant for both outcomes.

Although the parallel trend appears consistent in the pre-treatment period, a remaining concern is the potential influence of COVID-19 on DI applications and awards, given that the pandemic generally affected older workers more severely. Our difference-in-differences design should absorb such shocks as long as COVID-19 influenced the treatment and control groups similarly before and after the reform. However, evidence indicates that the share of DI applications listing COVID-19 as the primary diagnosis was higher in 2023 than in 2021–2022 (Schreuder and de Vries, 2024), suggesting that COVID-19 may have been less severe in the pre-reform than in the post-reform period, and that this pattern was stronger for the older treated sample. If so, COVID-19 would have raised DI-application rates among the treated group more strongly after the reform, biasing our estimates upward and implying that the reported effects may represent an upper bound of the reform's true impact. Nonetheless, the scale of this potential bias is likely limited: only around 5% of all DI awards between 2022 and 2024 listed COVID-19 or long-COVID as the primary diagnosis (Tweede Kamer der Staten-Generaal, 2025), and any differential effects between the 55-60 and 60-65 age groups are expected to be small given the narrow age range.

Figure 4.1: *DI applications and awards among 42-week sick-listed workers*



(a) Disability insurance applications (b) Disability insurance awards

Notes: Share of sick leave spells ≥42 weeks that resulted in a DI application (a) or DI award (b). The treatment group (red) are individuals aged 60–64 at the end of the waiting period (EWT), eligible for the fast-track; the control group (blue) are individuals aged 55–59. We exclude spells starting between Sep 2020 and Apr 2021 to prevent treatment overlap and outcome misclassification.

Table 4.3 presents the DiD estimates for DI applications and awards, following from Equation 4.1. Column 1 reports the results for the full post-reform sample. The introduction of the fast-track procedure increased the likelihood that a sick leave spell would lead to a DI application by 1.2 percentage points. Given a baseline application rate of 39.6%, this represents a modest 3% relative increase. This suggests limited behavioral response in terms of application behavior over the full period. By contrast, the effect on the DI award rate is considerably larger; it increased by 6.5 percentage points, corresponding to a 22.6% increase relative to the pre-reform mean of 28.7%. Since the increase in awards (6.5pp) by far exceeds the increase in applications (1.2pp), this suggests that, over the full period, most of the additional DI awards were driven by an increased acceptance rate, i.e., a mechanical effect from bypassing medical screening, rather than a large behavioral response in benefit take-up.

To capture potential delays in behavioral responses, we divided the post-reform sample into an early cohort with 3–6 months to adjust and a later cohort with 7–10 months to adjust. Columns 2 of 3 of Table 4.3 display the results separately for these periods. In the early post-reform period, we find that the award rate increased by 5.3 percentage points, with no statistically significant change in the application rate. This indicates that initial effects were primarily mechanical. In the later post-reform period, however, we do observe a behavioral response: the application rate increased by 2.4 percentage points, and the award rate rose by an additional 2.2 percentage points above the initial mechanical effect. Taken together, this implies a total increase of 7.5 percentage points in DI awards relative to non-treated individuals. These patterns indicate that the fast-track reform not only mechanically increased DI awards by lowering screening barriers but also induced additional applications over time, consistent with the presence of ex-ante moral hazard.

Table 4.3: *DiD results for DI applications and awards: full sample, early, and late cohorts*

	Full sample		Early applicants		Late applicants	
	DI appl.	DI award	DI appl.	DI award	DI appl.	DI award
Treatment × Post	0.012**	0.065***	−0.002	0.053***	0.024***	0.075***
	(0.006)	(0.006)	(0.008)	(0.008)	(0.008)	(0.007)
Treatment	0.032***	0.047***	0.032***	0.047***	0.032***	0.047***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Post	−0.029***	−0.036***	−0.020***	−0.028***	−0.036***	−0.042***
	(0.005)	(0.004)	(0.006)	(0.005)	(0.006)	(0.005)
Year = 2020	−0.012***	−0.013***	−0.012***	−0.013***	−0.012***	−0.013***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Intercept	0.385***	0.268***	0.385***	0.268***	0.385***	0.268***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Observations	128 172	128 172	108 930	108 930	111 971	111 971
Pre-reform average	0.396	0.287				

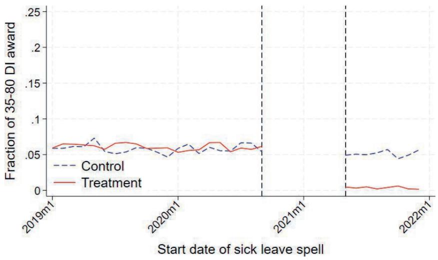
Notes: Difference-in-differences (DiD) estimates of Equation 4.1. Heteroskedasticity-robust standard errors in parentheses. The "pre-reform average" reports the mean of the dependent variable before the introduction of the fast-track measure (full sample). The post-reform sample is split into an *early* cohort (3–6 months to adjust at reform onset) and a *late* cohort (7–10 months to adjust). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.5.2 Types of DI benefits

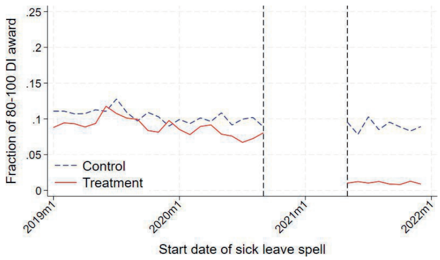
Knowing that there is an overall increase in DI awards following the introduction of the fast-track procedure, we next examine how the reform affected the composition of DI benefits awarded. We distinguish between partial DI, full temporary DI, full permanent DI, and full temporary DI awarded via the fast-track procedure (see Section 4.2). Since the reform effectively replaced the standard procedure for many applicants, we expect crowding-out effects to full and temporary benefits through the fast-track.

Figure 4.2 plots the shares of each benefit type awarded out of all sick leave spells exceeding 42 weeks, stratified by treatment groups. The figures illustrate the type substitution following from the reform with a sharp rise in the full DI awards through the fast track measure and a decline in comparable sizes for all other DE types. Figure 4.2 also reveals that pre-reform trends are similar across groups, with the expected exception of full temporary DI via the fast-track procedure, which—by construction—did not exist prior to the reform. Appendix Table C.2 presents the results of the placebo DiD analyses for each benefit type. The placebo effects are statistically insignificant, with the exception of full temporary DI via the regular procedure; here the second placebo period (May 2020) yields a small negative coefficient of -0.011 that is statistically significant at the 5% level. Given its small magnitude and the lack of consistent effects across placebo periods, we do not interpret this as strong evidence for violating the parallel trends assumption.

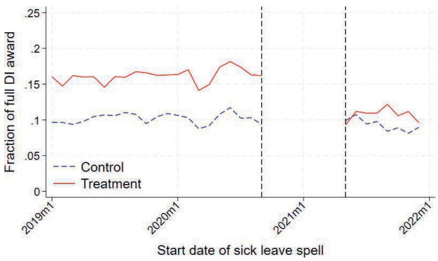
Figure 4.2: *Trends in DI award types over time, by treatment group*



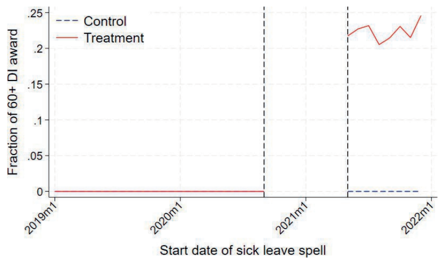
(a) 35-80 DI awards



(b) 80-100 DI awards



(c) full DI awards



(d) 80-100 DI awards via fast-track

Notes: Share of sick leave spells $\geq$42 weeks resulting in (a) 35–80 DI awards, (b) 80–100 DI awards, (c) full DI awards, and (d) 80–100 DI awards via fast-track. Control group: individuals aged 55–59 at EWT (blue); treatment group: 60–64 (red). Values left of the vertical lines (Sept. 2020, May 2021) are pre-reform; right are post-reform. Spells starting between these dates are excluded to avoid overlap and misclassification.

Table 4.4 reports the DiD estimates for the various benefit types. Among sick leave spells of individuals aged 60 or older at the end of the waiting period (EWT), 22.3% were granted full temporary DI via the fast-track procedure, accounting for roughly 60% of all post-reform applications. This shift was accompanied by substitution effects away from partial DI (–5.0pp), full temporary DI via the regular route (–6.5pp), and full permanent DI (–4.4pp). The impact of the reform on the distribution of benefit types thus appears largely mechanical: inherent with its design, the fast-track procedure automatically assigned eligible applicants to full temporary DI, reducing the likelihood of all other outcomes. Most notably, we also find a decline in full permanent DI awards. This suggests that some individuals who would have qualified for the more generous full permanent DI scheme under the standard procedure now opt for the fast-track route. A plausible explanation is that these individuals valued the certainty and speed of the fast-track decision. The regular assessment process entailed a non-trivial risk of being assigned to partial DI or even being denied benefits altogether, which may have rendered the fast-track option more attractive.

Table 4.4: *Main DiD results on type of DI benefits*

	Standard assessment			Fast-track
	Partial	Full temporary	Full permanent	Full temporary
Treatment × Post	-0.050^{***}	-0.064^{***}	-0.044^{***}	0.223^{***}
	(0.002)	(0.003)	(0.004)	(0.003)
Treatment	0.002	-0.015^{***}	0.060^{***}	0.000
	(0.002)	(0.002)	(0.002)	(0.000)
Post	-0.008^{***}	-0.019^{***}	-0.009^{***}	0.000
	(0.002)	(0.003)	(0.003)	(0.000)
Year = 2020	−0.002	-0.012^{***}	0.001	0.000
	(0.002)	(0.002)	(0.002)	(0.000)
Intercept	0.059^{***}	0.109^{***}	0.101^{***}	0.000
	(0.001)	(0.002)	(0.002)	(0.000)
Observations	128 172	128 172	128 172	128 172
Pre-reform average	0.150	0.242	0.332	0.000

Notes: DiD estimates of Equation 4.1 for the probability of receiving partial DI (35–80), full temporary DI (80–100), full permanent DI, or full temporary DI via the fast-track. Heteroskedasticity-robust standard errors in parentheses. The bottom row shows the pre-reform mean of the dependent variable. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.5.3 Employment outcomes

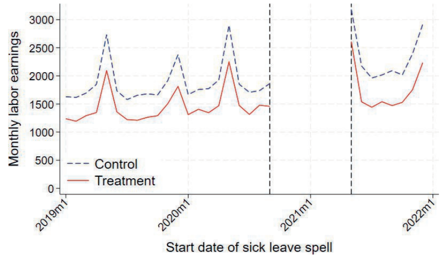
We finally examine whether the fast-track procedure translated into moral hazard effects in labor supply. As detailed in Section 4.2 and Appendix C.3, partial DI embeds the strongest work incentives, while full temporary DI is more generous and less conditional. The reform shifted older applicants directly into full temporary DI, raising overall DI receipt and reallocating claimants toward benefit types with weaker work incentives. Consistent with this shift, we expect—and find—adverse effects on post-EWT employment.

Before presenting the DiD estimates on employment outcomes, we again assess the parallel trends assumption first. Figure 4.3 shows monthly employment outcomes one year after potential DI receipt by the treatment and control groups over time. The two groups follow very similar trends prior to the reform, and they only began to diverge thereafter. The parallel trends assumption is again confirmed by the placebo DiD analyses in Appendix Table C.3, where placebo treatment effects are all insignificant.

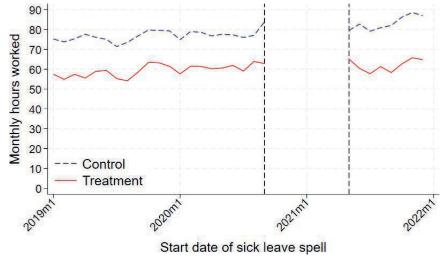
Table 4.5 reports the DiD estimates for employment outcomes three years after the first day of sick leave, i.e., one year after the EWT date, which may have resulted in DI receipt. Column 1 shows that average monthly labor earnings declined by 164 euros, which is a 10.0% reduction relative to the pre-reform mean. Column 2 shows that monthly hours worked decreased by 3.9 hours (5.8%), whereas column 3 shows that the probability of being employed, defined as working positive hours, fell by 2.1 percentage points (a 4% decline). These results suggest that the reform reduced labor supply, consistent with moral hazard arising from both increased DI receipt and the reallocation of recipients from partial DI benefits toward full temporary DI benefits.

To interpret our estimates in terms of earnings crowd-out, we next compare the estimated reduction in labor income with the increase in DI benefits. Average monthly labor earnings declined by 164 euros due to the reform. At the same time, the DI award rate increased by 6.5 percentage points. Assuming an average DI replacement rate of 70% of pre-disability wages, average monthly labor earnings of €2 886, and an employment rate of 89% for our post-reform sample, the implied average monthly DI benefits are approximately 2 270 euros ($0.70 \times \frac{2\,886}{0.89}$.). Multiplying this amount by the 6.5 percentage points increase in DI receipt yields an average increase of 148 euros in DI benefits. Concurrently, we estimate a 5.5 percentage points decrease in the receipt

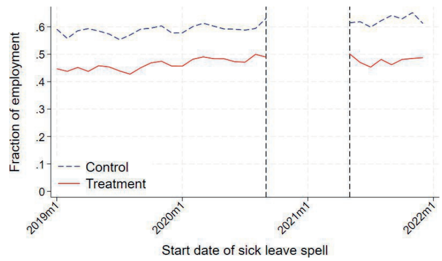
Figure 4.3: *Employment outcomes one year after EWT, treatment vs. control*



(a) Labor earnings



(b) Hours Worked



(c) Employment indicator

Notes: Employment outcomes one year after the end of the waiting period (EWT, i.e. 36 months after sick-leave start). (a) monthly labor earnings, (b) hours worked, (c) employment fraction. Blue: control group (55–59 at EWT), red: treatment group (60–64). Dotted vertical lines mark September 2020 and May 2021; spells starting between these dates are excluded to avoid treatment overlap and misclassification. Seasonal spikes in labor earnings reflect institutional features of Dutch payroll, notably holiday allowance (summer) and end-of-year bonuses (December).

of partial benefits; after the reform, this group received full benefits instead. When assuming that their degree of disability was 50%, the average benefit increase due to the move from partial to full benefits equaled 57 euros. In total, average DI benefits thus increased by 204 euros, and the crowd-out effect we find equals 80%. This percentage is larger than estimates based on Dutch reforms of 62% by Borghans et al. (2014) and 64% of Garcia-Mandicó et al. (2020), who consider benefit losses rather than gains and focus on all age groups.

Another way to put our employment effects in perspective is to present these as extensive margin effects. The fast-track reform increased DI awards by 6.5 percentage points and reduced employment by 2.1 percentage points, implying an extensive-margin employment crowd-out ratio of 31%. This estimate is somewhat higher than those

Table 4.5: *DiD estimates of employment outcomes one year after EWT*

	Earnings	Hours worked	Employment
Treatment × Post	−164.005***	−3.925***	−0.021***
	(33.006)	(1.028)	(0.006)
Treatment	−421.595***	−17.437***	−0.126***
	(15.060)	(0.497)	(0.003)
Post	519.323***	7.490***	0.046***
	(25.565)	(0.792)	(0.005)
Year = 2020	54.909***	2.172***	0.024***
	(15.101)	(0.497)	(0.003)
Intercept	1 823.322***	76.018***	0.580***
	(13.035)	(0.424)	(0.003)
Observations	128 172	128 172	128 172
Pre-measure average	1 634	68.160	0.526

Notes: Monthly outcomes are measured one year after the end of the waiting period (three years after sick-leave start). Reported are labor earnings, work hours, and an employment dummy. The bottom row shows pre-reform averages. Heteroskedasticity-robust standard errors in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

commonly found for the U.S., where Chen and Van der Klaauw (2008) and French and Song (2014) estimate that DI receipt reduced employment in the 1990s by 20 and 26 percentage points, respectively, and where Maestas et al. (2013) find that applicants on the margin of award would have had employment rates 28 percentage points higher absent DI receipt in 2005–2006.

Finally, Table 4.6 reports the DiD estimates for employment outcomes for the early window (January-April 2023) and a later window (May-August 2023). Consistent with application rates, responses are more pronounced in the later window.

4.5.4 Heterogeneity by gender, sector, pre-DI earnings, and employment type

Our main analyses establish that the fast-track measure led to a relatively small increase in the number of DI applications, and a much larger relative increase in the number of accepted DI claims. In this subsection, we show that these effects differ by subgroup. We explore differences across gender, the employment sector, pre-disability earnings quintiles, and whether a sick leave was registered as a permanent worker by the employer through the 42-weeks absence notification or by the NSII through the Sickness Act registration.

Table 4.6: *DiD estimates of employment outcomes one year after EWT, by early and late cohorts*

	Earnings		Hours of work		Employment	
	Early appl.	Late appl.	Early appl.	Late appl.	Early appl.	Late appl.
Treatment × Post	−135.1***	−188.0***	−1.929	−5.624***	−0.011	−0.031***
	(45.1)	(43.3)	(1.232)	(1.447)	(0.008)	(0.008)
Treatment	−421.6***	−421.6***	−17.437***	−17.437***	−0.126***	−0.126***
	(15.1)	(15.1)	(0.497)	(0.497)	(0.003)	(0.003)
Post	533.7***	507.2***	4.599***	9.939***	0.034***	0.056***
	(34.3)	(33.2)	(0.917)	(1.109)	(0.006)	(0.006)
Year = 2020	54.9***	54.9***	2.172***	2.172***	0.024***	0.024***
	(15.1)	(15.1)	(0.497)	(0.497)	(0.003)	(0.003)
Intercept	1 823.3***	1 823.3***	76.018***	76.018***	0.580***	0.580***
	(13.0)	(13.0)	(0.424)	(0.424)	(0.003)	(0.003)
Observations	108 930	111 971	108 930	111 971	108 930	111 971

Notes: Monthly labor earnings, work hours, and employment status are measured one year after the end of the waiting period (three years after sick-leave start). Estimates are reported separately for early applicants (about 3–6 months to adjust after the reform) and late applicants (about 7–10 months). Heteroskedasticity-robust standard errors in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4.7: *Heterogeneity in treatment effects by subgroup*

	N	DI application		DI award		Employment	
		Coef.	SE	Coef.	SE	Coef.	SE
Gender							
Men	62 246	0.001	0.009	0.050***	0.008	−0.017*	0.009
Women	65 926	0.024***	0.008	0.080***	0.008	−0.025***	0.009
Sector							
Industry	13 228	0.014	0.017	0.065***	0.016	−0.061***	0.017
Wholesale & Retail	7 230	0.014	0.023	0.107***	0.022	−0.055**	0.023
Transport	5 495	−0.042	0.026	0.030	0.024	0.028	0.027
Services	12 161	0.060***	0.018	0.104***	0.017	−0.052***	0.018
Public	32 505	0.011	0.011	0.054***	0.010	−0.020*	0.011
Earnings quintile							
Bottom quintile	14 453	0.027	0.017	0.113***	0.016	−0.039**	0.017
Top quintile	14 453	0.028*	0.016	0.056***	0.014	−0.053***	0.016
Type of registration							
Permanent workers	95 250	0.010	0.007	0.052***	0.006	−0.023***	0.007
Sickness Act	32 922	0.027**	0.013	0.117***	0.012	−0.014	0.011

Notes: Difference-in-differences estimates of Equation 4.1 for DI applications, DI awards, and employment, reported separately by gender, sector, earnings quintile, and registration type. Employment is measured one year after the end of the waiting period (EWT). Robust standard errors are shown in adjacent columns. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

First, we examine whether the treatment effect varies by gender. Table 4.7 reports the DiD analyses for DI application and DI award separately for men (columns 1 and 3) and for women (columns 2 and 4). The earlier estimated 1.2 percentage points increase in DI applications is driven almost entirely by women, as the reform had no significant effect on the applications of men, while applications of women increased by 2.4 percentage points. For DI awards, women also experienced a larger effect of the reform: their award percentage increased by 8 percentage points, compared to a 5 percentage points increase for men. A substantial part of this increase could be attributed to the increased number of female applications. Presumably, women were thus more responsive to reduced screening. This is in line with Godard et al. (2024), who find that women are more responsive to increased screening. That is, women disproportionally stopped applying for DI after the introduction of the Gatekeeper Protocol in the Netherlands.

Second, Table 4.7 presents the results of our DiD analyses for DI application and award by employment sector in the year preceding sick leave. With their DI application rate rising by 6 percentage points, employees in the services sector show an increase that by far exceeds the average increase of applications of 1.2 percentage points. The estimates of the other sectors are much closer to the average, with the exception of the transport sector. The application rate of the transport sector decreased by 4.2 percentage points, although statistically insignificant. The effect on DI award rates are positive across all job sectors, but smaller and statistically insignificant for the transport sector (3 percentage points).

Third, Table 4.7 reports the DiD results for the lowest pre-disability earnings quintile in the year before sick leave (columns 1 and 3) and the highest quintile (columns 2 and 4). For DI applications, the coefficients of the two quintiles are nearly identical (2.7 and 2.8 percentage points), while the estimates diverge for DI award: an 11.3 percentage points increase for the lowest earnings quintile and 5.6 for the highest earnings quintile. This possibly reflects the fact that high-income individuals were already more likely to be awarded DI prior to the reform: with higher pre-disability earnings, the assessed relative loss of earnings capacity is generally substantial (OCTAS, 2023).

Finally, we split our sample by sick leave spell registration, comparing (permanent) workers whose employer registered their sick leave spell through a 42-week absence notification and fixed-term and unemployed workers registered by the NSIII through the

Sickness Act registration. While most individuals who report sick have an employer throughout their entire sick leave period, temporary workers and agency workers in the Sickness Act registration may not or no longer have an employer during their sick leave period. Table 4.7 reports the DiD analyses split by sick leave spells from the 42-weeks registration and the Sickness Act registration. For both DI application and DI award, the effect of the fast-track procedure is strongest for individuals within the Sickness Act registration. Similar to our findings, which are stratified by pre-disability earnings quintiles, this represents a group of more vulnerable workers (Koning et al., 2025). The fast-track measure may have further strengthened their tendency to enter into the DI scheme.

4.5.5 Cost–benefit analysis

To assess the fiscal implications of the reform, we combine the estimated DiD effects from Tables 4.3–4.5 with wage data, replacement rates, and administrative cost parameters. The calculations use the 18,050 affected individuals aged 60 and above in the post-reform period and annualize this caseload to 27,075 individuals for fiscal interpretation. Because the observation period spans only eight months and application timing is not exactly observed, these annualized amounts are best interpreted as the expected fiscal effects in the next year, assuming that newly awarded DI beneficiaries remain on DI throughout that period.

The DiD estimates imply a 6.5 pp increase in DI awards and a 5 pp shift from partial to full benefits. Applied to the annualized affected population, these changes correspond to approximately 1,760 additional awards and 1,354 additional conversions to full DI. Multiplying these increments by the mean pre-reform wage (€3,243 per month), together with the relevant replacement rates (70% for new awards and the 35 pp differential between full and partial DI), yields an increase in DI benefit expenditures of about €66.4 million per year.

The reform also reduced employment earnings. The DiD estimate implies an average earnings loss of €164 per month per treated individual, which, when multiplied by the annualized affected population and the 37% effective tax-and-contribution rate, results in an estimated €1.64 million per month in lost fiscal revenue. Together, these components generate approximately €19.7 million per year in additional fiscal costs.

Administrative savings from lower assessment costs are marginal in comparison. The

Table 4.8: Annualized fiscal effects of the DI reform

	DiD Estimates	Individuals (annualized)	Rate/ Duration	Salary/ wage	Euro (mio./year)
Panel A: DI benefit expenditures					
Additional DI awards	6.5pp	1,760	0.70	€3,243/m	47.9
Higher DI benefits (partial→full)	5.0pp	1,354	0.35	€3,243/m	18.4
Subtotal DI cost increase		3,114			**66.4**
Panel B: Lost labor earnings and revenue					
Lost tax revenue	€164	27,075	0.37		19.7
Total costs					**86.1**
Panel C: Administrative savings					
Fewer standard assessments	15.8pp	4,278	5 hrs	€50/hr	-1.1
Subtotal savings					**-1.1**
Net fiscal effect					**85.0**

Notes: DiD estimates are taken from Tables 4.3, 4.4, and 4.5. The total number of treated individuals in the eight-month period is 18,050, which is annualized to 27,075. Column 2 reports the product of the DiD coefficient and this number. Column 3 shows the benefit rate (0.7 and 0.35) and a 37% effective tax-and-contribution rate. For administrative savings, we assume five hours per assessment. Column 4 reports the monthly average salary of the sample and uses a gross hourly wage of 50 euros for physicians. The final column reports fiscal effects in million euros per year; negative values denote savings.

reduction in standard medical assessments—an annualized decline of 4,278 assessments—combined with an assumed assessment duration of five hours and an average physician wage of €50 per hour, yields administrative savings of roughly €1.07 million per year.

Overall, the reform's additional DI expenditures and lost tax revenues substantially exceed its administrative savings, producing a net fiscal cost of approximately €85 million per year.

4.5.6 Sensitivity analyses

Table 4.9 explores the robustness of our main research design which follows Equation 4.1, and compares these to our benchmark outcomes in column 1. We consider using a regression discontinuity (RD) method instead of the DiD (column 2), narrowing the age selection (column 3), including a set of controls (column 4) and applying winsorization to the labor earnings and work hours variables (column 5).

In light of the strict age cutoff of the reform, another obvious candidate for effect estimation would be to use a regression discontinuity instead of a DiD design. We do so

Table 4.9: *Sensitivity of treatment effect estimates to different specifications*

	Main	RD regression	Ages 57–62	Inclusion Controls	Earnings/hours winsorized
DI application rate	0.012**	0.032	0.017**	0.012**	
DI award rate	0.065***	0.054**	0.066***	0.065***	
Benefit types					
Partial DI (share)	−0.050***	−0.032***	−0.048***	−0.050***	
Full temporary DI	−0.064***	−0.074***	−0.066***	−0.064***	
Full permanent DI	−0.044***	−0.049***	−0.038***	−0.044***	
Full temporary DI: fast-track	0.223***	0.207***	0.218***	0.223***	
Employment outcomes					
Labor earnings	−164.005***	−117.644	−125.231***	−161.170***	−159.312***
Work hours	−3.925***	−4.195	−3.872***	−3.829***	−3.000***
Employment (fraction)	−0.021***	−0.029	−0.025***	−0.021***	
Observations	128 172	35 443	78 113	128 172	128 172

Notes: Estimates under alternative specifications. Column 1 reproduces the main analysis. Column 2 reports regression discontinuity (RD) estimates from local linear regressions with a triangular kernel and optimal bandwidths. Column 3 restricts the sample to ages 57–62, Column 4 adds controls for gender, registration type, and age, and Column 5 uses earnings winsorized at the 0.5^{th} and 99.5^{th} percentiles and hours at the 99.5^{th} percentile. Robust standard errors are in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

following Cattaneo et al. (2019), and use a local linear regression (polynomial of degree one), with a triangular kernel, and mean-squared error optimal bandwidth selection. As an advantage of the RD approach, we then no longer need the parallel-trends assumption to hold. At the downside, however, our estimates become less precise and more local: compliers to the reform become limited to individuals close to the age cutoff of 60 at EWT. Although most of the outcome variables show results that are well in line with those obtained from the DiD model, responses may be different for individuals close to retirement. Most notably, we see that the effect on labor earnings is much lower for the RD specification: a reduction in monthly labor earnings of almost €117 compared to €164 under the DiD that holds for 60-65 years of age.

To widen our perspective, we therefore re-ran our DiD model while allowing for treatment effects that differ by age (60, 61, 62, 63, and 64 years at EWT). The results are shown in Appendix C.1 Table C.4. In line with the RD-results, we then find a treatment effect for those aged 60 very similar to the RD estimate, namely -€118. Similar patterns emerge for work hours and the dummy for employment: the treatment effect for individuals aged 60 closely resembles the RD estimate. This suggests that the RD results are driven by age heterogeneity. We therefore retain the DiD approach as our benchmark, which also gives more precise estimates.

Our results remain robust against the other specifications shown in Table 4.9. Column 3 reports the estimates including only individuals aged at 57-62, rather than 55-64. As a result, we relax the parallel-trends assumption to some extent. The DI application and award estimates remain statistically significant and similar in magnitude, at 1.7 and 6.6 percentage points, respectively. The effects on the different DI types are virtually the same as in the main specification. However, the coefficient for labor earnings is smaller than in the main analysis, at €125 per month compared to €164. This aligns with the finding that the DiD treatment effects for employment differ by age: younger workers (<63) experience a lower reduction in labor earnings than older workers (63 and 64) (see Appendix C.1 Table C.4). Column 4 reports the DiD results, including three additional controls: gender, age at EWT, and type of registration (42-weeks or Sickness Act). The DI application, DI award and DI types estimates are virtually equivalent.

Finally, column 5 reports the results on labor earnings and work hours one year after potential DI receipt using winsorized values. That is, we replaced values below the 0.5th and 99th percentile by the 0.5th and 99.5th percentile values, respectively, while we restricted values above the 99.5th percentile for work hours as the lowest value was zero hours. The estimated labor earning response remains significant at the 1% level and the effect size only drops marginally to euros 159 compared to euros 164. The effect on work hours decreases slightly to 3.0 compared to 3.9.

4.6 Conclusion

This chapter examines the ex-ante application and ex-post employment effects of reducing the Dutch DI screening for older workers, along with increased access to full rather than partial DI benefits. We exploit the fact that there is a sharp cutoff at the age of 60, which gave access to this so-called ‘fast-track procedure’, allowing for a difference-in-difference approach to obtain causal effects. Using unique administrative data from the Dutch Social Insurance Institute on long-term sick-listed workers, we disentangle mechanical from behavioral effects, showing how reduced screening shaped both DI inflows and labor supply near retirement.

Our results indicate small ex-ante effects of the reform in terms of additional DI applications by older workers, particularly in the first months following the implementation of the fast-track procedure. DI applications only rose by 1.2 percentage points, whereas the mechanical impact of reduced screening amounted to 6.5 percentage points. Given the strong sickness monitoring and mandatory reintegration activities, it thus seems that, at least in the first year of reduced screening, behavioral effects were limited. This contrasts with the behavioral responses in the labor supply of older workers that we find. One year after potential DI receipt, monthly labor earnings drop by €164, hours worked by almost four, and employment by 2.1 percentage points. These findings align with extensive and intensive margin crowd-out measures of DI benefits, which are consistent with existing evidence. The ex-post moral hazard effects are caused by reduced work incentives from two sources: those who would not have otherwise qualified for any type of DI, and those who would have otherwise qualified only for partial DI. Specifically, around one-third of those initially awarded partial benefits switched to full benefits.

Several policy implications can be drawn from our findings. First, employer and worker obligations inherent in the Gatekeeper Protocol during the sick leave period appear to have deterred additional DI applications. Extending sick leave to complete the two-year waiting period was not costless, for either employers or workers. This was particularly relevant for permanent workers, for whom employer responsibilities continue until the end of the two-year sickness period.

A second implication is that earnings crowd-out effects from increased access to DI benefits were substantial. Even though recipients obtained full DI benefits, many of the newly awarded claimants still had considerable earnings capacity. From a welfare perspective, this reveals a disconnect: while older workers generally have lower employment rates and are often considered in need of extra income support, the targeted group of long-term sick-listed elderly might have continued working, and possibly until retirement, without the fast-track procedure. In practice, the reform thus created a new route into early retirement for long-term sick-listed workers with remaining work capacity, marked by weaker work incentives and earlier labor market exit. This development raises policy concerns, as it reduces labor supply activation efforts aimed at older workers and may have implications for the pension sector's transition to a new system.

Another channel through which the measure affects the pension system concerns the supplementary disability pensions (WIA-hiaat and WIA-excedent) provided by pension funds. The shift toward full disability benefits has two implications. First, the need for supplementary payments to top up partial disability benefits decreases. Second, the higher inflow into full temporary disability benefits increases the number of employees eligible for WIA-excedent benefits, making these supplementary schemes more costly, particularly for higher-wage workers.

Heterogeneity analysis further shows that the behavioral effects were almost entirely driven by women. This may reflect gender-specific labor market prospects, but also suggests that women were particularly deterred by the uncertainty and scrutiny of medical screening under the regular procedure. If so, their increased DI entry under the fast track may represent reduced administrative barriers rather than purely moral hazard.

Finally, while the fast-track procedure successfully reduced waiting times and the demand for insurance physicians, it also weakened work incentives. From an administrative perspective, the reform added another layer of complexity to an already intricate Dutch sickness and disability system with multiple categorical schemes (Koning and Lent, 2024). By introducing an optional new pathway into DI, the fast track increased the number of benefit routes and choices available to employers and workers, raising the question of whether decisions were always well-informed and aligned with long-term policy objectives.

Appendices

Appendix A: Chapter 2

A.1 Proofs and derivations main model

A.1.1 Proof of Proposition 3

The accommodation response for *never appliers* (with $\theta < \theta^1$) depends on the relative sizes of χ and e, as $\pi_{a=1} - \pi_{a=0} = \chi - e$. These individuals will not apply to DI when the firm is operational, regardless of whether accommodation is provided. Hence, only the productivity gain from accommodation (χ) must be compared to the cost of accommodation (e). For now, I assume that $\chi < e$ (Assumption 2). Thus, never appliers will not be accommodated.

The accommodation response for *compliers with respect to application* ($\theta^1 < \theta < \theta^2$), who do not apply when they are accommodated but do apply when they are not accommodated, depends on the disability level and on the relative size of the effect of disability on productivity (ϕ). Accommodation is either positive or negative up to a certain disability threshold $\theta^* \equiv \frac{\chi - e}{p(\theta^*)\phi} + \frac{S-w+\eta}{\phi}$.That is, $\pi_{a=1} - \pi_{a=0} = \chi - e + p(\theta)(S - w - \phi\theta) + p(\theta)\eta$, and then shifts sign after the threshold. This threshold is calculated by setting the profit difference ($\pi_{a=1} - \pi_{a=0}$) equal to zero and then solving for θ. Accommodation will only be provided when $\pi_{a=1} > \pi_{a=0}$. The two profit functions are equal when

$$S - w - \phi\theta + \chi - e = (1 - p(\theta))(S - w - \phi\theta) - p(\theta)\eta.$$

Rewriting this yields that the disability level θ^* at which the two are the same is the following:

$$\theta^* \equiv \frac{\chi - e}{p(\theta^*)\phi} + \frac{S - w + \eta}{\phi}.$$

Whether profits with or without accommodation are larger ($\pi_{a=1}$ or $\pi_{a=0}$) before or after θ^* depends on the relative steepness of the two profit function slopes with respect to θ. Both slopes are decreasing in θ. The slope of $\pi_{a=1}$ with respect to θ is steeper than the slope of $\pi_{a=0}$ with respect to θ when $\frac{\partial \pi_{a=1}}{\partial \theta} < \frac{\partial \pi_{a=0}}{\partial \theta}$. This is true when $\phi > \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta+p(\theta)}$.. This indicates that $\pi_{a=1}$ is larger than $\pi_{a=0}$ for values of θ lower than θ^*, and $\pi_{a=1}$ is lower than $\pi_{a=0}$ when θ is larger than θ^*. Hence, the optimal employer accommodation decision for compliers with respect to application is $a = 1$ for $\theta < \theta^*$, and $a = 0$ when $\theta > \theta^*$, in the case that ϕ is relatively large.

The proof behind this is the following. $\frac{\partial \pi_{a=1}}{\partial \theta} < \frac{\partial \pi_{a=0}}{\partial \theta}$ holds true when:

$$\begin{aligned}
\frac{\partial \pi_{a=1}}{\partial \theta} &< \frac{\partial \pi_{a=0}}{\partial \theta} \Leftrightarrow \\
-\phi &< -p'(\theta)(S - w - \phi\theta + \eta) - \phi(1 - p(\theta))\theta \\
-\phi - p'(\theta)\theta\phi + \theta(1 - p(\theta))\phi &< -p(\theta)(S - w + \eta) \\
\phi[-1 - p'(\theta)\theta + 1 - p(\theta)] &< -p'(\theta)(S - w + \eta) \\
\phi &> \frac{-p'(\theta)(S - w + \eta)}{-p'(\theta)\theta - p(\theta)} \\
\phi &> \frac{p'(\theta)(S - w + \eta)}{p'(\theta)\theta + p(\theta)}.
\end{aligned}$$

The reverse holds true when $\phi < \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta+p(\theta)}$. Then, $\frac{\pi_{a=1}}{\partial \theta} > \frac{\partial \theta_{a=0}}{\partial \theta}$.

The intuition is the following. In both cases (accommodation versus no accommodation), profits depend negatively on the disability level θ. When the firm accommodates ($\pi_{a=0}$), a higher disability decreases productivity and reduces profits by $-\phi$. When the firm does not accommodate ($\pi_{a=0}$), disability has three separate effects on profits: *i*) a higher disability increases the chance of having to pay the experience rating fee, reducing expected profits by $-p'(\theta)\eta$, *ii*) a higher disability decreases the chance of the worker staying at the firm, and hence, of positive profits, which reduces expected profits by $-p'(\theta)(S - w - \phi\theta)$, and *iii*) a higher disability decreases productivity so decreases the positive profits when the worker stays at the firm, reducing expected profits by $-(1 - p(\theta))\phi$. When the productivity loss effect (ϕ), which is the only effect on profits when the firm does accommodate, is relatively large, the profits with accommodation do not respond to an increase in disability as much as the profits without accommodation. Hence, profits when accommodating are higher up to the point that the two profit functions are equal to each other (when $\theta = \theta^*$), and lower beyond that point

($\theta > \theta^*$). The reverse is true when ϕ is relatively small.

For exposition reasons, I continue in the main text under the assumption that the productivity loss ϕ is relatively large (Assumption 5). In Section 2.6, I work out the opposite case and show how the results differ.

Moreover, I assume that the employer threshold θ^* lies strictly within the employee threshold (Assumption 6, see Section 2.6 for the general case in which the employer threshold may lie outside of these bounds.

Always appliers/always suppliers ($\theta^2 < \theta < \theta^3$), whose application and labor supply decisions do not depend on accommodation, will not be accommodated. That is, $\pi_{a=1} - \pi_{a=0} = (1 - p(\theta))(\chi - e) < 0$. These people always apply to DI and if they are rejected for DI, they stay at the firm. Hence, the only difference in profits for the firm when they accommodate compared to when they do not is that with probability $1 - p(\theta)$, when the worker is rejected and stays at the firm, the productivity gain from accommodation χ will materialize and the accommodation cost has to be made and cannot be recouped by selling.

Compliers with respect to labor supply ($\theta^3 < \theta < \theta^4$) will be accommodated as the profit difference is positive because of Assumption 3, $\pi_{a=1} - \pi_{a=0} = (1 - p(\theta))(S - w - \phi\theta + \chi - e) > 0$. By accommodating these workers, who all apply to DI, the firm can keep the worker in the scenario that DI is not granted, unambiguously increasing profits.

Never suppliers ($\theta > \theta^4$) will not be accommodated as $\pi_{a=1} - \pi_{a=0} = 0$. Never suppliers always leave the firm, so no firm income is earned and the payoffs in both cases ($a = 1$ and $a = 0$) are the same ($-\eta$).

A.1.2 Proof of Proposition 4

To determine at which disability level the firm's expected profits turn negative and the firm no longer hires, I consider the profit levels at the different disability levels. I define the disability level above which profits are no longer positive as θ^h. Table A.1 reports the different disability levels and the optimal accommodation responses of the firm is on each of these ranges, together with the expected profit when the firm would hire.

For some disability ranges it is unambiguous whether expected profits are positive or not, while for some it is not. For the healthiest workers with $\theta < \theta^*$, profits are positive because of Assumption 3, so it is optimal for the firm to hire, i.e., $h = 1$ for $\theta < \theta^*$. For

Table A.1: *Possible locations for the hiring threshold: disability level ranges and their profit levels under optimal accommodation*

Disability range	a **on range**	π
$[0, \theta^1]$	0	$S - w - \phi\theta > 0$
$[\theta^1, \theta^*]$	1	$S - w - \phi\theta + \chi - e > 0$
$\boldsymbol{[\theta^*, \theta^3]}$	**0**	$\boldsymbol{(1 - p(\theta))(S - w - \phi\theta) - p(\theta) \cdot \eta \gtrless 0}$
$\boldsymbol{[\theta^3, \theta^4]}$	**1**	$\boldsymbol{(1 - p(\theta))(S - w - \phi \cdot \theta + \chi - e) - p(\theta) \cdot \eta \gtrless 0}$
$[\theta^4, \bar{\theta})]$	0	$-p(\theta)\eta < 0$

Notes: this table reports the different disability ranges, the accommodation decision of the firm at the respective range if the firm would hire, and the profit level if the firm would not. Only the second and third disability level ranges ($[\theta^*, \theta^3]$ and $[\theta^3, \theta^4]$) do not have unambiguously negative or positive profits, meaning that the hiring threshold lies within one of these ranges, depending on the parameterization of the model.

the least healthy workers, profits are negative for sure from θ^4 on as workers either leave the firm to collect social assistance or DI, meaning that the firm makes no profits and risks paying the experience rating fee if the worker is hired. Thus, $h = 0$ is optimal for $\theta > \theta^4$. Somewhere between these disability levels, θ^* and θ^4, there will be a disability level above which the firm will stop hiring as expected profits turn negative.

In between these disability levels ($[\theta^*, \theta^4]$), profits are decreasing in θ. Hence, if profits are negative for a certain disability value in between θ^1 and θ^4, for any disability level beyond that, profits will remain negative. Therefore, I can distinguish two possible locations for the hiring threshold, which I define as θ^h: in $[\theta^*, \theta^3]$ and $[\theta^3, \theta^4]$.

For each of these two disability ranges, I calculate the threshold value θ^h by setting the profits in that range equal to zero. This leads to two possible hiring values which correspond to two profitability regimes.

Given that profits are still positive up to θ^*, the first option for the hiring threshold θ^h is in the range $[\theta^*, \theta^3]$. In this range, the optimal accommodation decision for the firm is *not* to accommodate, meaning that the worker will apply to DI but will remain employed when rejected for DI. Hence, expected firm profits are $(1 - p(\theta))(S - w - \phi\theta) - p(\theta) \cdot \eta$, which may or may not be positive. The expected profits equal exactly zero when:

$$(1 - p(\theta))(S - w - \phi\theta) - p(\theta) \cdot \eta = 0,$$

rewriting for θ yields the hiring threshold θ^h:

$$\theta^h \equiv \frac{S-w}{\phi} - \frac{p(\theta)}{(1-p(\theta))\phi}\eta.$$

The derivative of the profits with respect to θ is:

$$\frac{\partial \pi}{\partial \theta} = -p'(\theta)(S-w-\phi\theta) - \phi(1-p(\theta)) - p'(\theta)\eta < 0.$$

If profits are still positive for $\theta \in [\theta^* \theta^3]$, they may turn negative in the range $[\theta^3, \theta^4]$. In this range, profits are:

$$\pi = (1-p(\theta))(S-w-\phi\theta+\chi-e) - p(\theta)\eta,$$

this equals zero when

$$\pi = (1-p(\theta))(S-w-\phi\theta+\chi-e) - p(\theta)\eta = 0.$$

Rewriting gives θ^h:

$$\theta^h = \frac{S-w+\chi-e}{\phi} - \frac{p(\theta)}{(1-p(\theta))\phi}\eta.$$

The derivative of profits with respect to θ is given by:

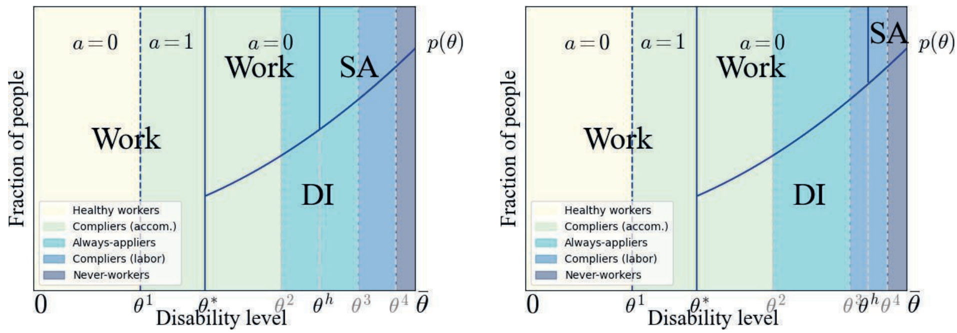
$$\frac{\partial \pi}{\partial \theta} = -p'(\theta)(S-w-\phi\theta+\chi-e) - (1-p(\theta))\phi - p'(\theta)\eta < 0.$$

To summarize, for each of the two disability level ranges in which the disability level threshold above which profits become negative, θ^h, can be found by setting profits under the optimal accommodation decision in that range equal to zero. If θ^h lies in the first possible range, $[\theta^*, \theta^3]$, it is $\theta^h = \frac{S-w}{\phi} - \frac{p(\theta^h)\eta}{(1-p(\theta^h))\phi}$. In the second possible location, $[\theta^3, \theta^4]$, $\theta^h = \frac{S-w+\chi-e}{\phi} - \frac{p(\theta^h)\eta}{(1-p(\theta^h))\phi}$

The regimes are displayed in Figure A.1. Beyond the hiring threshold, the other thresholds are no longer effective and a fraction $p(\theta)$ of workers receives DI, whereas a fraction $1-p(\theta)$ relies on social assistance, as workers cannot be employed beyond the hiring threshold.

Figure A.1: *Overview model with high and low profitability*

(a) *Low profitability* (b) *High profitability*



Notes: panel (a) shows the economy in the case of low profitability, i.e., the hiring threshold θ^h lies in $[\theta*, \theta^3]$, while panel (b) shows the high profitability economy, i.e., $\theta^h \in [\theta^3, \theta^4]$.

A.1.3 Proof of Proposition 5

The first-order condition with respect to the level of the experience rating fee η is given by Equation 2.5. The individual partial derivatives of this equation are the following. The partial derivative of the government budget constraint is given by:

$$\frac{\partial G(\eta, b, \theta^e)}{\partial \eta} = \tau L'(\eta) + E + \eta E'(\eta) - bDI'(\eta) - sSA'(\eta).$$

I define the number of people who are accommodated as A, which gives:

$$A = \int_{\theta^1}^{\theta^*} dF(\theta).$$

Then, the partial derivative of aggregate worker utility is:

$$\begin{aligned}
\frac{\partial V_w(\eta, b, \theta^e)}{\partial \eta} = & \frac{\partial \theta^*}{\partial \eta} f(\theta^*)(u(w-\tau) - \theta^*) + \frac{\partial \theta^*}{\partial \eta} f(\theta^*) v \\
& - \frac{\partial \theta^*}{\partial \eta} f(\theta^*)(p(\theta^*)u(b) + (1-p(\theta^*))(u(w-\tau) - \theta^*)) \\
& + \frac{\partial \theta^h}{\partial \eta} f(\theta^h)(p(\theta^h)u(b) + (1-p(\theta^h))(u(w-\tau) - \theta^h)) \\
& - \frac{\partial \theta^h}{\partial \eta} f(\theta^h)(p(\theta^h)(u(b) + (1-p(\theta^h))u(s)),
\end{aligned}$$

plugging in the following derivatives:

$$A'(\eta) = \frac{\partial \theta^*}{\partial \eta} f(\theta^*),$$

$$DI'(\eta) = -\frac{\partial \theta^*}{\partial \eta} f(\theta^*) p(\theta^*),$$

$$SA'(\eta) = -\frac{\partial \theta^h}{\partial \eta} f(\theta^h)(1 - p(\theta^h)),$$

I can rewrite this into:

$$\begin{aligned}\frac{\partial V_w(\eta, b, \theta^e)}{\partial \eta} &= A'(\eta)v + DI'(\eta)[u(b) - u(w - \tau) + \theta^*] \\ &+ SA'(\eta)[u(s) - u(w - \tau) + \theta^h].\end{aligned}$$

I define $M(\eta) \equiv E$ as the mechanical fiscal effect of increasing η and $B(\eta) \equiv \tau L'(\eta) - bDI'(\eta) + \eta E'(\eta) - sSA'(\eta)$ as the behavioral fiscal effect, following the notation of Haller et al. (2024). Combining the partial derivatives yields:

$$\begin{aligned}&\frac{A'(\eta)v + DI'(\eta)[u(b) - u(w - \tau) + \theta^*] + SA'(\eta)[u(s) - u(w - \tau) + \theta^h]}{\lambda M(\eta)} \\ &= -\left(1 + \frac{B(\eta)}{M(\eta)}\right).\end{aligned}$$

Rewriting this gives the first-order condition for the level of the experience rating fee η in Proposition 5.

A.1.4 Proof of Proposition 6

The individual partial derivatives of Equation 2.7 are the following. The partial derivative of aggregate worker utility with respect to $-b$ is given by:

$$\frac{\partial V_w(\eta, b, \theta^e)}{\partial (-b)} = u'(-b) \cdot DI + A'(-b) \cdot v.$$

I define the mechanical fiscal effect of $-b$ as $M(-b) \equiv DI$.

The partial derivative of aggregate firm utility is given by:

$$\frac{\partial V_f}{\partial (-b)} = A'(-b)(\chi - e).$$

The partial derivative of the government budget constraint equals:

$$\frac{\partial G(\eta, b, \theta^e)}{\partial(-b)} = DI.$$

Combining the three partial derivatives yields the first-order condition:

$$\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial(-b)} = u'(-b)DI + A'(-b)v + \lambda\left[M(-b)\right] = 0,$$

which can be rewritten into Proposition 6.

A.1.5 Proof of Proposition 7

The individual partial derivatives of Equation 2.9 are the following.

I define the following terms:

$$DI'(\theta^e) = DI'_M(\theta^e) + DI'_B(\theta^e) = \int_{\theta^*}^{\bar{\theta}} \frac{\partial p(\theta, \theta^e)}{\partial \theta^e} dF(\theta) - \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*)p(\theta^*),$$

in which $DI'_M(\theta^e) = \int_{\theta^*}^{\bar{\theta}} \frac{\partial p(\theta,\theta^e)}{\partial \theta^e} dF(\theta)$ and $DI'_B(\theta^e) = -\frac{\partial \theta^*}{\partial \theta^e} f(\theta^*)p(\theta^*)$. Moreover, I define

$$SA'(\theta^e) = SA'_M(\theta^e) + SA'_B(\theta^e) = -\int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta; \theta^e)}{\partial \theta^e} dF(\theta) - \frac{\partial \theta^h}{\partial \theta^e} f(\theta^h)(1 - p(\theta^h)),$$

with $SA'_M(\theta^e) = -\int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta;\theta^e)}{\partial \theta^e} dF(\theta)$ and $SA'_B(\theta^e) = -\frac{\partial \theta^h}{\partial \theta^e} f(\theta^h)(1 - p(\theta^h))$. And finally, I derive

$$A'(\theta^e) = \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*).$$

Then, the partial derivative of aggregate worker utility with respect to θ^e is:

$$\begin{aligned}
\frac{\partial V_w(\eta, b, \theta^e)}{\partial \theta^e} &= DI'_B(\theta^e)(u(b) - u(w - \tau) + \theta^*) \\
&\quad + SA'_B(\theta^e)(u(s) - u(w - \tau) + \theta^h) + A'(\theta^e)v \\
&\quad + [DI'_M(\theta^e) + SA'_M(\theta^e)](u(b) - u(w - \tau) + \theta) \\
&\quad + SA'_M(\theta^e)(u(s) - u(b).
\end{aligned}$$

Note that in the fourth term, $DI'_M(\theta^e)$ encompasses both $\int_{\theta^*}^{\theta^h} \frac{\partial p(\theta)}{\partial \theta^e}$ and $\int_{\theta^h} \bar{\theta} \frac{\partial p(\theta)}{\partial \theta^e}$ (which is $-SA'_M(\theta^e)$, while for only the area between θ^* and θ^h, people switch from being on DI to working. The second area, from θ^h to $\bar{\theta}$, concerns people who switch from being on DI to receiving SA. Hence, I add the change in the number of people receiving SA to this term to only capture the first area, while the final term captures the second area.

The partial derivative of the government budget constraint is:

$$\frac{\partial G(\eta, b, \theta^e)}{\partial \theta^e} = \tau L'(\theta^e) - bDI'(\theta^e) + \eta E'(\theta^e) - sSA'(\theta^e).$$

in which

$$L'_M(\theta^e) = -\int_{\theta^*}^{\theta^h} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta),$$

$$L'_B(\theta^e) = \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*) - \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*)(1 - p(\theta^*)) + \frac{\partial \theta^h}{\partial \theta^e} f(\theta^h)(1 - p(\theta^h)),$$

and $L'(\theta^e) = L'_M(\theta^e) + L'_B(\theta^e)$. Moreover, I define

$$E'_M(\theta^e) = \int_{\theta^*}^{\theta^h} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta) \text{ and } E'_B(\theta^e) = -\frac{\partial \theta^*}{\partial \theta^e} f(\theta^*)p(\theta^*) + \frac{\partial \theta^h}{\partial \theta^e} f(\theta^h)p(\theta^h),$$

while

$$E'(\theta^e) = E'_M(\theta^e) + E'_B(\theta^e).$$

Combining the two partial derivatives (worker utility and government budget with respect to θ^e) leads to:

$$\begin{aligned}
\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \theta^e} &= DI'_B(\theta^e)(u(b) - u(w - \tau) + \theta^*) \\
&+ SA'_B(\theta^e)(u(s) - u(w - \tau) + \theta^h) + A'(\theta^e)v \\
&+ [DI'_M(\theta^e) + SA'_M(\theta^e)](u(b) - u(w - \tau) + \theta) \\
&+ SA'_M(\theta^e)(u(s) - u(b) \\
&+ \lambda[B(\theta^e) + M(\theta^e)] = 0,
\end{aligned}$$

when I define the following:

$$M(\theta^e) \equiv - \int_{\theta^*}^{\theta^h} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta)(b + \tau - \eta) - \int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta)(b - s).$$

$$M(\theta^e) \equiv \tau L'_M(\theta^e) - bDI'_M(\theta^e) + \eta E'_M(\theta^e) - sSA'_M(\theta^e).$$

$$B(\theta^e) \equiv \tau L'_B(\theta^e) - bDI'_B(\theta^e) + \eta E'_B(\theta^e) - sSA'_B(\theta^e).$$

The first-order condition can be rewritten, showing Proposition 7.

A.1.6 Proof of the first-order condition with respect to accommodation in the social planner solution

a is a discrete variable, which should equal one when $V_{w,a=1} > V_{w,a=0}$.

$$V_{w,a=1} - V_{w,a=0} = \int_0^{\theta^e} (v) dF(\theta) > 0,$$

hence, a should be one in the social planner solution.

A.2 Other parameterizations and boundary cases

In this section, I consider other model specifications and the alternative parameterizations of the model. I start by solving the model for the high profitability regime: $\theta^h \in [\theta^3; \theta^4]$. Next, I consider the cases when the employer accommodation thresholds lie outside the employee thresholds. I also derive the case with a relatively low profitability loss caused by disability. Finally, I consider an alternative social welfare function: one that includes firm profits, equally weighted with worker utility.

A.2.1 High profitability economy ($\theta^h \in [\theta^3; \theta^4]$)

In the main model, I consider a low profitability economy, i.e. when the hiring threshold lies between θ^3 and θ^4. Here, I consider the case when the hiring threshold lies within θ^3 and θ^4. When $\theta^3 < \theta^h < \theta^4$, the indirect utility function and government budget constraint are:

$$
\begin{aligned}
V(b,\eta) = &\int_0^{\theta^*} u(w-\tau) - \theta dF(\theta) + \int_{\theta^1}^{\theta^*} v dF(\theta) \\
&+ \int_{\theta^*}^{\theta^3} p(\theta)u(b) + (1-p(\theta))(u(w-\tau)-\theta)dF(\theta) \\
&+ \int_{\theta^3}^{\theta^h} p(\theta)u(b) + (1-p(\theta))(u(w-\tau)-\theta+v)dF(\theta) \\
&+ \int_{\theta^h}^{\bar{\theta}} p(\theta)u(b) + (1-p(\theta))u(s)dF(\theta).
\end{aligned}
$$

$$
\begin{aligned}
G(b,\eta) = &\tau \cdot [\int_0^{\theta^*} dF(\theta) + \int_{\theta^*}^{\theta^h} (1-p(\theta))dF(\theta)] \\
&+ \eta \cdot [\int_{\theta^*}^{\theta^h} p(\theta)dF(\theta)] - b \cdot [\int_{\theta^*}^{\bar{\theta}} p(\theta)dF(\theta)] - s\int_{\theta^h}^{\bar{\theta}} (1-p(\theta))dF(\theta).
\end{aligned}
$$

This gives:

$$
\frac{\partial W(b,\eta)}{\partial \eta} = \frac{\partial V(b,\eta)}{\partial \eta} + \lambda \frac{\partial G(b,\eta)}{\partial \eta}.
$$

$$
\frac{\partial G(b,\eta)}{\partial \eta} = \tau L'(\eta) + E + \eta E'(\eta) - bDI'(\eta) - sSA'(\eta).
$$

$$
\frac{\partial V(b,\eta)}{\partial \eta} = SA'(\eta)[u(s)-u(w-\tau)+\theta^h] + DI'(\eta)[u(b)-u(w-\tau)+\theta^*] + A'(\eta)v.
$$

Combining the two derivatives gives:

$$
\begin{aligned}
\frac{\partial W(b,\eta)}{\partial \eta} = &SA'(\eta)[u(s)-u(w-\tau)+\theta^h] + DI'(\eta)[u(b)-u(w-\tau)+\theta^*] \\
&+ A'(\eta)v + \lambda[\tau L'(\eta) + E + \eta E'(\eta) - bDI'(\eta) - sSA'(\eta)].
\end{aligned}
$$

Setting this equal to zero gives:

$$
\begin{aligned}
&SA'(\eta)[u(s)-u(w-\tau)+\theta^h] + DI'(\eta)[u(b)-u(w-\tau)+\theta^*] + A'(\eta)v \\
&= -\lambda[\tau L'(\eta) + E + \eta E'(\eta) - bDI'(\eta) - sSA'(\eta)].
\end{aligned}
$$

Let us define $M(\eta) = E$ as the mechanical fiscal effect of increasing η and $B(\eta) = \tau L'(\eta) - bDI'(\eta) + \eta E'(\eta) - sSA'(\eta)$ as the behavioral fiscal effect. This gives:

$$SA'(\eta)[u(s) - u(w-\tau) + \theta^h] + DI'(\eta)[u(b) - u(w-\tau) + \theta^*] + A'(\eta)v$$
$$= -\lambda[M(\eta) + B(\eta)].$$

Which gives the following optimality condition for the level of experience rating:

$$\frac{SA'(\eta)[u(s) - u(w-\tau) + \theta^h] + DI'(\eta)[u(b) - u(w-\tau) + \theta^*] + A'(\eta)v}{\lambda M(\eta)}$$
$$= -\Big(1 + \frac{B(\eta)}{M(\eta)}\Big),$$

which is the same as under the low profitability regime.

The first-order condition with respect to b is given by:

$$\frac{\partial W(b,\eta)}{\partial b} = \frac{\partial V(b,\eta)}{\partial b} + \lambda\frac{\partial G(b,\eta)}{\partial b}.$$

And we have:

$$\frac{\partial V(b,\eta)}{\partial b} = A'(b)v + u'(b)DI,$$

$$\frac{\partial G(b,\eta)}{\partial b} = -DI.$$

We define $M(b) = -DI$. Combining the two derivatives yields:

$$\frac{\partial W(b,\eta)}{\partial b} = A'(b)v + u'(b)DI + \lambda[M(b)] = 0.$$

Rewriting gives the optimality condition for the benefit level gives:

$$\frac{A'(b)v + u'(b)DI}{\lambda M(b)} = -1,$$

which is again the same as in the low profitability regime.

A.2.2 Employer threshold θ^* outside of bounds

In the main body of the text, I consider the case when the employer accommodation threshold lies strictly in between the two employee thresholds upon which it is based ($\theta^1 < \theta^* < \theta^2$). Here, I first assess the case when $\theta^1 > \theta^*$ and then the case when $\theta^* > \theta^2$.

When $\theta^1 > \theta^*$, the indirect utility function becomes:

$$
\begin{aligned}
V(b,\eta) = &\int_0^{\theta^1} u(w-\tau) - \theta dF(\theta) \\
&+ \int_{\theta^1}^{\theta^h} p(\theta)u(b) + (1-p(\theta))(u(w-\tau)-\theta)dF(\theta) \\
&+ \int_{\theta^h}^{\bar{\theta}} p(\theta)u(b) + (1-p(\theta))u(s)dF(\theta),
\end{aligned}
$$

and the government budget constraint:

$$
\begin{aligned}
G(b,\eta) = &\tau \cdot [\int_0^{\theta^1} dF(\theta) + \int_{\theta^1}^{\theta^h} (1-p(\theta))dF(\theta)] - b \cdot [\int_{\theta^1}^{\bar{\theta}} p(\theta)dF(\theta)] \\
&+ \eta \cdot [\int_{\theta^1}^{\theta^h} p(\theta)dF(\theta)] - s\int_{\theta^h}^{\bar{\theta}} (1-p(\theta))dF(\theta).
\end{aligned}
$$

$$
\frac{\partial V(b,\eta)}{\partial \eta} = SA'(\eta) \cdot (u(s) - u(w-\tau) + \theta^h).
$$

$$
\frac{\partial G(b,\eta)}{\partial \eta} = \tau L'(\eta) + E + \eta E'(\eta) - sSA'(\eta).
$$

Let us define $M(\eta) = E$ as the mechanical fiscal effect of increasing η and $B(\eta) = \tau L'(\eta) + \eta E'(\eta) - sSA'(\eta)$ as the behavioral fiscal effect. This gives:

$$
\frac{\partial G(b,\eta)}{\partial \eta} = M(\eta) + B(\eta).
$$

Combining the two derivatives gives:

$$
\frac{\partial W(b,\eta)}{\partial \eta} = SA'(\eta) \cdot (u(s) - u(w-\tau) + \theta^h) + \lambda[M(\eta) + B(\eta)] = 0.
$$

Which yields the optimality condition for the level of experience rating:

$$\frac{SA'(\eta) \cdot (u(s) - u(w - \tau) + \theta^h)}{\lambda M(\eta)} = -\Big(1 + \frac{B(\eta)}{M(\eta)}\Big).$$

This can be interpreted as follows. If η goes up, θ^h shifts to the left because firms find it more expensive to hire disabled workers. This means that more people will go into social assistance, who gain $u(s)$ but also lose $u(w - \tau) - \theta^h$. Compared to the main case, two terms drop out: the utility changes caused by the employer accommodation threshold shifting to the right (θ^*), resulting in more accommodation and the accompanying change in the number of people in DI because of the reduction in DI applications ($A'(\eta)$ and $DI'(\eta)$). This happens because the accommodation threshold is not effective under this parameterization; $\theta^* < \theta^1$, so all compliers with respect to accommodation will already be accommodated - so experience rating has no effect on accommodation. On the right-hand side, the total fiscal effect per mechanically saved dollar consists of reduced labor tax income, fewer people for whom experience-rated premiums are paid, but a higher per-person fee.

$$\frac{\partial V(b, \eta)}{\partial b} = DI'(b)[u(b) - u(w - \tau) + \theta^1] + u'(b)DI.$$

$$\frac{\partial G(b, \eta)}{\partial b} = \tau \cdot L'(b) + \eta \cdot E'(b) - DI - b \cdot DI'(b).$$

Combining the two derivatives gives:

$$\begin{aligned}\frac{\partial W(b, \eta)}{\partial b} &= DI'(b) \cdot [u(b) - u(w - \tau) + \theta^1] \\ &\quad + u'(b) \cdot DI + \lambda\left[M(b) + B(b)\right].\end{aligned}$$

Setting this to zero gives:

$$DI'(b) \cdot [u(b) - u(w - \tau) + \theta^1] + u'(b) \cdot DI = -\lambda\left[M(b) + B(b)\right].$$

Rewriting gives the optimality condition for the benefit level b:

$$\frac{DI'(b)[u(b) - u(w-\tau) + \theta^1] + u'(b)DI}{\lambda M(b)} = -\Big(1 + \frac{B(b)}{M(b)}\Big).$$

When $\theta^* > \theta^2$, the indirect utility function becomes:

$$\begin{aligned} V(b,\eta) = & \int_0^{\theta^1} u(w-\tau) - \theta dF(\theta) + \int_{\theta^1}^{\theta^2} u(w-\tau) - \theta + v dF(\theta) \\ & + \int_{\theta^2}^{\theta^h} p(\theta)u(b) + (1-p(\theta))(u(w-\tau) - \theta) dF(\theta) \\ & + \int_{\theta^h}^{\bar{\theta}} p(\theta)u(b) + (1-p(\theta))u(s) dF(\theta). \end{aligned}$$

And the government budget constraint becomes:

$$\begin{aligned} G(b,\eta) = & \tau \cdot [\int_0^{\theta^2} dF(\theta) + \int_{\theta^2}^{\theta^h} (1-p(\theta))dF(\theta)] - b \cdot [\int_{\theta^2}^{\bar{\theta}} p(\theta)dF(\theta)] \\ & + \eta \cdot [\int_{\theta^2}^{\theta^h} p(\theta)dF(\theta)] - s \int_{\theta^h}^{\bar{\theta}} (1-p(\theta))dF(\theta). \end{aligned}$$

$$\frac{\partial V(b,\eta)}{\partial \eta} = SA'(\eta) \cdot (u(s) - u(w-\tau) + \theta^h).$$

$$\frac{\partial G(b,\eta)}{\partial \eta} = \tau L'(\eta) + E + \eta E'(\eta) - sSA'(\eta).$$

Let us define $M(\eta) = E$ as the mechanical fiscal effect of increasing η and $B(\eta) = \tau L'(\eta) + \eta E'(\eta) - sSA'(\eta)$ as the behavioral fiscal effect. This gives:

$$\frac{\partial G(b,\eta)}{\partial \eta} = M(\eta) + B(\eta).$$

Combining the two derivatives gives:

$$\frac{\partial W(b,\eta)}{\partial \eta} = SA'(\eta) \cdot (u(s) - u(w-\tau) + \theta^h) + \lambda[M(\eta) + B(\eta)] = 0.$$

Which yields the optimality condition for the level of experience rating:

$$\frac{SA'(\eta) \cdot (u(s) - u(w-\tau) + \theta^h)}{\lambda M(\eta)} = -\Big(1 + \frac{B(\eta)}{M(\eta)}\Big).$$

Which is exactly the same as in case 2.

$$\frac{\partial V(b,\eta)}{\partial b} = DI'(b) \cdot (u(b) - u(w-\tau) + \theta^2) + u'(b) \cdot DI.$$

$$\frac{\partial G(b,\eta)}{\partial b} = \tau \cdot L'(b) + \eta \cdot E'(b) - DI - b \cdot DI'(b).$$

Let us define the mechanical fiscal effect of b as $M(b) = -DI$ and the behavioral fiscal effect of b as $B(b) = \tau \cdot L'(b) + \eta \cdot E'(b) - b \cdot DI'(b)$:

$$\frac{\partial G(b,\eta)}{\partial b} = M(b) + B(b).$$

Combining the two derivatives gives:

$$\begin{aligned}\frac{\partial W(b,\eta)}{\partial b} &= DI'(b) \cdot [u(b) - u(w-\tau) + \theta^2] \\ &\quad + u'(b) \cdot DI + \lambda \left[M(b) + B(b)\right].\end{aligned}$$

Setting this to zero gives:

$$DI'(b) \cdot [u(b) - u(w-\tau) + \theta^2] + u'(b) \cdot DI = -\lambda \left[M(b) + B(b)\right].$$

Rewriting gives the optimality condition for the benefit level b:

$$\frac{DI'(b)[u(b) - u(w-\tau) + \theta^2] + u'(b)DI}{\lambda M(b)} = -\Big(1 + \frac{B(b)}{M(b)}\Big).$$

This can be interpreted as follows. The left-hand side again is the total utility change per mechanically spent dollar converted to monetary terms by λ. More people go into DI because of employee moral hazard: applying to DI is more attractive. Besides, those who already were on DI, gain some utility from the increased generosity. The right-hand side concerns the total fiscal effect per mechanically spent dollar. The behavioral fiscal effect consists of the effect of decreased tax income (lower labor supply), plus increased experience rating income because of an increase in the number of people for which experience rated premiums have to be paid, plus the costs caused by more people receiving DI benefits. The mechanical effect is just the increased costs spent on DI benefits for those on DI.

A.2.3 Low productivity loss caused by disability, ϕ

A low ϕ does not directly affect the employee side but changes optimal employer accommodation and hiring behavior. Regarding employer accommodation, the optimal response for never-appliers is the same as this only depends on $\chi - e$. For compliers with respect to application, with disability level $\theta^1 < \theta < \theta^2$, the optimal response is different than with a high ϕ. As shown in Appendix A.2.3, when $\phi < \frac{p'(\theta)(S-w+\eta)}{p'(\theta)\theta+p(\theta)}$, the negative slope of $\pi_{a=1}$ with respect to θ is less steep than the slope of $\pi_{a=0}$ with respect to θ, meaning that $\pi_{a=1}$ is lower than $\pi_{a=0}$ for values of θ on $[\theta^1, \theta^*]$, and $\pi_{a=1}$ is larger than $\pi_{a=0}$ for values of θ on $[\theta^*, \theta^2]$. This implies that with a relatively low ϕ, the optimal employer accommodation decision for compliers with respect to accommodation becomes $a = 0$ for $\theta < \theta^*$ and $a = 0$ when $\theta > \theta^*$. For the other employee types (always appliers/always suppliers, compliers with respect to labor supply, and never suppliers), optimal employer accommodation does not differ from the case with relatively high ϕ.

Besides accommodation, employers choose the optimal hiring threshold. As in the main model, the firm stops hiring when expected profits turn negative. Hence, the profits at the different disability levels under the best accommodation response have to be considered. Now that right before the accommodation threshold θ^* firms will accommodate, and right after firms will not, the profit levels under optimal accommodation are as shown in table A.2.

The first, third, and final ranges, are either unambiguously positive (first and third), while the final range is unambiguously negative. The three other ranges, the ranges printed in bold, are not unambiguously positive or negative.

As in the main model, the ranges where profits can turn negative are decreasing in θ, so if it turns negative in $[\theta^1, \theta^*]$, profits are also negative in $[\theta^2, \theta^3]$ and $[\theta^3, \theta^4]$ - with the exception of the range in between where accommodation is provided and profits do not turn negative ($[\theta^*, \theta^2]$). When the profits turn negative in ranges $[\theta^1, \theta^*]$ or $[\theta^2, \theta^3]$, the hiring threshold is defined as $\theta^h \equiv \frac{S-w}{\phi} - \frac{p(\theta)\eta}{(1-p(\theta))\phi}$, as in the main model. When profits turn negative in $[\theta^3, \theta^4]$, the hiring threshold also is the same as in the main

Table A.2: *Possible locations for the hiring threshold: disability level ranges and their profit levels under optimal accommodation*

Disability range	a **on range**	π
$[0, \theta^1]$	0	$S - w - \phi\theta > 0$
$[\boldsymbol{\theta^1}, \boldsymbol{\theta^*}]$	**0**	$\boldsymbol{(1 - p(\theta))(S - w - \phi\theta) - p(\theta) \cdot \eta \gtrless 0}$
$[\theta^*, \theta^2]$	1	$S - w - \phi\theta + \chi - e > 0$
$[\boldsymbol{\theta^2}, \boldsymbol{\theta^3}]$	**0**	$\boldsymbol{(1 - p(\theta))(S - w - \phi\theta) - p(\theta) \cdot \eta \gtrless 0}$
$[\boldsymbol{\theta^3}, \boldsymbol{\theta^4}]$	**1**	$\boldsymbol{(1 - p(\theta))(S - w - \phi \cdot \theta + \chi - e) - p(\theta) \cdot \eta \gtrless 0}$
$[\theta^4, \bar{\theta})]$	0	$-p(\theta)\eta < 0$

Notes: this table reports the different disability ranges, the accommodation decision of the firm at the respective range if the firm would hire, and the profit level if the firm would not. Only the second, fourth and fifth disability level ranges ($[\theta^1, \theta^*]$, $[\theta^2, \theta^3]$ and $[\theta^3, \theta^4]$) are not unambiguously positive or negative, so the hiring threshold is within one of these ranges, depending on the parameterization of the model.

model: $\theta^h \equiv \frac{S-w+\chi-e}{\phi} - \frac{p(\theta)\eta}{(1-p(\theta))\phi}$. To correspond to the main model, I will continue assuming that profits turn negative in the disability range $[\theta^*, \theta^3]$, i.e., corresponding to a low profitability economy as defined earlier.

Next, the government optimization problem has to be solved. The Lagrangian is given by:

$$\max_{\eta,b,\theta^e} \mathcal{L}(\eta, b, \theta^e) = V_w(\eta, b, \theta^e) + \lambda(G(\eta, b, \theta^e) - \bar{G}),$$

$$s.t.$$

$$\theta^1 = u(w - \tau) - u(b), \theta^* = \frac{\chi - e}{p(\theta)\phi} + \frac{S - w + \eta}{\phi}, \theta^2 = u(w - \tau) - u(b) + v,$$

$$\theta^h = \frac{S - w}{\phi} - \frac{p(\theta)\eta}{(1 - p(\theta))\phi}, \theta^h \in [\theta^*; \theta^3], \phi < \frac{p'(\theta)(S - w + \eta)}{p'(\theta)\theta + p(\theta)}.$$

$$
\begin{aligned}
V_w(\eta, b, \theta^e) = &\underbrace{\int_0^{\theta^1} \big(u(w-\tau) - \theta\big) dF(\theta)}_{\text{healthy workers who all work}} \\
+ &\underbrace{\int_{\theta^1}^{\theta^*} \big(p(\theta;\theta^e)u(b) + (1 - p(\theta;\theta^e))(u(w-\tau) - \theta)\big) dF(\theta)}_{\text{unaccommodated workers who apply to DI, a fraction } p \text{ gets DI, the other fraction works}} \\
+ &\underbrace{\int_{\theta^*}^{\theta^2} \big(u(w-\tau) - \theta\big) dF(\theta)}_{\text{accommodated workers who work and do not apply}} \quad + \underbrace{\int_{\theta^*}^{\theta^2} v dF(\theta)}_{\text{accommodated workers}} \\
+ &\underbrace{\int_{\theta^2}^{\theta^h} \big(p(\theta;\theta^e)u(b) + (1 - p(\theta;\theta^e))(u(w-\tau) - \theta)\big) dF(\theta)}_{\text{workers who applied to DI, a fraction } p \text{ gets DI, the other fraction works, unaccommodated}} \\
+ &\underbrace{\int_{\theta^h}^{\bar{\theta}} \big(p(\theta;\theta^e)u(b) + (1 - p(\theta;\theta^e)u(s)\big) dF(\theta).}_{\text{workers who applied to DI, a fraction } p \text{ gets DI, the others get social assistance}} \qquad .
\end{aligned}
$$

The government budget constraint is given by:

$$
\begin{aligned}
G(\eta, b, \theta^e) = \tau \cdot \Big[&\int_0^{\theta^1} dF(\theta) + \int_{\theta^1}^{\theta^*} (1 - p(\theta;\theta^e)) dF(\theta) \\
&+ \int_{\theta^*}^{\theta^2} dF(\theta) + \int_{\theta^2}^{\theta^h} (1 - p(\theta;\theta^e)) dF(\theta)\Big] \\
&- b \cdot \Big[\int_{\theta^1}^{\theta^*} p(\theta;\theta^e) dF(\theta) + \int_{\theta^2}^{\bar{\theta}} p(\theta;\theta^e) dF(\theta)\Big] \\
&+ \eta \cdot \Big[\int_{\theta^1}^{\theta^*} p(\theta;\theta^e) dF(\theta) + \int_{\theta^2}^{\theta^h} p(\theta;\theta^e) dF(\theta)\Big] \\
&- s \cdot \int_{\theta^h}^{\bar{\theta}} (1 - p(\theta;\theta^e)) dF(\theta) \geq -\bar{G},
\end{aligned}
$$

which can also be summarized as:

$$
G(\eta, b, \theta^e) = \tau L - bDI + \eta E - sSA \geq -\bar{G}.
$$

The first-order condition with respect to η is given by:

$$\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \eta} = \frac{\partial V_w(\eta, b, \theta^e)}{\partial \eta} + \lambda \frac{\partial G(\eta, b, \theta^e)}{\partial \eta} = 0. \tag{A.1}$$

The partial derivative of V_w with respect to η is given by:

$$\begin{aligned}
\frac{\partial V_w(\eta, b, \theta^e)}{\partial \eta} &= \frac{\partial \theta^*}{\partial \eta} f(\theta^*)(p(\theta^*)u(b) + (1 - p(\theta^*))(u(w-\tau) - \theta^*)) \\
&- \frac{\partial \theta^*}{\partial \eta} f(\theta^*)[u(w-\tau) - \theta^*] - \frac{\partial \theta^*}{\partial \eta} f(\theta^*)v \\
&+ \frac{\partial \theta^h}{\partial \eta} f(\theta^h)(p(\theta^h)u(b) + (1 - p(\theta^h))(u(w-\tau) - \theta^h)) \\
&- \frac{\partial \theta^h}{\partial \eta} f(\theta^h)(p(\theta^h)(u(b) + (1 - p(\theta^h))u(s)).
\end{aligned}$$

Plugging in the following derivatives:

$$A'(\eta) = -\frac{\partial \theta^*}{\partial \eta} f(\theta^*),$$

$$DI'(\eta) = \frac{\partial \theta^*}{\partial \eta} f(\theta^*)p(\theta^*),$$

$$SA'(\eta) = -\frac{\partial \theta^h}{\partial \eta} f(\theta^h)(1 - p(\theta^h)),$$

gives that I can rewrite the partial derivative as:

$$\begin{aligned}
\frac{\partial V_w(\eta, b, \theta^e)}{\partial \eta} &= A'(\eta)v + DI'(\eta)[u(b) - u(w-\tau) + \theta^*] \\
&+ SA'(\eta)[u(s) - u(w-\tau) + \theta^h].
\end{aligned}$$

This partial derivative includes the same terms as the original, yet, the signs of the effect on the number of DI applicants and on the number of people accommodated are opposite from before.

The partial derivative of G with respect to η is given by:

$$\frac{\partial G(\eta, b, \theta^e)}{\partial \eta} = \tau L'(\eta) - bDI'(\eta) + E + \eta E'(\eta) - sSA'(\eta),$$

in which $L'(\eta) = -\frac{\partial\theta^*}{\partial\eta} f(\theta^*)p(\theta^*) + \frac{\partial\theta^h}{\partial\eta} f(\theta^h)(1-p(\theta^h))$ and $E'(\eta) = \frac{\partial\theta^*}{\partial\eta} f(\theta^*)p(\theta^*) + \frac{\partial\theta^h}{\partial\eta} f(\theta^h)p(\theta^h)$.

Combining these two partial derivatives gives the first-order condition with respect to η:

$$\frac{A'(\eta)v + DI'(\eta)[u(b) - u(w-\tau) + \theta^*] + SA'(\eta)[u(s) - u(w-\tau) + \theta^h]}{\lambda M(\eta)} = -\left(1 + \frac{B(\eta)}{M(\eta)}\right), \tag{A.2}$$

in which I again define $M(\eta) \equiv E$ as the mechanical fiscal effect of increasing η and $B(\eta) \equiv \tau L'(\eta) - bDI'(\eta) + \eta E'(\eta) - sSA'(\eta)$ as the behavioral fiscal effect.

The first-order condition with respect to $-b$ is given by:

$$\frac{\partial\mathcal{L}(\eta, b, \theta^e)}{\partial - b} = \frac{\partial V_w(\eta, b, \theta^e)}{\partial - b} + \lambda\frac{\partial G(\eta, b, \theta^e)}{\partial - b} = 0. \tag{A.3}$$

$$\begin{aligned}\frac{\partial V_w(\eta, b, \theta^e)}{\partial - b} = &-\frac{\partial\theta^1}{\partial - b} f(\theta^1)p(\theta^1)(u(b) - u(w-\tau) + \theta^1)\\ &- \frac{\partial\theta^2}{\partial - b} f(\theta^2)(u(b) - u(w-\tau) - \theta^2)\\ &+ \frac{\partial\theta^2}{\partial - b} f(\theta^2)v + \int_{\theta^1}^{\theta^*} p(\theta)u'(-b)dF(\theta)\\ &+ \int_{\theta^2}^{\bar{\theta}} p(\theta)u'(-b)dF(\theta),\end{aligned}$$

using the following derivatives:

$$DI'(-b) = -\frac{\partial\theta^1}{\partial - b} f(\theta^1)p(\theta^1) - \frac{\partial\theta^2}{\partial - b} f(\theta^2)p(\theta^2),$$

$$A'(-b) = \frac{\partial\theta^2}{\partial - b} f(\theta^2),$$

gives:

$$
\begin{aligned}
\frac{\partial V_w(\eta, b, \theta^e)}{\partial b} = & -\frac{\partial \theta^1}{\partial - b} f(\theta^1) p(\theta^1)(u(b) - u(w-\tau) + \theta^1) \\
& - \frac{\partial \theta^2}{\partial - b} f(\theta^2)(u(b) - u(w-\tau) - \theta^2) \\
& + A'(-b)v + u'(-b)DI.
\end{aligned}
$$

The first-order condition of the government budget with respect to $-b$ is given by:

$$
\frac{\partial G(\eta, b, \theta^e)}{\partial - b} = \tau L'(-b) - DI - bDI'(-b) + \eta E'(-b),
$$

in which $L'(-b) = \frac{\partial \theta^1}{\partial - b} f(\theta^1)p(\theta^1) + \frac{\partial \theta^2}{\partial - b} f(\theta^2)p(\theta^2)$ and $E'(-b) = -\frac{\partial \theta^1}{\partial - b} f(\theta^1)p(\theta^1) - \frac{\partial \theta^2}{\partial - b} f(\theta^2)p(\theta^2)$. Combining these two partial derivatives yields the first-order condition:

$$
\begin{aligned}
& \frac{\begin{aligned} & - \frac{\partial \theta^1}{\partial(-b)} f(\theta^1)p(\theta^1)\big(u(b) - u(w-\tau) + \theta^1\big) \\ & - \frac{\partial \theta^2}{\partial(-b)} f(\theta^2)\big(u(b) - u(w-\tau) - \theta^2\big) \\ & + A'(-b)v + u'(-b)DI \end{aligned}}{\lambda M(-b)} \\
& = -\Big(1 + \frac{B(-b)}{M(-b)}\Big).
\end{aligned}
$$

The first-order condition with respect to θ^e is given by:

$$
\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \theta^e} = \frac{\partial V_w(\eta, b, \theta^e)}{\partial \theta^e} + \lambda \frac{\partial G(\eta, b, \theta^e)}{\partial \theta^e}.
$$

$$\begin{aligned}\frac{\partial V_w(\eta, b, \theta^e)}{\partial \theta^e} &= \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*)[p(\theta^*)u(b) + (1-p(\theta^*))(u(w-\tau)-\theta^*)] \\ &+ \int_{\theta^1}^{\theta^*} \frac{\partial p(\theta)}{\partial \theta^e}[u(b) - u(w-\tau) + \theta] dF(\theta) \\ &- \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*)[u(w-\tau)-\theta^*] - \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*) v \\ &+ \frac{\partial \theta^h}{\partial \theta^e} f(\theta^h)[p(\theta^h)u(b) + (1-p(\theta^h))(u(w-\tau)+\theta^h)] \\ &+ \int_{\theta^2}^{\theta^h} \frac{\partial p(\theta)}{\partial \theta^e}[u(b) - u(w-\tau) + \theta] dF(\theta) \\ &- \frac{\partial \theta^h}{\partial \theta^e} f(\theta^h)[p(\theta^h)u(b) + (1-p(\theta^h))u(s)] \\ &+ \int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta)}{\partial \theta^e}[u(b) - u(s)] dF(\theta).\end{aligned}$$

I define the following terms:

$$DI'_M(\theta^e) = \int_{\theta^1}^{\theta^*} \frac{\partial p(\theta^1)}{\partial \theta^e} dF(\theta) + \int_{\theta^2}^{\bar{\theta}} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta).$$

$$DI'_B(\theta^e) = \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*) p(\theta^*).$$

$$SA'_M(\theta^e) = -\int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta).$$

$$SA'_B(\theta^e) = -\frac{\partial \theta^h}{\partial \theta^e} f(\theta^h)(1 - p(\theta^h)).$$

$$A'(\theta^e) = -\frac{\partial \theta^*}{\partial \theta^e} f(\theta^*).$$

This gives that the partial derivative of total worker utility with respect to θ^e can be rewritten as:

$$\begin{aligned}\frac{\partial V_w(\eta,b,\theta^e)}{\partial\theta^e} &= DI_B'(\theta^e)(u(b)-u(w-\tau)+\theta^*)+A'(\theta^e)v\\ &+[DI_M'(\theta^e)\\ &+SA_M'(\theta^e)](u(b)-u(w-\tau)+\theta)+SA_M'(\theta^e)(u(s)-u(b))\\ &+SA_B'(\theta^e)(u(s)-u(w-\tau)+\theta^h).\end{aligned}$$

The partial derivative of the government budget with respect to θ^e is:

$$\frac{\partial G(\eta,b,\theta^e)}{\partial\theta^e}=\tau L'(\theta^e)-bDI'(\theta^e)+\eta E'(\theta^e)-sSA'(\theta^e),$$

in which $L'(\theta^e)=-\frac{\partial\theta^h}{\partial\theta^e}f(\theta^*)p(\theta^*)+\frac{\partial\theta^h}{\partial\theta^e}f(\theta^h)(1-p(\theta^h))$, $DI'(\theta^e)=DI_M'(\theta^e)+DI_B'(\theta^e)$, $E'(\theta^e)=\frac{\partial\theta^*}{\partial\theta^e}f(\theta^*)p(\theta^*)+\frac{\partial\theta^h}{\partial\theta^e}f(\theta^h)p(\theta^h)$ = and $SA'(\theta^e)=SA_M'(\theta^e)+SA_B'(\theta^e)$.

Combining the partial derivatives yields the optimality condition with respect to the eligibility threshold:

$$\begin{aligned}\frac{\partial\mathcal{L}(\eta,b,\theta^e)}{\partial\theta^e} &= DI_B'(\theta^e)(u(b)-u(w-\tau)+\theta^*)\\ &+SA_B'(\theta^e)(u(s)-u(w-\tau)+\theta^h)+A'(\theta^e)v\\ &+[DI_M'(\theta^e)+SA_M'(\theta^e)](u(b)-u(w-\tau)+\theta)\\ &+SA_M'(\theta^e)(u(s)-u(b)\\ &+\lambda[B(\theta^e)+M(\theta^e)]=0. \qquad \text{(A.4)}\end{aligned}$$

A.2.4 Social welfare function that includes firm profits

The optimality conditions with respect to η, $-b$ and θ^e under a social welfare function that includes firm profits are the following:

$$\begin{aligned}
\frac{\partial \mathcal{L}(\eta, b, \theta^e)}{\partial \eta} &\gtrless 0 \Leftrightarrow \\
&\frac{1}{\lambda M(\eta)}\Big(A'(\eta)(v+\chi-e) \\
&- DI'(\eta)[-u(b)+u(w-\tau)-\theta^* + (S-w-\phi\theta^*)] \\
&+ SA'(\eta)[u(s)-u(w-\tau)+\theta^h-(S-w-\phi\theta^h)] - E'(\eta)\eta \\
&- E\Big) \gtrless -\Big(1+\frac{B(\eta)}{M(\eta)}\Big),
\end{aligned} \tag{A.5}$$

with $M(\eta) \equiv E = \eta$ and $B(\eta) \equiv \tau L'(\eta) - bDI'(\eta) + \eta E'(\eta) - sSA'(\eta)$.

$$\frac{\partial \mathcal{L}}{\partial(-b)} \gtrless 0 \Leftrightarrow \frac{u'(-b)DI + A'(-b)(v+\chi-e)}{\lambda M(-b)} \gtrless -1, \tag{A.6}$$

with $M(-b) = DI$.

$$\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial \theta^e} \gtrless 0 \Leftrightarrow \\
&DI'_B(\theta^e)(u(b)-u(w-\tau)+\theta^*-S+w+\phi\theta^*) \\
&+ SA'_B(\theta^e)(u(s)-u(w-\tau)+\theta^h-S+w+\phi\theta^h) \\
&+ A'(\theta^e)(v+\chi-e) \\
&+ E'(\theta^e)[-\eta] \\
&+ \int_{\theta^*}^{\theta^h} \frac{\partial p(\theta;\theta^e)}{\partial \theta^e}(u(b)-u(w-\tau)+\theta-\eta-S+w+\phi\theta)dF(\theta) \\
&+ \int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta;\theta^e)}{\partial \theta^e}(u(b)-u(s))dF(\theta) \\
&\gtrless \lambda[B(\theta^e)+M(\theta^e)] = 0,
\end{aligned} \tag{A.7}$$

with

$$M(\theta^e) \equiv -(b+\tau-\eta)\int_{\theta^*}^{\theta^h} \frac{\partial p(\theta;\theta^e)}{\partial \theta^e} dF(\theta) - (b-s)\int_{\theta^h}^{\bar{\theta}} \frac{\partial p(\theta;\theta^e)}{\partial \theta^e} dF(\theta),$$

$$B(\theta^e) = \tau L'(\theta^e) - bDI'(\theta^e) + \eta E'(\theta^e) - sSA'(\theta^e).$$

A.3 Derivations for economy without experience rating and welfare impact of experience rating

A.3.1 Derivations economy without experience rating

The employee optimization problem changes when experience rating is set to zero. That is, the accommodation decision is based upon the following maximization problem, which no longer includes the experience rating fee η term:

$$\max_{a\in\{0,1\}} \pi = \begin{cases} S - w - \phi\theta + \mathbb{1}_a(\chi - e) & \theta < \theta^\gamma < \theta^l \\ (1-p(\theta))(S - w - \phi\theta + \mathbb{1}_a(\chi - e)) & \theta^\gamma < \theta < \theta^l \\ 0 & \theta^\gamma < \theta^l < \theta \end{cases}$$

$$s.t.$$

$$\theta^1 = u(w-\tau) - u(b), \theta^2 = u(w-\tau) - u(b) + v,$$

$$\theta^3 = u(w-\tau) - u(s), \theta^4 = u(w-\tau) - u(s) + v.$$

Never-appliers will not be accommodated, as $\pi_{a=1} - \pi_{a=0} = \chi - e < 0$. Compliers with respect to application will be accommodated up to $\theta^* \equiv \frac{\chi - e}{p(\theta^*)\phi} + \frac{S-w}{\phi}$, as $\pi_{a=1} - \pi_{a=0} = \chi - e + p(\theta)(S - w - \phi\theta)$, when ϕ is relatively large.

Always appliers/always suppliers will not be accommodated, as $\pi_{a=1} - \pi_{a=0} = (1-p(\theta))(\chi - e) < 0$. Compliers with respect to labor supply will be accommodated, as $\pi_{a=1} - \pi_{a=0} = (1-p(\theta))(S - w - \phi\theta + \chi - e) > 0$. Never suppliers will not be accommodated, as $\pi_{a=1} - \pi_{a=0} = 0$.

As before, the firm bases its hiring decision on whether expected profits are positive under optimal firm accommodation behavior. Different from the economy with experience rating, profits cannot be negative here, because of Assumption 3 that states that profits are always positive when someone is employed. This assumption ensures that

Table A.3: *Possible locations for the hiring threshold: disability level ranges and their profit levels under optimal accommodation*

Disability range	a **on range**	π
$[0, \theta^1]$	0	$S - w - \phi\theta > 0$
$[\theta^1, \theta^*]$	1	$S - w - \phi\theta + \chi - e > 0$
$[\boldsymbol{\theta^*}, \boldsymbol{\theta^3}]$	**0**	$\boldsymbol{(1 - p(\theta))(S - w - \phi\theta) > 0}$
$[\boldsymbol{\theta^3}, \boldsymbol{\theta^4}]$	**1**	$\boldsymbol{(1 - p(\theta))(S - w - \phi\theta + \chi - e) > 0}$
$[\theta^4, \bar{\theta})$	0	0

negative labor *demand* effects only occur in the model when experience rating is present. Hence, the hiring threshold coincides with θ^4: when the worker is a never-supplier and would not work, the firm decides not to hire them.

The first-order condition with respect to θ^e, in an economy without experience rating, is:

$$\begin{aligned}\frac{\partial \mathcal{L}}{\partial \theta^e} = &\frac{\partial \theta^*}{\partial \theta^e} f(\theta^*) + \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*) v \\ &- \frac{\partial \theta^*}{\partial \theta^e} f(\theta^*) \Big(p(\theta^*) u(b) + (1 - p(\theta^*))(u(w - tau) - \theta^*) \Big) \\ &+ \int_{\theta^*}^{\theta^4} \frac{\partial p(\theta)}{\partial \theta^e} (u(b) - u(w - \tau) + \theta) dF(\theta) \\ &+ \int_{\theta^4}^{\bar{\theta}} \frac{\partial p(\theta)}{\partial \theta^e} (u(b) - u(s)) dF(\theta) \\ &+ \lambda [M(\theta^e) + B(\theta^e)] = 0.\end{aligned}$$

in which

$$M(\theta^e) \equiv - \int_{\theta^*}^{\theta^4} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta)(b + \tau - \eta) - \int_{\theta^4}^{\bar{\theta}} \frac{\partial p(\theta)}{\partial \theta^e} dF(\theta)(b - s).$$

$$\begin{aligned}&B(\theta^e) \equiv \tau L'_B(\theta^e) - bDI'_B(\theta^e). \\ &= \frac{\partial \theta^*}{\partial \theta^e} p(\theta^*) f(\theta^*) [b + \tau].\end{aligned}$$

Note that the behavioral effect $SA'_B(\theta^e)$ is absent. This can be rewritten as:

$$\begin{aligned}\frac{\partial \mathcal{L}}{\partial \theta^e} &= A'(\theta^e) + DI'_B(\theta^e)(u(b) - u(w-\tau) + \theta^*) \\ &\quad + L'_M(\theta^e)(u(w-\tau) - \theta - u(b)) + SA'_M(\theta^e)(u(s) - u(b)) \\ &\quad + \lambda[M(\theta^e) + B(\theta^e)] = 0.\end{aligned}$$

A.3.2 Derivation signs utility terms in welfare analysis experience rating

To derive the signs of the utility terms in the optimality condition with respect to experience rating (Proposition 5), I use the following partial derivatives: $\frac{\partial \theta^*}{\partial \eta} = \frac{1}{\phi} > 0$ and $\frac{\partial \theta^h}{\partial \eta} = -\frac{p(\theta^h)}{(1-p(\theta^h))\phi} < 0$. Working out the partial derivatives of A, SA and DI with respect to η yields: $A'(\eta) = \frac{\partial \theta^*}{\partial \eta} f(\theta^*)$, $DI'(\eta) = -\frac{\partial \theta^*}{\partial \eta} f(\theta^*)p(\theta^*)$ and $DI'(\eta) = -\frac{\partial \theta^*}{\partial \eta} f(\theta^*)p(\theta^*)$.

Using that $\theta^* > \theta^1 = u(w-\tau) - u(b)$ and $\theta^3 < \theta^3 = u(w-\tau) - u(s)$ and using the partial derivatives above gives the signs of the utility terms.

The terms in the utility impact of experience rating have the following signs:

$$A'(\eta)v = \frac{1}{\phi} f(\theta^*)v > 0,$$

$$DI'(\eta)[u(b) - u(w-\tau) + \theta^*] = -\frac{1}{\phi} f(\theta^*)p(\theta^*)[u(b) - u(w-\tau) + \theta^*] < 0,$$

$$SA'(\eta)[u(s) - u(w-\tau) + \theta^h] = \frac{p(\theta^h)}{\phi} f(\theta^h)[u(s) - u(w-\tau) + \theta^h] < 0.$$

Moreover, the fiscal impact consists of the following terms, which are also ambiguous in sign:

$$
\begin{aligned}
&\tau L'(\eta) - bDI'(\eta) + \eta E'(\eta) - sSA'(\eta) \\
&= \tau\Big(p(\theta^*)f(\theta^*)\frac{1}{\phi} - p(\theta^h)f(\theta^h)\frac{1}{\phi}\Big) \\
&+ b\frac{1}{\phi}f(\theta^*)p(\theta^*) \\
&+ \eta\Big(- \frac{(p(\theta^h))^2}{(1-p(\theta^h))\phi}f(\theta^h) - \frac{1}{\phi}f(\theta^*)p(\theta^*)\Big) \\
&- s\big(\frac{p(\theta^h)}{\phi}f(\theta^h)\big) \\
&+ E.
\end{aligned}
$$

Appendix B: Chapter 3

B.1 Sample selection and cleaning

Our first sample restriction limits the sample to those respondents who filled in the key covariates. These consist of, firstly, the specific groups: non-permanent employees (distinguishing two subcategories, agency workers and temporary workers) and permanent employees. Moreover, gender, education level, age, type of disability, and migration background must be filled in. Firm size must also be reported. Yet, firm size was not asked about in the non-permanent survey of wave 1. Therefore, we allow these respondents to have a missing firm size variable.

The second restriction excludes respondents whose firm sector is categorized as 'other', as these are only six observations.

The third sample restriction is to exclude those respondents who reported to be an agency worker or temporary worker but filled in the permanent worker survey. Fifth, we exclude the respondents who entered that their first date of reported sickness was more than one month away from the inclusion period (for wave 2, October 2011 and November 2011, and for wave 3, October 2014 up to and including January 2015.[1])

Next, we restrict the sample to those who have answered the question which informs our key dependent (binary) variable of whether accommodation was provided by the employer.

Finally, we clean and impute values for firm size. For observations in the second and third wave, the size of the total firm is missing. Therefore, there we assume that the total firm is large (more than 100 employees) when an employee works at a branch that is part of a larger firm. Moreover, when it was not indicated whether the branch was part of a large firm, but all other questions in that part of the survey were filled in, we code this as a 'no' for being part of a larger firm. When this question is missing but size of the total firm is filled in, we code this as a 'yes' on whether the branch is part of a larger firm. Then, still, 14 values for whether the branch is part of a large firm are still missing

[1]This data was not available for wave 2.

are still missing on. These are deleted. Moreover, 12 observations are conflicting and therefore dropped: they claim not to be part of a larger firm but total firm size is filled in. Finally, we drop 6 conflicting observations where total firm size is smaller than the branch size, and 20 observations from wave 1 where total firm size was asked for but not answered when a respondent indicated that they were part of a larger firm.

We test whether our results depend on the choice to assume that everyone who indicated that the branch was part of a larger firm was employed at a large firm. We do so by multiple imputation on a logit estimation on both *Small* $\times$ *Medium-sized* or *Large* $\times$ *Medium-sized* using our controls and complete information on total firm size from wave 1, permanent employees. For this estimation, we do not drop the conflicting observations where total firm size is smaller than the branch size but rather as this makes the branch size a perfect predictor for total firm size when we split the two groups into small versus medium or large. We take ten imputed datasets. Table B.1 reports the DID estimates on accommodation for non-permanent employees (column 1), permanent employees (column 2), and for opting out for non-permanent employees (column 3). This does not substantially differ from our main results without multiple imputation. The effect of experience rating on accommodation remains significant while the effect on opting out reduces from 23.5% to 18.0%, but remains significant at the 1% level.

Table B.1: *Main DID results using multiple imputation on firm size*

	Dependent variable		
	accom	accom	opted out
	Sample		
	Non-perm.	Perm.	Non-perm.
After	-0.0085	0.0051	0.1390***
	(0.0421)	(0.0115)	(0.0242)
Large/medium-sized	0.0255		-0.0094*
	(0.0308)		(0.0056)
After × Large/medium-sized	0.0470		0.1798***
	(0.0300)		(0.0300)
Small/medium-sized		-0.0526***	
		(0.0124)	
After × Small/medium-sized		0.0163	
		(0.0212)	
Constant	0.3271***	0.8550***	-0.0134
	(0.0447)	(0.0169)	(0.0220)
Controls	Yes	Yes	Yes
2008 included	No	Yes	No
Observations	2,236	9,518	2,236

Notes: This table reports the main DID analyses using multiple logit imputation on firm size. Column 1 estimates the effect of the introduction of experience rating on accommodation of non-permanent employees, column 2 the effect of the removal of experience rating on accommodation of permanent employees, while column 3 considers the effect of experience rating on opting out of public sick leave insurance for non-permanent workers. The number of imputed datasets is ten for all three analyses. Imputation-corrected and heteroskedasticity-robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

B.2 Robustness checks tables

Table B.2: *Robustness checks accommodation*

Dependent variable	accom	accom	accom	accom	accom	accom	accom	accom
Robustness check	temporary workers	agency workers	no change in contract	no change in contract	no switch to perm. contract	no medium-sized firm	replicating KMP	replicating PR
After	-0.0268	-0.0058	-0.0099	-0.0044	-0.0278	-0.0242	0.0036	0.0045
	(0.0526)	(0.1311)	(0.0511)	(0.0113)	(0.0488)	(0.0484)	(0.0088)	(0.0089)
Large/medium-sized	0.0068	-0.1296	0.0126		-0.0172			
	(0.0398)	(0.0842)	(0.0377)		(0.0359)			
After × Large/medium	0.0468	0.1301	0.0375		0.0655			
	(0.0576)	(0.1386)	(0.0557)		(0.0530)			
Small/medium-sized				-0.0484***				
				(0.0130)				
After × Small/medium				0.0263				
				(0.0224)				
Large						-0.0418		
						(0.0368)		
After × Large						0.0925*		
						(0.0541)		
Non-perm.							-0.4759***	
							(0.0121)	
After × Non-perm.							-0.0038	
							(0.0197)	
TreatmentPR								-0.6485***
								(0.0266)
After × TreatmentPR								0.1514***
								(0.0529)
Constant	0.3518***	0.3401	0.3401***	0.8561***	0.3530***	0.3651***	0.8311***	0.8400***
	(0.0518)	(0.2309)	(0.0505)	(0.0170)	(0.0479)	(0.0512)	(0.0145)	(0.0157)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2008 included	No	No	No	Yes	No	No	No	No
Observations	1,820	416	1,948	9,234	2,220	1,754	12,523	9,781

Notes: The table presents our main DID analyses on accommodation using different samples and treatment group definitions. Columns 1 and 2 examine non-permanent employees, distinguishing between temporary (1) and agency workers (2). Columns 3 and 4 exclude those who change employers or become self-employed, for non-permanent (3) and permanent employees (4). Column 5 excludes non-permanent employees who switch to permanent contracts. Columns 6 and 7 follow Koning et al. (2025), comparing large vs. small firms (6) and estimating the full reform effect by comparing permanent to non-permanent workers (7). Column 8 follows Prinz and Ravesteijn (2020), comparing agency to permanent employees. Heteroskedasticity-robust standard errors are in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B.3: *Robustness checks opting out*

	Dependent variable				
	opted out	opted out	opted out	opted out	opted out
	Robustness check				
	temporary worker	agency worker	no switch in contract	no switch to perm. contract	no medium-sized firm
After	0.0287*	0.3513***	0.0808***	0.0804***	0.0797***
	(0.0152)	(0.1020)	(0.0226)	(0.0210)	(0.0206)
Large/medium	-0.0080*	0.0060	-0.0099	-0.0108*	
	(0.0044)	(0.0187)	(0.0063)	(0.0061)	
After × Large/medium	0.2175***	0.2560**	0.2378***	0.2322***	
	(0.0223)	(0.1118)	(0.0282)	(0.0260)	
Large					-0.0148**
					(0.0073)
After × Large					0.3020***
					(0.0276)
Constant	0.0094	-0.0649	-0.0088	-0.0064	0.0112
	(0.0214)	(0.1870)	(0.0229)	(0.0215)	(0.0257)
Controls	Yes	Yes	Yes	Yes	Yes
2008 included	No	No	No	No	No
Observations	1,820	416	1,948	2,220	1,754

Notes: The table presents our main DID analyses on opting out using different samples and treatment group definitions. Columns 1 and 2 focus on non-permanent employees, distinguishing between temporary (1) and agency workers (2). Column 3 excludes those who change employers or become self-employed during sick leave, while Column 4 excludes those who switch to permanent contracts. Column 5 follows Koning et al. (2025), comparing non-permanent employees in large and small firms.

B.3 Additional DID clustered accommodation types

To explore whether the effects of the reform differed by specific type of accommodation, we estimate DID models using five grouped accommodation categories as dependent variables. We follow the classification of Hill et al. (2016), who distinguish between three categories: task or job adjustments, hours adjustments, and adjustments to the workplace or equipment. We add a fourth category for work on a therapeutic basis/gradual return to work and a fifth 'other' category, which includes, among others, job-oriented education/training and conflict resolution or mediation. We conduct DID analyses on each accommodation type separately, for both non-permanent employees (Table B.4) and permanent employees (Table B.5).

For non-permanent employees, Table B.4 shows a significant (at the 5% level) increase of nearly 8 percentage points in the chance of receiving the 'other' type of accommodation.

Table B.4: *DID results non-permanent employees types of accommodation*

	Dependent variable				
	diff./fewer tasks	fewer hours	therap. work	workpl./equipm.	other
	Sample				
	Non-perm.	Non-perm.	Non-perm.	Non-perm.	Non-perm.
After	-0.0072	-0.0377	0.0064	0.0105	-0.0195
	(0.0281)	(0.0278)	(0.0306)	(0.0182)	(0.0331)
Large/medium	0.0171	-0.0136	0.0308	0.0017	-0.0458*
	(0.0214)	(0.0231)	(0.0223)	(0.0119)	(0.0248)
After × Large/medium	-0.0075	0.0221	0.0016	-0.0162	0.0774**
	(0.0309)	(0.0306)	(0.0341)	(0.0194)	(0.0357)
Constant	0.0953***	0.0735**	0.1606***	0.0031	0.1344***
	(0.0296)	(0.0287)	(0.0311)	(0.0149)	(0.0321)
Controls	Yes	Yes	Yes	Yes	Yes
2008 included	No	No	No	No	No
Observations	2,236	2,236	2,236	2,236	2,236

Notes: This table shows the DID results for non-permanent employees on the different possible types of accommodations, which are binary variables taking the value of 1 if that accommodation was offered and zero if it was not, including the possibility of no other accommodation being provided or a different type of accommodation.

For permanent employees, we find that the removal of experience rating was associated with an increase in work hours adjustments of approximately 5 percentage points and a decrease in adjustments to the workplace or equipment of approximately 3 percentage points. This may reflect a shift from more costly to less costly forms of accommodation. Accommodations are often provided in combination: 43% of accommodated workers received more than one type. To examine the intensive margin of accommodation, we also estimate DID models using the number of accommodation types received as the dependent variable (Table B.6). These analyses show no statistically significant effects, in line with the main analysis.

Table B.5: *DID results permanent employees types of accommodation*

	Dependent variable				
	diff./fewer tasks Sample	fewer hours	therap. work	workpl./equipm.	other
	Perm.	Perm.	Perm.	Perm.	Perm.
After	0.0832***	0.0307**	0.0379***	0.0181**	-0.0578***
	(0.0129)	(0.0125)	(0.0140)	(0.0083)	(0.0095)
Small/medium	-0.0442***	-0.0466***	-0.0336**	-0.0106	0.0097
	(0.0130)	(0.0125)	(0.0149)	(0.0084)	(0.0109)
After × Small/medium	0.0279	0.0534**	-0.0041	-0.0296**	-0.0191
	(0.0240)	(0.0233)	(0.0264)	(0.0142)	(0.0169)
Constant	0.3047***	0.2698***	0.5772***	0.1036***	0.1107***
	(0.0189)	(0.0183)	(0.0208)	(0.0122)	(0.0144)
Controls	Yes	Yes	Yes	Yes	Yes
2008 included	Yes	Yes	Yes	Yes	Yes
Observations	9,512	9,512	9,512	9,512	9,512

Notes: This table shows the DID results for permanent employees on the different possible types of accommodations, which are binary variables taking the value of 1 if that accommodation was offered and zero if it was not, including the possibility of no other accommodation being provided or a different type of accommodation.

Table B.6: *DID results intensive margin of accommodation*

	Dependent variable	
	Number of accom. types Sample	Number of accom. types
	Non-perm.	Perm.
After	-0.0537	0.1487***
	(0.1397)	(0.0266)
Large/medium	0.0075	
	(0.1081)	
After × Large/medium	0.0041	
	(0.1531)	
Small/medium		-0.0508*
		(0.0273)
After × Small/medium		-0.0062
		(0.0496)
Constant	1.3083***	1.5860***
	(0.1389)	(0.0394)
Controls	Yes	Yes
2008 included	No	Yes
Observations	641	7,539

Notes: This table reports the DID results on the intensive margin of accommodation, i.e. the number of different accommodation types summed up, conditional on being accommodated. Column 1 reports this for non-permanent employees and column 2 reports this for permanent employees.

Appendix C: Chapter 4

C.1 Additional analyses

Table C.1: *Placebo DiD results for DI applications and awards*

	DI applications	DI awards
Treatment × Placebo 1	-0.003	0.003
	(0.008)	(0.008)
Treatment × Placebo 2	0.000	-0.004
	(0.008)	(0.007)
Number of observations	92729	92729

Notes: Placebo DiD estimates using pre-reform data, with May 2019 and May 2020 as placebo treatment dates. Dependent variables are DI application (col. 1) and DI award (col. 2). Only the coefficients of the treatment × post interactions are reported; the model also controls for treatment status, post status, and a dummy for spells starting in 2020.

Table C.2: *Placebo DiD analyses on DI benefit types*

	35–80 DI	80–100 DI	Full DI	Full DI through fast-track
Treatment × Placebo 1	0.000	0.007	-0.005	0.000
	(0.004)	(0.005)	(0.006)	(0.000)
Treatment × Placebo 2	-0.003	-0.011**	0.009	0.000
	(0.004)	(0.005)	(0.006)	(0.000)
Number of observations	92,729	92,729	92,729	92,729

Notes: This table reports the DiD placebo analysis run on the pre-measure data, with May 2019 and May 2020 as placebo treatment dates. The dependent variables are dummies for the different types of DI: 35–80 DI (column 1), 80–100 DI (column 2), full DI (column 3) and 80–100 DI through the fast-track measure (column 4). Only the treatment effects of the interaction terms are reported. The full model also includes the treatment dummy and the post dummy separately, as well as a dummy for first year of sick leave in 2020.

Table C.3: *Placebo DiD results for labor market outcomes*

	Labor earnings	Work hours	Employment dummy
Treatment × Placebo 1	6.490	1.967	0.014*
	(38.961)	(1.233)	(0.008)
Treatment × Placebo 2	6.328	0.251	0.008
	(38.368)	(1.242)	(0.008)
Number of observations	92,729	92,729	92,729

Notes: Placebo DiD estimates using pre-reform data, with May 2019 and May 2020 as placebo treatment dates. Dependent variables are labor earnings, work hours, and an employment dummy. Only coefficients of the treatment × post interactions are reported; the model also controls for treatment status, post status, and a dummy for spells starting in 2020.

Table C.4: *DiD treatment effects on employment outcomes one year after EWT by age*

	Labor earnings	Work hours	Employment dummy
Age 60 × Post	-118.208**	-4.237**	-0.026**
	(55.793)	(1.881)	(0.011)
Age 61 × Post	-88.000	-2.586	-0.011
	(53.986)	(1.678)	(0.011)
Age 62 × Post	-128.785**	-2.840	-0.024**
	(57.078)	(1.795)	(0.011)
Age 63 × Post	-217.862***	-5.233***	-0.025**
	(55.586)	(1.623)	(0.011)
Age 64 × Post	-258.575***	-4.264***	-0.018*
	(50.441)	(1.592)	(0.010)
Number of observations	128,172	128,172	128,172

Notes: DiD estimates of heterogeneous treatment effects by age on employment outcomes. Only coefficients of the treatment × post interactions are reported; the model also controls for age dummies, post status, and a dummy for spells starting in 2020. Heteroskedasticity-robust standard errors are in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

C.2 Sick leave and reintegration details

Payment and coverage During sick leave, employers are legally obliged to pay at least 70% of pre-disability earnings Y^{pre} for a maximum of 104 weeks. In specific cases, the National Social Insurance Institute (NSII; UWV) pays sick-leave benefits under the Sickness Act (*Ziektewet*) and assumes the role that would otherwise rest with the employer (for example when a fixed-term contract expires during sickness or for pregnancy-related illness). In Ziektewet cases, the NSII rather than the employer is responsible for reintegration during the sick-leave spell.

Gatekeeper Protocol: timeline and required documents The Gatekeeper Protocol structures reintegration effort with fixed checkpoints and written records:

- **Week 6 (occupational-physician assessment).** An occupational physician draws up a medical problem analysis describing functional limitations, remaining capacities and reintegration goals.
- **Week 8 (action plan).** Within two weeks of the assessment, employer and employee agree a written plan of action that allocates tasks and sets interim targets (e.g., task adjustments, hours, training).
- **Weeks 8–42 (monitoring).** Employer and employee monitor progress and adjust the plan when needed; contacts and interventions are logged.
- **Week 42 (NSII notification).** The employer files a 42-week absence notification with the NSII, formally registering the ongoing sick-leave spell.
- **Week 52 (first-year review).** Employer and employee must evaluate progress against the plan and record updated agreements.
- **Week 104 (DI gateway).** If recovery has not occurred, a *reintegration report* is compiled. This report summarizes activities and outcomes during sick leave and includes the occupational physician's medical assessment. It serves as the basis for DI application.

Compliance checks and sanctions Before any DI assessment, an NSII vocational expert reviews the reintegration report for compliance with Gatekeeper requirements. If the report is inadequate—indicating insufficient reintegration effort—the NSII may *extend* the sick-leave period (up to a maximum of twelve additional months), effectively sanctioning non-compliance. By contrast, when the NSII paid sick-leave benefits under the Ziektewet, no employer-submitted reintegration report exists and this specific compliance check is not applied.

Implications for measurement The fixed checkpoints (weeks 6, 8, 42, 52 and 104) create common event time across cases and define the end-of-waiting-time (EWT) boundary at week 104, i.e. two years after the start of the sickness spell.

C.3 Benefit schedules and work incentives

The Dutch disability insurance system distinguishes three main benefit types: partial DI (35–80% assessed disability), full temporary DI (80–100%), and full permanent DI (80–100%). Each type follows a specific benefit formula that shapes work incentives through earnings thresholds and implicit tax rates. The formulas below use the following notation: Y^{pre} denotes pre-disability earnings (the baseline wage before sickness), Y_t current earnings at time t, and $R = (1-d)\,Y^{pre}$ residual earning capacity implied by disability degree d. WML_t is the statutory monthly minimum wage, and $\beta(d)$ a flat-benefit factor applied in the partial DI continuation phase.

Partial DI (35–80%). Wage-related phase:

$$B_t^{\text{partial,w}} = \begin{cases} \gamma_t\,Y^{pre} - 0.70\,Y_t, & \text{if } Y_t \leq 0.65\,Y^{pre}, \\ 0, & \text{if } Y_t > 0.65\,Y^{pre}, \end{cases} \tag{A1}$$

with $\gamma_t = 0.75$ in the first three months and $\gamma_t = 0.70$ thereafter. Duration ranges from three months to two years depending on work history. Benefits decline by €0.70 for each additional euro of earnings and end if income exceeds 65% of Y^{pre}.

Continuation phase:

$$B_t^{\text{partial,c}} = \begin{cases} \beta(d)\,WML_t, & \text{if } Y_t < 0.50\,R, \\ 0.70\,Y^{pre} - 0.70\,Y_t, & \text{if } 0.50\,R \leq Y_t \leq 0.65\,Y^{pre}, \\ 0, & \text{if } Y_t > 0.65\,Y^{pre}. \end{cases} \tag{A2}$$

The requirement to earn at least 50% of residual capacity to regain the wage-related formula creates strong incentives to return to work.

Full temporary DI (80–100%).

$$B_t^{\text{full temp}} = \begin{cases} 0.70\,Y^{pre} - 0.70\,Y_t, & \text{if } Y_t \leq 0.65\,Y^{pre}, \\ 0, & \text{if } Y_t > 0.65\,Y^{pre}. \end{cases} \tag{A3}$$

The formula mirrors the wage-related phase of partial DI but without the 50% residual-capacity requirement. Benefits therefore end only once earnings exceed 65% of Y^{pre}. Reassessments are possible but rare, so the effective work requirement is weaker than under partial DI.

Full permanent DI (80–100%).

$$B_t^{\text{full perm}} = \begin{cases} 0.75\,Y^{pre} - 0.70\,Y_t, & \text{if } Y_t \leq 0.20\,Y^{pre}, \\ 0, & \text{if } Y_t > 0.20\,Y^{pre}. \end{cases} \tag{A4}$$

This scheme is slightly more generous at low earnings but cuts off benefits once earnings exceed 20% of Y^{pre}, leaving little scope for work. Awards are permanent, with no reassessment.

Implications of the fast-track. The fast-track reform assigns eligible older workers directly to full temporary DI. For individuals who would otherwise have entered partial DI, this implies weaker work incentives because the 50% residual-capacity condition is removed. For those who would otherwise have received full permanent DI, the switch increases the earnings threshold from 20% to 65% of Y^{pre}, modestly expanding scope for work. On balance, the reform reduces incentives for partially disabled workers to use their residual capacity but increases them slightly for those who would otherwise have been classified as fully and permanently disabled.

C.4 Data cleaning and selection

We start from a merged dataset that includes all 42-week notifications for permanent employees and all sick leave spells for non-permanent employees that were at least nine months sick-listed between 2019 and 2024. This has been merged with the DI application register data. We select all unique sick leave spells from the merged sick leave registers and DI application data. If sick leave spells are overlapping, we select the earliest sick leave spell, which deletes only 3.3% of the total number of sick leave spells. We merge this dataset with the labor income register of the NSII, which contains all jobs an individual has had during 2019 and 2024. We keep total wage income and total hours from all jobs. We also record the largest job for each calendar year, which is defined as the one with the most hours recorded. The job sector recorded per year is based on this job. Moreover, we merge the personal characteristics to this data set: date of birth, date of death (if applicable), and gender.

After merging all files, we clean the data and exclude inconsistent information. That is, we start with 1,472,992 unique sick leave spells or DI applications, but 150,536 of these observations only have information on a DI application without any records on the sick leave spell. Therefore, we delete these. As a result, all observations concern sick leave spells of which we know whether or not a DI application was made, and any DI applications without sick leave spells recorded are taken out.

We next restrict the time period and distinguish two samples. The first sample, of sick leave spells that were not affected by the fast-track measure (the post-measure sample), consists of sick leave spells with a start date from the 30th of September 2018 until the 30th of September 2020. The second sample, the post-measure sample, consists of sick leave spells that started on or after the 1st of May 2021 but not after the 31st of December 2021. Any sick leave spells that did not start according to these time restrictions are removed, which leaves us with 505,496 sick leave spells.

Finally, we remove in total 6,890 observations due to lacking or wrong information: no labor income data although recorded as employee (128), no date of birth recorded (3,465), observations with conflicting information, i.e., sick leave spells with 60+ measure record before October 2022 or for individuals < 60 (14), no gender recorded (11). The last step is to apply the final age restriction: considering only individuals that are at least 55 and not older than 65 at their EWT, leading to 128,172 final observations.

Bibliography

Aarts, L., de Jong, P., van Kleef, D., and Kluft, S. (2018). *De rol van private verzekeraars in het hybride WGA stelsel*. APE Rapport 1631.

Ahammer, A. and Packham, A. (2025). Disability insurance screening and worker health. *Journal of Health Economics*, 101:102986.

Aizawa, N., Kim, S., and Rhee, S. (2025). Labour market screening and the design of social insurance: An equilibrium analysis of the labour market for the disabled. *Review of Economic Studies*, 92(1):1–39.

Anderson, P. M. and Meyer, B. D. (2000). The effects of the unemployment insurance payroll tax on wages, employment, claims and denials. *Journal of Public Economics*, 78(1-2):81–106.

Auray, S. and Fuller, D. L. (2020). Eligibility, experience rating, and unemployment insurance take-up. *Quantitative Economics*, 11(3):1059–1107.

Autor, D. and Duggan, M. (2010). *Supporting work: A proposal for modernizing the US disability insurance system*. Center for American Progress and the Hamilton Project.

Autor, D., Kostøl, A., Mogstad, M., and Setzler, B. (2019). Disability benefits, consumption insurance, and household labor supply. *American Economic Review*, 109(7):2613–2654.

Autor, D. H. (2011). The unsustainable rise of the disability rolls in the United States: Causes, consequences, and policy options. NBER Working Paper 17697.

Autor, D. H. and Duggan, M. G. (2003). The rise in the disability rolls and the decline in unemployment. *The Quarterly Journal of Economics*, 118(1):157–206.

Baily, M. N. (1978). Some aspects of optimal unemployment insurance. *Journal of Public Economics*, 10(3):379–402.

Ball, S. and Low, H. (2014). Do self-insurance and disability insurance prevent consumption loss on disability? *Economica*, 81(323):468–490.

Berendsen, E., van Sonsbeek, J.-M., and de Vries, M. (2025). *WIA-instroom 2018–2024 geduid*. UWV Kennisverslag 2025-7.

Böckerman, P., Kanninen, O., and Suoniemi, I. (2018). A kink that makes you sick: The effect of sick pay on absence. *Journal of Applied Econometrics*, 33(4):568–579.

Böheim, R. and Leoni, T. (2020). Do employees' sickness absences react to a change in costs for firms? Evidence from a natural experiment. *The Scandinavian Journal of Economics*, 122(2):553–581.

Borghans, L., Gielen, A. C., and Luttmer, E. F. (2014). Social support substitution and the earnings rebound: Evidence from a regression discontinuity in disability insurance reform. *American Economic Journal: Economic Policy*, 6(4):34–70.

Bound, J. (1989). The health and earnings of rejected disability insurance applicants. *American Economic Review*, 79(3):482–503.

Britton, J. and French, E. (2020). Health and employment amongst older workers. *Fiscal Studies*, 41(1):221–250.

Burkhauser, R. V., Butler, J., and Kim, Y.-W. (1995a). The importance of employer accommodation on the job duration of workers with disabilities: A hazard model approach. *Labour Economics*, 2(1):109–130.

Burkhauser, R. V., Butler, J., and Kim, Y.-W. (1995b). The importance of employer accommodation on the job duration of workers with disabilities: A hazard model approach. *Labour Economics*, 2(1):109–130.

Burkhauser, R. V., Butler, J. S., Kim, Y.-W., and Weathers, R. R. (1999). The importance of accommodation on the timing of disability insurance applications: Results from the Survey of Disability and Work and the Health and Retirement Study. *The Journal of Human Resources*, 34(3):589–611.

Burkhauser, R. V. and Daly, M. C. (2011). *The declining work and welfare of people with disabilities: What went wrong and a strategy for change*. AEI Press.

Burkhauser, R. V., Daly, M. C., and De Jong, P. R. (2008). Curing the Dutch disease: Lessons for United States disability policy. Michigan Retirement Research Center Working Paper 2008-188.

Burkhauser, R. V., Daly, M. C., and Ziebarth, N. R. (2016). Protecting working-age people with disabilities: experiences of four industrialized nations. *Journal for Labour Market Research*, 49(4):367–386.

Campolieti, M. (2002). Moral hazard and disability insurance: On the incidence of hard-to-diagnose dedical conditions in the Canada/Quebec pension plan disability program. *Canadian Public Policy / Analyse de Politiques*, 28(3):419–441.

Campolieti, M. (2005). How accommodations affect the duration of post-injury employment spells. *Journal of Labor Research*, 26:485–499.

Cattaneo, M. D., Idrobo, N., and Titiunik, R. (2019). *A practical introduction to regression discontinuity designs: Foundations*. Cambridge University Press.

Chen, S. and Van der Klaauw, W. (2008). The work disincentive effects of the disability insurance program in the 1990s. *Journal of Econometrics*, 142(2):757–784.

Chetty, R. (2006). A general formula for the optimal level of social insurance. *Journal of Public Economics*, 90(10-11):1879–1901.

Chetty, R. and Finkelstein, A. (2013). Social insurance: Connecting theory to data. In *Handbook of Public Economics*, volume 5, pages 111–193. Elsevier.

Chetty, R. and Saez, E. (2010). Optimal taxation and social insurance with endogenous private insurance. *American Economic Journal: Economic Policy*, 2(2):85–116.

De Groot, N. and Koning, P. (2016). Assessing the effects of disability insurance experience rating. The case of The Netherlands. *Labour Economics*, 41:304–317.

De Groot, N. and Koning, P. (2022). A burden too big to bear? The effect of experience-rated disability insurance premiums on firm bankruptcies and employment. *The Scandinavian Journal of Economics*, 124(1):214–242.

De Jong, P., Lindeboom, M., and Van der Klaauw, B. (2011). Screening disability insurance applications. *Journal of the European Economic Association*, 9(1):106–129.

Deshpande, M. (2016). Does welfare inhibit success? The long-term effects of removing low-income youth from the disability rolls. *American Economic Review*, 106(11):3300–3330.

Deshpande, M. and Lockwood, L. M. (2022). Beyond health: Nonhealth risk and the value of disability insurance. *Econometrica*, 90(4):1781–1810.

Diamond, P. and Sheshinski, E. (1995). Economic aspects of optimal disability benefits. *Journal of Public Economics*, 57(1):1–23.

Dumhs, L. and Van Deursen, C. (2017). *Re-integratie langdurig zieke werknemers. Een vergelijking van de ervaren re-integratieactiviteiten en re-integratieresultaten binnen de eerste 2 ziektejaren tussen werknemers van eigenrisicodragers voor de WGA en die van publiek verzekerden*. UWV Kennisverslag 2017-3.

Everhardt, T. P. and de Jong, P. R. (2011). Return to work after long term sickness: The role of employer based interventions. *De Economist*, 159:361–380.

French, E. and Song, J. (2014). The effect of disability insurance receipt on labor supply. *American Economic Journal: Economic Policy*, 6(2):291–337.

Garcia-Mandicó, S., García-Gómez, P., Gielen, A. C., and O'Donnell, O. (2020). Earnings responses to disability insurance stringency. *Labour Economics*, 66:101880.

Gelber, A., Moore, T. J., and Strand, A. (2017). The effect of disability insurance payments on beneficiaries' earnings. *American Economic Journal: Economic Policy*, 9(3):229–261.

Godard, M., Koning, P., and Lindeboom, M. (2024). Application and award responses to stricter screening in disability insurance. *Journal of Human Resources*, 59(5):1353–1386.

Groenewoud, M., Mallee, L., Slotboom, S., and Visee, H. (2015). *Modernisering Ziektewet. Onderzoek naar gedragsreacties van werkgevers en Ziektewetgerechtigden en ontwikkelingen op de private verzekeringsmarkt*. Regioplan Rapport 14005.

Gruber, J. (1997). The consumption smoothing benefits of unemployment insurance. *The American Economic Review*, 87(1):192–205.

Gruber, J. and Kubik, J. D. (1997). Disability insurance rejection rates and the labor supply of older workers. *Journal of Public Economics*, 64(1):1–23.

Hall, C., Liljeberg, L., and Lindahl, E. (2024). Firm responses to a more generous insurance against high sick pay costs. *Labour Economics*, 86:102477.

Haller, A., Staubli, S., and Zweimüller, J. (2024). Designing disability insurance reforms: Tightening eligibility rules or reducing benefits? *Econometrica*, 92(1):79–110.

Hassink, W. H., Koning, P., and Zwinkels, W. (2015). Employers opting out of public disability insurance: Selection or incentive effects? IZA Discussion Paper 9181.

Hassink, W. H., Koning, P., and Zwinkels, W. (2018). Do firms with low disability risks opt out from public to private insurance? *The BE Journal of Economic Analysis & Policy*, 18(1):20170022.

Hawkins, A. and Simola, S. (2024). Paying for disability insurance: Firm cost sharing and its employment consequences. Working Paper.

Hill, M. J., Maestas, N., and Mullen, K. J. (2016). Employer accommodation and labor supply of disabled workers. *Labour economics*, 41:291–303.

Høgelund, J. and Holm, A. (2014). Worker adaptation and workplace accommodations after the onset of an illness. *IZA Journal of Labor Policy*, 3(1):1–18.

Itskhoki, O. and Moll, B. (2019). Optimal development policies with financial frictions. *Econometrica*, 87(1):139–173.

Jansen, J., Snippen, N., Koning, P., Boot, C., Van Ooijen, R., and Brouwer, S. (2023). Discrepancies between workers with disabilities and their supervisors in reported work accommodations and associations with return to work. *BMC Public Health*, 23(1):525.

Jansen, J., van Ooijen, R., Koning, P., Boot, C. R., and Brouwer, S. (2021). The role of the employer in supporting work participation of workers with disabilities: A systematic literature review using an interdisciplinary approach. *Journal of Occupational Rehabilitation*, 31(4):916–949.

Jansen, L. (2025). A model of employer and employee moral hazard in optimal disability insurance. Working paper.

Jansen, L., Angelini, V., Groneck, M., and van Ooijen, R. (2025). Do stronger employer responsibilities enhance work accommodation for sick-listed workers? Evidence from a Dutch reform. *Health Economics*, 34(12):2297–2316.

Jansen, L., Groneck, M., Koning, P., Spijkerman, M., and van Ooijen, R. (2026). Application and employment effects of reduced screening for disability insurance benefits of older workers. Working paper.

Jansen, L. and Spijkerman, M. (2025). *Vereenvoudigde beoordeling voor 60-plussers: Effecten op het aantal WIA-uitkeringen en de arbeidsparticipatie*. UWV Kennisverslag 2025-11.

Karlström, A., Palme, M., and Svensson, I. (2008). The employment effect of stricter rules for eligibility for DI: Evidence from a natural experiment in Sweden. *Journal of Public Economics*, 92(10-11):2071–2082.

Kolsrud, J., Landais, C., Nilsson, P., and Spinnewijn, J. (2018). The optimal timing of unemployment benefits: Theory and evidence from Sweden. *American Economic Review*, 108(4-5):985–1033.

Koning, P. (2009). Experience rating and the inflow into disability insurance. *De Economist*, 157:315–335.

Koning, P. (2016). Privatizing sick pay: Does it work? *IZA World of Labor 2017-324*.

Koning, P. and Lent, M. v. (2024). Workers' moral hazard and private insurer effort in disability insurance. *Journal of Risk and Insurance*, 91(4):1049–1088.

Koning, P. and Lindeboom, M. (2015). The rise and fall of disability insurance enrollment in the Netherlands. *Journal of Economic Perspectives*, 29(2):151–172.

Koning, P., Muller, P., and Prudon, R. (2025). Why does temporary work increase disability insurance inflow? *Labour Economics*, 96:102719.

Korkeamäki, O. and Kyyrä, T. (2012). Institutional rules, labour demand and retirement through disability programme participation. *Journal of Population Economics*, 25:439–468.

Kyyrä, T. and Paukkeri, T. (2018). Does experience rating reduce sickness and disability claims? Evidence from policy kinks. *Journal of Health Economics*, 61:178–192.

Kyyrä, T. and Tuomala, J. (2023). The effects of employers' disability and unemployment insurance costs on benefit inflows. *Labour Economics*, 85:102434.

Landais, C., Michaillat, P., and Saez, E. (2018). A macroeconomic approach to optimal unemployment insurance: Applications. *American Economic Journal: Economic Policy*, 10(2):182–216.

Landais, C. and Spinnewijn, J. (2021). The value of unemployment insurance. *The Review of Economic Studies*, 88(6):3041–3085.

Lehr, B. (2017). Optimal unemployment insurance with endogenous negative duration dependence. *Public Finance Review*, 45(3):395–422.

Liebert, H. (2019). Does external medical review reduce disability insurance inflow? *Journal of Health Economics*, 64:108–128.

Liebman, J. B. and Smalligan, J. A. (2013). *Proposal 4: An evidence-based path to disability insurance reform*. The Hamilton Project.

Lorenzoni, L., Marino, A., Morgan, D., and James, C. (2019). Health spending projections to 2030: New results based on a revised OECD methodology. OECD Health Working Papers 110.

Low, H. and Pistaferri, L. (2015). Disability insurance and the dynamics of the incentive insurance trade-off. *American Economic Review*, 105(10):2986–3029.

Maestas, N., Mullen, K. J., and Rennane, S. (2019). Unmet need for workplace accommodation. *Journal of Policy Analysis and Management*, 38(4):1004–1027.

Maestas, N., Mullen, K. J., and Strand, A. (2013). Does disability insurance receipt discourage work? Using examiner assignment to estimate causal effects of SSDI receipt. *American Economic Review*, 103(5):1797–1829.

Maestas, N., Mullen, K. J., and Strand, A. (2014). Disability insurance and health insurance reform: Evidence from Massachusetts. *American Economic Review*, 104(5):329–335.

Markussen, S., Røed, K., and Schreiner, R. C. (2017). Can compulsory dialogues nudge sick-listed workers back to work? *The Economic Journal*, 128(610):1276–1303.

Meier, M. and Obermeier, T. (2025). Employer screening and optimal unemployment insurance. *The Economic Journal*, 135(667):671–711.

Meyer, B. D. and Mok, W. K. (2019). Disability, earnings, income and consumption. *Journal of Public Economics*, 171:51–69.

Mongrain, S. and Roberts, J. (2005). Unemployment insurance and experience rating: insurance versus efficiency. *International Economic Review*, 46(4):1303–1319.

Moore, T. J. (2015). The employment effects of terminating disability benefits. *Journal of Public Economics*, 124:30–43.

Morantz, A. (2010). Opting out of workers' compensation in Texas: A survey of large, multistate nonsubscribers. In *Regulation vs. Litigation: Perspectives from Economics and Law*, pages 197–238. University of Chicago Press.

Mullen, K. J. and Staubli, S. (2016). Disability benefit generosity and labor force withdrawal. *Journal of Public Economics*, 143:49–63.

Nature (2025). What makes PhD students happy? Good supervision. *Nature*, 646:775. Editorial.

Nevala, N., Pehkonen, I., Koskela, I., Ruusuvuori, J., and Anttila, H. (2015). Workplace accommodation among persons with disabilities: A systematic review of its effectiveness and barriers or facilitators. *Journal of Occupational Rehabilitation*, 25:432–448.

OCTAS (2023). *Beoordeling van het arbeidsongeschiktheidsstelsel*. OCTAS Tussenrapport.

OCTAS (2024). *Toekomst van het arbeidsongeschiktheidsstelsel*. OCTAS Eindevaluatie.

OECD (2008). *Sickness, disability and work: Breaking the barriers. Vol. 3: Denmark, Finland, Ireland and the Netherlands*. OECD Publishing.

OECD (2022). *Disability, work and inclusion*. OECD Publishing.

OECD (2023a). *Public spending on incapacity (indicator) [Data set]*. OECD Data Explorer.

OECD (2023b). *Ready for the next crisis? Investing in health system resilience*. OECD Health Policy Studies.

OECD (2025). *Health at a glance 2025: OECD indicators*. OECD Publishing.

OECD (2025). *OECD employment outlook 2025: Can we get through the demographic crunch?* OECD Publishing.

Premji, S., Begum, M., and Laila, K. (2025). Claim suppression of occupational injuries and illnesses among precariously employed immigrant workers in Ontario. *New Solutions: A Journal of Environmental and Occupational Health Policy*, 35(1):9–21.

Prinz, D. and Ravesteijn, B. (2020). Employer responsibility in disability insurance: Evidence from the Netherlands. Working paper.

Rijnsburger, P. (2017). *Werkhervatting langdurig zieke vangnetters*. UWV Kennisverslag 2017-4.

Schmieder, J. F., von Wachter, T., and Bender, S. (2016). The effect of unemployment benefits and nonemployment durations on wages. *American Economic Review*, 106(3):739–777.

Schreuder, F. and de Vries, M. (2024). *Volumeontwikkelingen najaar 2024*. UWV Kennisverslag 2024-10.

Staubli, S. (2011). The impact of stricter criteria for disability insurance on labor force participation. *Journal of Public Economics*, 95(9-10):1223–1235.

Tompa, E., Cullen, K., and McLeod, C. (2012). Update on a systematic literature review on the effectiveness of experience rating. *Policy and Practice in Health and Safety*, 10(2):47–65.

Tompa, E., Hogg-Johnson, S., Amick III, B. C., Wang, Y., Shen, E., Mustard, C., Robson, L., and Saunders, R. (2013). Financial incentives of experience rating in workers' compensation: New evidence from a program change in Ontario, Canada. *Journal of Occupational and Environmental Medicine*, 55(3):292–304.

Tweede Kamer der Staten-Generaal (2012). *Memorie van toelichting: Wet beperking ziekteverzuim en arbeidsongeschiktheid vangnetters*. Kamerstuk 33241-3.

Tweede Kamer der Staten-Generaal (2025). *Antwoord op vragen van het lid Saris over het bericht 'Steeds meer longcovidpatiënten arbeidsongeschikt, "topje van de ijsberg"*. Kamervragen (aanhangsel) 2024/2025-1658.

UWV (2013). *Gedifferentieerde premie WGA 2013*.

UWV (2014). *Gedifferentieerde premies WGA en ZW 2014*.

Van der Burg, C., Klein Hesselink, D., and Molenaar-Cox, P. (2011). *Profilering langdurig zieke vangnetters. Kenmerken en begeleiding van de vangnetpopulatie op basis van een dossieronderzoek*. AStri Rapport.

Van Ooijen, R., Koning, P., Boot, C. R., and Brouwer, S. (2024). Implemented disability-related policies and practices and sustained employment of partially disabled employees: Evidence from linked survey and register data. *Scandinavian Journal of Work, Environment & Health*, 50(6):437.

Van Sonsbeek, J.-M. and Gradus, R. H. (2013). Estimating the effects of recent disability reforms in the Netherlands. *Oxford Economic Papers*, 65(4):832–855.

Von Wachter, T., Song, J., and Manchester, J. (2011). Trends in employment and earnings of allowed and rejected applicants to the Social Security Disability Insurance Program. *American Economic Review*, 101(7):3308–3329.

Nederlandse samenvatting

Gezondheidsproblemen kunnen grote gevolgen hebben voor het inkomen van huishoudens. In OESO-landen leeft gemiddeld één op de vier mensen met een arbeidsongeschiktheid in een huishouden onder de armoedegrens (OECD, 2022). Om dit risico te verkleinen, zijn werknemers verzekerd via publieke arbeidsongeschiktheidsregelingen. Tegelijkertijd zijn deze regelingen kostbaar voor de overheid. Door vergrijzing en het verhogen van de pensioenleeftijd neemt het aantal mensen dat een uitkering ontvangt bovendien toe. Zo is in Nederland de WIA-instroom (Wet Werk en Inkomen naar Arbeidsvermogen, de publieke arbeidsongeschiktheidsverzekering) tussen 2018 en 2024 met 60% gestegen (Berendsen et al., 2025)

Daarom is het belangrijk om goed na te denken over de inrichting van het arbeidsongeschiktheidsstelsel. Een goed systeem moet een balans vinden tussen twee doelen. Aan de ene kant moet het mensen beschermen tegen inkomensverlies als zij door ziekte niet (volledig) kunnen werken. Aan de andere kant kunnen hogere uitkeringen of soepelere toegang ertoe leiden dat mensen minder prikkels hebben om te blijven werken of om terug te keren naar werk. Wanneer verzekering het gedrag van werknemers beïnvloedt, wordt dit *moreel risico* aan de kant van de werknemer genoemd.

Wat vaak echter minder aandacht krijgt, is de rol van werkgevers. Werkgevers kunnen werkplekaanpassingen aanbieden: bijvoorbeeld taken wijzigen, uren verminderen, of de werkplek fysiek wijzigen. Dit kan ertoe leiden dat werknemers met gezondheidsproblemen toch (deels) kunnen blijven werken. Dit kan instroom in de WIA voorkomen. Maar werkgevers hebben niet altijd voldoende financiële prikkels om hierin te investeren omdat de kosten van de uitkering grotendeels publiek worden gedragen. Ook dit wordt *moreel risico* genoemd, maar dan aan de kant van de werkgever.

Voor een goed ontwopren arbeidsongeschiktheidsstelsel is het daarom belangrijk om zowel het gedrag van werknemers als dat van werkgevers mee te nemen. In deze dissertatie onderzoek ik eerst theoretisch hoe een optimaal stelsel eruitziet wanneer rekening wordt gehouden met beide partijen (Hoofdstuk 2). Vervolgens analyseer ik met Nederlandse data hoe werknemers en werkgevers reageren op hervormingen van de WIA (Hoofdstukken 3 en 4).

Hoofdstuk 2: Optimale arbeidsongeschiktheidsverzekeringen: Werkgevers- en werknemersprikkels.

In dit hoofdstuk ontwikkel ik een theoretisch model om te onderzoeken hoe een publieke arbeidsongeschiktheidsverzekering het best kan worden vormgegeven wanneer rekening wordt gehouden met het gedrag van zowel werkgevers als werknemers. Hiermee kan ik het optimale niveau bepalen van beleidsinstrumenten die gericht zijn op werknemersgedrag, zoals de hoogte van de uitkering en de strengheid van de medische beoordeling. Daarnaast kan ik ook het optimale niveau bepalen van een beleidsinstrument dat zich richt op werkgevers, namelijk premiedifferentiatie. Dit betekent dat werkgevers hogere of lagere premies betalen afhankelijk van hoeveel werknemers vanuit hun bedrijf de WIA instromen. Het idee hierachter is dat werkgevers zo een financiële prikkel krijgen om arbeidsongeschiktheid te voorkomen, bijvoorbeeld door werk aan te passen of re-integratie te stimuleren. Uit mijn analyse blijkt dat het optimale niveau van premiedifferentiatie een uitruil bevat tussen twee effecten. Enerzijds kan het werkplekaanpassingen stimuleren, anderzijds kan het ertoe leiden dat werkgevers terughoudender worden bij het aannemen van mensen met een hoger gezondheidsrisico. Tot slot laat het model zien dat de optimale hoogte van uitkeringen en strengheid van beoordelingen veranderen wanneer ook het gedrag van werknemersgedrag wordt meegenomen.

Hoofdstuk 3: Leiden sterkere werkgeversverantwoordelijkheden tot meer werkplekaanpassingen voor langdurig zieke werknemers? Bewijs uit een Nederlandse hervorming.

In dit hoofdstuk onderzoeken wij het effect van premiedifferentiatie in de Ziektewet en de WIA op werkplekaanpassingen voor langdurig zieke werknemers. Daarnaast bekijken wij of premiedifferentiatie invloed heeft op de keuze van werkgevers om hun niet-vaste werknemers (zogeheten vangnetters) publiek te verzekeren voor de Ziektewet. Hiervoor maken wij gebruik van een hervorming uit 2013, de BeZaVa (Wet Beperking Ziekteverzuim en Arbeidsongeschiktheid Vangnetters). Deze hervorming breidde premiedifferentiatie uit van alleen vaste werknemers naar ook vangnetters. Bovendien werd de mate van premiedifferentiatie gelinkt aan de grootte van het bedrijf. We gebruiken enquêtegegevens van het UWV onder werknemers die negen maanden ziek zijn. Onze resultaten laten zien dat premiedifferentiatie geen effect heeft op het aanbieden van werkplekaanpassingen van deze groep. Wel vinden we een duidelijk positief effect op het aantal bedrijven dat besluit zich niet meer publiek te verzekeren voor de Ziektewetuitkeringen van vangnetters. Daarnaast blijken werkplekaanpassingen niet gelijk verdeeld te zijn. Jongere werknemers, hoger opgeleiden, en werknemers in grotere bedrijven krijgen vaker aanpassingen aangeboden. Werknemers met hart- en vaatziekten ontvangen juist minder vaak aanpassingen.

Hoofdstuk 4: Aanvraag- en arbeidsmarkteffecten van verminderde screening bij arbeidsongeschiktheidsuitkeringen voor oudere werknemers.

In dit hoofdstuk onderzoeken wij de effecten van de zogeheten 60+-versnellingsmaatregel. Deze maatregel werd in 2022 door het UWV ingevoerd om de lange wachttijden voor WIA-beoordelingen te verkorten. Werknemers van 60 jaar en ouder die al twee jaar ziek waren, kregen zonder medische beoordeling toegang tot een WIA-uitkering, namelijk een WGA 80-100 uitkering: een volledige maar niet permanente uitkering. We gebruiken administratieve gegevens van het UWV over alle ziekgemelde werknemers in Nederland om het effect van deze maatregel te meten. We vinden dat het aantal WIA-aanvragen beperkt toeneemt (met 1,2 procentpunt). Het aantal toekenningen stijgt echter sterk. Dit is een mechanisch effect: doordat de toegang eenvoudiger wordt, krijgen automatisch meer mensen een uitkering. Daarnaast vinden we aanwijzingen voor moreel risicogedrag wat betreft werkgelegenheid: door de verhoogde toegang tot uitkeringen wordt er minder gewerkt. Drie jaar na het begin van de ziekteperiode is de werkgelegenheid 2,1 procentpunt lager. De effecten zijn over het algemeen het grootst voor vrouwen, werknemers in de dienstensector en werknemers in het laagste inkomenskwintiel vóór arbeidsongeschiktheid.

university of groningen

Disability Insurance Design with Employer and Employee Behavior

Laura Jansen

Health problems, population ageing, and rising inflow into disability insurance programs have increased the urgency of carefully designing disability insurance systems. A well-functioning system must balance two objectives: protecting individuals against income loss when they cannot work due to illness, while maintaining incentives to remain at or return to work. When the disability insurance system reduces work incentives, this is referred to as moral hazard on the employee side. However, the role of employers is often overlooked. Employers can provide workplace accommodations, such as modifying tasks, reducing hours, or making physical adaptations to the work environment, that enable workers with health problems to remain employed and can reduce disability benefit take-up. Yet, employers may not face sufficient incentives to invest in such accommodations. This is called employer-side moral hazard.

This thesis studies how disability insurance systems can be designed when accounting for behavioral responses by both employees and employers. The first study develops a theoretical framework to characterize the optimal disability insurance system in the presence of moral hazard on both sides of the labor market. The second study empirically examines employer-side moral hazard by analyzing how an employer-side policy instrument, experience rating, affects workplace accommodation for long-term sick-listed workers in the Netherlands. The final study turns to employee-side moral hazard and estimates the effects of a Dutch reform that eliminated medical screening for applicants aged 60 and above on disability insurance applications and employment.

rug.nl/feb/research