Social Insurance for Entrepreneurs*

Youssef Benzarti† Jarkko Harju‡ Tuomas Matikka§
Ella Mattinen¶ Alisa Tazhitdinova†

Abstract

We estimate entrepreneurs' preferences for social insurance coverage and the extent of adverse selection and moral hazard in social insurance for entrepreneurs in Finland. We show that when given a choice, entrepreneurs prefer a level of coverage that is on average 20% lower than what is mandated for wage earners. To estimate the extent of moral hazard and adverse selection, we leverage a reform that allowed a subset of entrepreneurs to freely choose their level of social insurance contributions and coverage. We find that both moral hazard and adverse selection are close to zero. These findings are supported by survey evidence showing that perceived health and knowledge about the benefits are not significantly associated with the actual social insurance coverage choices of entrepreneurs.

Keywords: entrepreneurs; social insurance; moral hazard, adverse selection.

JEL: H55, J32, L26.

*We thank seminar participants at University of Oslo, Stanford, Tampere University, VATT, the SustAgeable Consortium Meeting, STAX, the 2023 NTA Meetings, and 2024 IIPF meetings for insightful comments.

†University of California, Santa Barbara and NBER

‡Tampere University, FIT, VATT and CESifo

§VATT, FIT and CESifo

¶Tampere University, FIT and VATT

1 Introduction

Self-employment, independent contract work and small business ownership have been steadily rising in recent decades in OECD countries (Boeri et al., 2020). The majority of such small business owners are exposed to higher levels of income volatility than wage earners, and may thus benefit from social insurance such as sick pay and disability benefits (Audoly, 2022; Boeri et al., 2020). Yet, entrepreneurs are rarely covered by the traditional social insurance programs. Most OECD countries provide some form of social insurance coverage to the self-employed, but it tends to be either voluntary or only ensuring against extreme poverty. Insuring small business owners is challenging as they are likely to be well informed about the riskiness of their businesses and may have a greater ability to take advantage of insurance benefits compared to wage earners. As a result, social insurance provision for entrepreneurs is expected to be adversely selected and costly because of potential moral hazard responses. However, the actual extent of adverse selection and moral hazard among business owners have not been analyzed before, mostly due to the lack of identifying variation. Furthermore, it is unknown whether entrepreneurs even desire more extensive social insurance coverage, or would they rather invest their scarce financial resources into their businesses instead.

In this paper, we take advantage of a unique setting in Finland to provide novel evidence on small business owners' willingness to pay for social insurance (SI) and the extent of adverse selection and moral hazard in this market. In Finland, some small business owners can freely choose their SI coverage, determining the amount of their SI contributions, and hence the generosity of pension, sick pay, and parental leave benefits they would receive. Prior to 2011, business owners whose ownership share of their firm exceeded 50% could choose their level of SI contributions. Meanwhile, those with smaller ownership shares were defaulted into the traditional SI scheme, similarly to wage earners, with contributions and benefits set according to one's earnings with no freedom to deviate from this rule. Starting in 2011, the ownership threshold was lowered to 30%. As a result of this policy change, individuals who owned between 31–50% of their company could now more freely determine

their level of SI contributions, providing us with variation in insurance choices. We use this exogenous policy change to estimate entrepreneurs' preferences for SI, and the extent of adverse selection and moral hazard using linked administrative data on SI contributions, benefit claims, and individual and business tax returns. In addition, we link these data to entrepreneurial surveys conducted by Statistics Finland, including questions about the SI claims and attitudes towards the SI system, to gain novel insight on the potential mechanisms behind our observations from the administrative data.

First, we find that business owners who can more freely choose their SI coverage select a much lower level of social insurance compared to similar business owners with no freedom to choose. This suggests that business owners with freedom to choose prefer lower levels of SI coverage compared to that in the strictly mandated system in Finland. As an example of the magnitude, those who became eligible to choose their SI coverage in the 2011 reform (those with in ownership share of their firm between 31–50%) decreased their SI contributions and coverage after the reform by 15–20% compared to owners with no freedom to choose their coverage (those with 10-30% ownership share). Our survey evidence reveals that the lack of trust in the social insurance system, plans to work during retirement and liquidity constraints are the main stated reasons for low SI coverage choices. However, when linking administrative data to the survey answers, the actual coverage choices are surprisingly similar regardless of the stated reasons for low coverage choices in the survey.

In addition to preferences, SI coverage choices can be driven by perceived or observed risks, giving rise to adverse selection or moral hazard responses (Chetty and Finkelstein, 2013; Chiappori and Salanie, 2000). However, we find only a weak relationship between SI coverage choices and SI claims, indicating no significant selection by risks. Relatedly, we observe only small anticipatory responses in years leading to a claim event such as sickness, child bird, and retirement. Entrepreneurs with freedom to choose their coverage increase their social insurance contributions by only 5% or less in years preceding these events.

Pensions are likely to form the most important part of social insurance benefits,

as most entrepreneurs are likely to consider retiring and claiming pension benefits at least some point in their later life. However, we find only small differences in the retirement timing between those entrepreneurs who are free to choose their SI coverage and those who are not, despite the fact the low coverage choices of those with freedom to choose lead to approximately 15% smaller pension income when retired (measured at age 68). Our survey evidence indicates that many business owners plan to replace mandatory SI contributions with private savings. Indeed, we observe that despite lower pension benefits, the gross incomes of retired business owners are very similar for both those who were and were not able to freely choose their SI coverage. Our evidence suggests that this crowd-out effect largely stems from increased savings within the firm among those with freedom to choose their SI coverage.

Our results on the relationship between social insurance coverage and claims indicate that moral hazard and adverse selection are both weak in our setting. We use an event study design and the 2011 reform to more carefully separate potential moral hazard responses from adverse selection. To do so, we compare the SI claims of individuals who were affected by the policy change (those with 30–50% ownership share) to those who were unaffected by it (10-30% or 50-70% ownership shares) before and after the 2011 reform. This approach exploits the fact that the assignment to the treatment and control groups is fixed over time. Therefore, when comparing pre- and post-reform claims of individuals, we compare the behavior of the same groups of individuals over time. This implies that the adverse selection channel is shutdown, and a simple difference recovers moral hazard responses as long as the risk profiles of individuals are time-invariant or change similarly in both the treatment and controls groups over time due to, for example, inherent risk type volatility or institutional and demographic changes.

Our event-study estimates show moral hazard responses are weak and economically insignificant. In fact, in contrast to what is assumed in the presence of moral hazard responses, we find that SI claims increase by 1-2% in response to an average 20% decrease

in SI coverage in the treatment group after the reform. We find similar results for both the intensive and extensive claiming margins and when including or excluding individual fixed effects. Also, we observe a similar pattern in claims for those treatment group business owners who decreased, increased or did not change their SI contributions in the 2011 reform, indicating that moral hazard does not appear to drive claiming behavior.

To better understand the mechanisms behind the lack of sorting by risk types in our setting, we study the role of information and learning. We find that the degree of sorting does not quickly increase in time. In other words, if entrepreneurs learn about the incentives they face or the benefits they are eligible for, this learning happens only slowly. In particular, we do not observe large differences in individuals' claiming behavior around the birth of their first vs. second or third child. Since childbirth is known to the claimants in advance, the lack of positive correlation cannot be attributed to unfamiliarity with one's risk type. Furthermore, survey evidence shows that the perceived health status of entrepreneurs is not associated with their actual SI coverage choices, which is consistent with the lack of adverse selection. However, we observe a small positive correlation with SI coverage choices and stated knowledge about benefit eligibility among the survey respondents.

Our results suggest that moral hazard responses are weak and adverse selection is not prevalent in the social insurance market for entrepreneurs. The latter suggests that a stricter social insurance mandate is not necessary for entrepreneurs. Instead, such a system can be distortionary, as it can impose unnecessary liquidity constraints on younger firms (Benzarti et al., 2020). On the other hand, the lack of moral hazard responses suggest that entrepreneurs do not take advantage the SI system. Therefore, the government may offer a coverage that is of similar generosity as for wage earners in the regular SI scheme.

To the best of our knowledge, we are the first study to estimate moral hazard and adverse selection responses of entrepreneurs. The previous literature has estimated the degree of adverse selection and the extent of moral hazard in various other settings (e.g. Finkelstein and McGarry, 2006; Einav et al., 2010; Finkelstein and Poterba, 2004; Landais

et al., 2021). Focusing on entrepreneurs is important because they face unique risks, making the provision of social insurance an important policy question. They typically have greater ability to respond to incentives and are more likely to have private information on their risks, thus making the moral hazard and adverse selections concerns particularly acute.

2 Institutional Setting and Data

2.1 The Finnish Social Insurance System

Overview. The Finnish social insurance (SI) system is financed by taxes and social insurance contributions that are based on individual-level earnings. The contributions are paid by both employees and employers. SI contributions are income-tax deductible, but otherwise the contributions do not depend on income taxes. The system provides benefits for individuals who live in Finland on a permanent basis, or work in the country temporarily. It provides a wide range of benefits, including old age and disability pensions, sickness, unemployment, parental, and rehabilitation benefits. The level of SI benefits are based on previously earned income and, therefore, are a function of SI contributions. In addition to earnings-related benefits, there are flat-rate minimum benefits available for those with low or no previous earnings.[1] In addition to these social insurance benefits, publicly provided health care is available to everyone.

TyEL and YEL Contribution Schemes. Wage earners receive social insurance benefits under the TyEL insurance scheme ("Työnantajan eläkevakuutus" in Finnish). Social insurance contributions of TyEL-insured individuals are fixed with no option to choose one's SI contributions or coverage. The contributions are based on a government-mandated rate and are paid based on earnings. In 2016, the total contribution rate was 23.6% including both

[1] Additionally, there is a means-tested last-resort income support available for those households whose income from work, benefits or assets do not cover their essential daily needs such as food and housing.

the employee and employer-level contributions.[2]

Self-employed individuals and owners of partnerships and privately held corporations have access to social insurance under one of two schemes. The YEL insurance scheme ("Yrittäjän eläkelaki") applies to all self-employed individuals and owners of unincorporated partnership firms who own, alone or together with family members, at least a certain share of their firm.[3] In addition, owners of privately held corporations who hold a leading position in the firm (such as the CEO or chairman of the board) and own a certain percentage share of the company are considered to be YEL entrepreneurs.[4] If these conditions are not met, entrepreneurs are automatically subject to the TyEL insurance scheme, i.e. the same insurance program as for the wage earners.

The main difference between the TyEL and YEL schemes is that while the TyEL owners have no discretion over their SI contributions, the YEL owners can more freely set their contribution level. To do this, the YEL owners are required to report an income level from which the SI contributions are paid to an insurance company that administers the SI contributions. The reported income needs to be within a certain range (in 2016, between €7,557 and €171,625), and the owners can adjust their reported incomes at any point in time.[5] For simplicity, we refer to the reported income as the *social insurance (SI) income*, and to their overall earnings as their *labor income (LI)*.

The YEL regulations state that the chosen SI income should reflect an income level the owner would pay to an outside employee for similar tasks she conducts when working in the company. Therefore, the rational of the policy is that social insurance would insure

[2]Contribution rates vary slightly over time and are set annually. The contribution rates also vary by age, and are higher for older individuals. In 2016, the TyEL rate for individuals aged 53 or older is 25.2% instead of 23.6%.

[3]In addition, to qualify for the YEL, entrepreneurs must meet the following conditions: they have to be 18 to 67 years old, their firm must be at least four months old, and the work contribution they derive from the firm has to be at least €7,557 per year (in 2016). The Self-employed Persons' Pension Act (HE 1272/2006) is available online here (in Finnish): https://www.finlex.fi/fi/laki/alkup/2006/20061272 (accessed May 24, 2019). More information in English can be found here: https://www.ilmarinen.fi/en/self-employed-person/self-employed-persons-pension-insurance/yel-contributions (accessed May 24, 2019).

[4]The above conditions are binding, and entrepreneurs cannot opt out from the YEL insurance scheme.

[5]To update the SI income, an entrepreneur would have to contact the pension company and fill out minimal paperwork. There are no restrictions on how frequently such changes can be made.

against earnings losses at an adequate level for the business owners. However, there is no strict enforcement of this rule, mainly due to the fact the this hypothetical earnings level of an outside employee is not observable. Note that under the YEL scheme, the entrepreneur self-reports the value of their SI income, and it is not automatically adjusted when one's earnings increase or decrease. In contrast, the contributions and coverage levels automatically change according to one's earnings under the TyEL scheme. The contribution rate that applies to the SI income under the YEL scheme is similar to the contribution rate under the TyEL scheme (23.7% instead of 23.6%).[6] Importantly, there are no differences in income taxation between YEL and TyEL owners.

To summarize, YEL owners have significantly more discretion over their level of mandatory social insurance contributions than TyEL owners. Since future benefit entitlements are a function of contribution levels, when YEL owners change their self-reported SI income, they implicitly change the level of benefits they will be entitled to in the future. On the other hand, the contributions and benefit entitlements of TyEL owners are set automatically as a function of their labor earnings.

Ownership Share Thresholds and the 2011 YEL Reform. To qualify for the YEL insurance scheme, a business owner must own, alone or together with family members, a portion of the firm. Before 2011, this threshold was set to 50%. In 2011, this threshold was decreased to the current level of 30%. This means that from 2011 onward, business owners with a 30–50% ownership share could more freely determine their level of social insurance contributions.[7] Apart from this reform, there were no other notable changes to the social insurance program during the time period we study.

Entrepreneurs with ownership shares between 30–50% could opt out of switching

[6]YEL contribution rates and the minimum and maximum YEL income levels vary slightly over time and are determined annually. The contribution rates also vary by age, and are higher for older individuals. In 2016, the YEL contribution rate for persons aged 53 to 62 was 25.1% instead of 23.7%. In addition, the YEL contribution rates are lower for start up business-owners: 19.6% for persons aged 53 to 62, and 18.4% for others.

[7]More information about the reform (HE 135/2010) can be found here (in Finnish): https://www.finlex.fi/fi/esitykset/he/2010/20100135 (accessed May 24, 2019).

to the YEL scheme for 3 years. However, in our data we observe that most of the switches to the YEL scheme occurred immediately after the reform. In addition, the newly eligible YEL owners with 30–50% ownership received a 22% discount on their total annual SI contributions for a maximum of three years. Under the discount period, their SI benefits are based on their reported SI income in spite of the discounted SI payments.

Benefit Entitlements. We focus on three major earnings-related benefits for entrepreneurs: retirement benefits, sick pay benefits, and parental leave benefits.

Old-age pension benefits and *disability pension benefits* are calculated based on all SI income (or earnings for wage earners) accumulated during a working career, whether as an employee or as an entrepreneur. Yearly contributions are generally weighted equally (at approximately 1.5% in 2023), so that the level of pension increases with the number of working years and one's SI contributions irrespective of when these contributions are made during one's career.[8]

The pension benefits are not capped. Claiming pension benefits does not prevent working or running a business, meaning that entrepreneurs can still actively run their business irrespective of collecting old-age pension benefits.

Pension benefits are likely to be the most relevant benefit for many entrepreneurs. First, most entrepreneurs are likely to consider retiring or claiming pension benefits at some point. Second, the official Finnish name of the YEL program, "Yrittäjien eläkevakuutus", stands for "Pension insurance for entrepreneurs" in English, even though it does include other key insurance benefits as well. Thus entrepreneurs are likely to be aware that the YEL contributions will at least affect their future pension benefits. Therefore, a key focus of our analysis will be on analyzing the pension claims of entrepreneurs.

Parental leave benefits can be claimed by either parent or jointly up to a maximum

[8]For example, if business owner chose SI =€10000 for 15 years and SI =€30000 for 20 years, the approximate yearly pension amount is $0.015(15 \cdot 10000 + 20 \cdot 30000)$. The exact pension benefit, however, will be slightly different because of special provisions related to standard retirement age and small yearly fluctuations in regulations.

of six months. A typical parental leave is claimed when the child turns three months old (after the end of maternity leave) and ends when the child turns nine months old.[9] Until 2015, the benefit was equal to approximately 70% of an individual's SI income in the past 12 months for SI incomes up to €32,892, and the replacement rates for higher SI incomes are lower. For example, in 2010, an individual with SI income of €50,000 would receive a parental allowance of €99.6 per working day.

Sick pay benefits can be claimed when individuals face a long-term health issue. Eligibility for sick pay benefits is based on a medical review. The replacement rate follows the same rules as the parental benefits. For TyEL owners, there is a waiting period during the first nine days of a sickness spell, after which an entrepreneur can claim sickness benefits up to a maximum of 300 working days. YEL owners are eligible for sick day benefits after a one-day waiting period. For these reasons, we will focus on sick day benefit spells beyond the first nine days. Below, we discuss the potential implications of the difference in waiting days between the TyEL and YEL insurance schemes when interpreting the results on sick pay claims after the 2011 reform.

Entrepreneurs are also entitled to unemployment benefits under certain conditions. However, we will not include unemployment benefits in our baseline analysis for the following reasons: first, in order to qualify for earnings-related unemployment benefits, an individual must have been a member of an unemployment fund for the past six months. Membership in an unemployment fund is voluntary and subject to a small annual fee. Without unemployment fund membership, individuals are only eligible for flat-rate unemployment benefits (approximately €37 per work day in 2024) which do not depend on SI income. While over 70% of wage earners in Finland are members of unemployment funds, the membership

[9] In addition to parental leave, parents can claim a maternity leave and a home care leave. The maternity leave is typically claimed up to one month prior to birth and for a maximum of 4 months. Maternity leave benefits also depends on one's SI income. However, since nearly all mothers claim this leave, we do not study this benefit. The home care leave is typically claimed after the conclusion of the parental leave and until the child turns three years old. The home care leave has lower replacement rates compared to the maternity and parental leaves, and in many municipalities it does not depend on one's SI income. For this reason, we exclude this benefit from our analysis. Maternity leave and parental leave can overlap by at most 3 weeks.

rate among entrepreneurs is very small. A report on unemployment fund memberships by the Finnish Financial Supervisory Authority (FSA, 2010) notes that approximately 27,000 entrepreneurs (out of more than 200,000 entrepreneurs in total) were members of an unemployment fund in 2010. Based on survey data from Statistics Finland (described in more detail below), we observe that only 10% of entrepreneurs who answered the survey belong to an unemployment fund. Therefore, unemployment benefits do not depend on the selected SI income for a large majority of entrepreneurs, which implies that choice of SI income by unemployment risk types do not apply for a large share of entrepreneurs. Furthermore, we cannot identify unemployment fund members in our data, which makes it impossible to conduct a separate analysis for entrepreneurs eligible for earnings-related unemployment benefits. Second, there are strict rules for unemployment benefit eligibility for entrepreneurs. Eligibility requires that the claimant registers with an unemployment office as an unemployed job seeker, is in search of full-time work, and is ready to start a new job once a suitable job opportunity appears. In practice, these requirements mean that an entrepreneur cannot simultaneously act as an owner of a business and collect unemployment benefits. Therefore, in practice the eligibility to unemployment benefits requires quitting the business and leaving the YEL insurance scheme.

2.2 Data

We use several administrative data sets in this study: (1) SI contribution data from the two largest Finnish pension companies that administer the TyEL and YEL contribution schemes, (2) individual-level annual benefit claims data, and (3) individual and corporate tax return data covering all entrepreneurs in Finland, including both firm and owner-level outcomes and other key characteristics. We complement the administrative data with survey data from Statistics Finland.

SI Contribution Data. YEL contribution-level data is obtained from the two largest Finnish pension companies, which together cover approximately 70% of all entrepreneurs under the YEL insurance scheme. These data are available from 2006 to 2014 and contain the base used to calculate SI coverage and benefits, the amount of annual SI contributions, and the relevant contract dates.

Benefit Claims Data. We observe all benefits claimed by the TyEL and YEL business owners. We focus on the following earnings-related benefit claims: pensions, sick pay and parental leave benefits. The data provide information on the annual amount (in euros) of benefits received. We combine this dataset with information on individuals' SI contributions and benefit formulas in order to infer the number of days claimed. We identify retirement dates from the pension benefit claims. Our analysis focuses on the following claims measures. For sick pay, we record the number of sick days claimed during a given year for for TyEL owners, and for YEL we record the max(0, sick days - 10) to account for differences in sick pay claim rules discussed above. For parental leave benefits, we record the number of days taken for parental leave in a given year, both for TyEL and YEL owners. For pensions claims, we record whether or not a given individual retired in a given year. We use the pension claims to measure the annual pension incomes of retired individuals.

Tax Return Data. We use tax return data covering the full population of business owners and their firms from 2006 to 2016, extracted from the Finnish Tax Administration database. The data set includes information on the financial statements and tax records of all Finnish businesses and their owners and detailed information on each individual's total income and its composition. Importantly, this data set allows us to observe SI contributions of the business owners under the TyEL scheme.

Survey Data. We complement our administrative data with data from two separate surveys conducted by Statistics Finland. The first survey carried out in 2013 was targeted at

entrepreneurs and the self-employed (Itsensätyöllistäjät Suomessa, 2013) garnered 1,573 responses. The survey included questions regarding working conditions for entrepreneurs, their views on their business potential, incomes, and social insurance system for entrepreneurs. The second survey (Yrittäjyys Suomessa, 2017) was conducted in 2017, covers 1,072 individuals (13.4% response rate), out of whom 94.8% were under the YEL scheme. The survey asked the respondents about their businesses, health and well-being, absences related to family or illness, and awareness and attitudes toward the social insurance system, as well as insights into their retirement plans.

In this paper, we focus on questions pertaining to pensions, social insurance and subjective well-being. We combine the survey data with the administrative data using individual-level identifiers. Therefore, we can link perceptions about the social insurance system with the actual choices of YEL owners. This provides insights into the mechanisms underlying our findings based on the administrative records.

Sample Restrictions. In our baseline analysis, we focus on the owners of privately-held corporations, and exclude sole proprietors and owners of partnership firms. This restriction allows a better comparison of outcomes and choices between TyEL and YEL owners. Note that in this paper we use the terms "business owner", "YEL/TyEL owner" "entrepreneur" and "firm owner" interchangeably to denote the owners of privately-held corporations. TyEL owners are by definition all owners of privately held corporations, and thus incorporated TyEL and YEL owners are presumably more similar to each other in terms of the nature of their business than sole proprietors and partnership owners, who often only employ themselves through their business. Relatedly, focusing on incorporated business owners allows us to focus on SI coverage choices and their implications among business owners who are more likely to engage in growth-seeking and riskier business activities that require cognitive tasks, compared to self-employed individuals who often conduct more routine non-cognitive tasks (see e.g. Levine and Rubinstein 2017; Lazear 2004; Evans and Leighton 1989). However, due

to the relatively small sample sizes in the survey data, we will include all types of business owners (privately-held corporations, partnership firms, sole proprietors) when analyzing the link the between the survey evidence and choices on SI coverage.

Second, our baseline sample includes all YEL entrepreneurs whose total income exceeds 1.2 times the YEL minimum and is less than the YEL maximum divided by 1.2. This sample is used to study the overall choice of SI coverage levels and the overall relationship between claims and coverage. The income restrictions ensure that each entrepreneur can lower or increase their contributions by at least 20% relative to their true profits. Also, we exclude the owners of multiple firms from the sample. However, our results are robust to including them, as only 7.3% of the business owners in our data own more than one firm at a time.

Descriptive Statistics. Table 1 presents the descriptive statistics for our baseline sample and the owners of privately held corporations that changed their insurance status from TyEL to YEL in the 2011 reform.

3 Expected Outcomes and Definitions

A significant degree of discretion in determining mandatory insurance levels among YEL business owners can lead to various outcomes. Freedom to choose one's SI coverage among YEL owners may result in either lower or higher insurance contributions compared to otherwise similar TyEL owners. In the case of TyEL owners, the level of labor earnings directly dictates the SI coverage. However, YEL owners have much more flexibility to select their coverage, for example, based on their preferences for SI. How this flexibility manifests in actual data, however, remains an empirical question. Therefore, a first key question in our analysis is how much entrepreneurs value social insurance when given the opportunity to freely choose their coverage.

The choice on SI coverage depends on perceived or observed risks, potentially

leading to adverse selection and moral hazard responses. Following the traditional definitions of these concepts (see e.g. Chetty and Finkelstein 2013), by *adverse selection* we refer to the tendency for business owners with higher risk levels to contribute more to the public system. In practice, this means that individuals with, for example, only few years before retirement or with a history of sickness report higher SI income. In other words, adverse selection is when the type (high or low-risk) is hidden. Alternatively, SI coverage levels can affect realized benefit claims such that higher coverage leads to higher claims. We define these responses as *moral hazard*. In this case, it is the action (how much social insurance benefit to claim) rather than the type is hidden.

Using, the detailed data described above and the 2011 source of variation, we can assess the extent of adverse selection and moral hazard in this market. We begin by presenting descriptive insights into SI choices, benefit claims, and their correlations with risk measures in Sections 4 and 5. In Section 6, we introduce a simple conceptual framework to differentiate between moral hazard and adverse selection responses, and use the 2011 YEL reform as a source of exogenous variation to estimate these effects among business owners. In addition, we assess the crowd-out responses to SI coverage, and use the linked survey data on social insurance and perceived risk measures with register-based insurance data to shed more light on the potential underlying mechanisms for the observed responses.

4 Do Entrepreneurs Value Social Insurance?

The first question when evaluating social insurance for entrepreneurs is how much entrepreneurs value insurance and how much they are willing to pay for it. Almost all OECD countries mandate some form of old-age, disability and sickness insurance programs for wage earners. However, there is large variation in how entrepreneurs are treated by social insurance. In OECD countries, entrepreneurs and business owners are either mandated to participate in the regular social insurance program (in 73% of the countries), offer a specific

program targeted at entrepreneurs (15%), or allow them to opt into the regular social insurance program with no specific mandate (12%) (Benzarti et al., 2020). This variation begs the question of which of these options is best suited for entrepreneurs.

Survey evidence suggests that entrepreneurs prefer for more extensive social insurance coverage (Audoly, 2022; Boeri et al., 2020). However, stated preferences in surveys do not always match revealed preferences. Therefore, estimating how much entrepreneurs actually value social insurance requires evidence on their choices of SI coverage and contributions.

Figure 1 shows the choice of insurance coverage among all entrepreneurs in our baseline sample. Figure 1(a) compares the SI income choices of the unrestricted YEL entrepreneurs to those of the restricted TyEL entrepreneurs with the same levels of earnings. As restricted owners cannot freely choose their coverage, their SI incomes, and hence their insurance coverage, closely follow their labor earnings. In contrast, unrestricted entrepreneurs consistently choose significantly lower levels of SI income compared to their restricted counterparts across the income distribution. Furthermore, we see that SI coverage choice significantly declines with income. For example, unrestricted entrepreneurs with yearly earnings of €80,000 insure only approximately 50% of their earnings, compared to restricted owners with no choice. The chosen SI coverage for YEL owners with earnings of €100,000 or more is only approximately 40% of their earnings level.[10] This evidence suggests that when given more freedom to choose, entrepreneurs select an insurance coverage that is much lower than in the regular mandated system.

One may be concerned that restricted and unrestricted owners are somehow different, resulting in differential choices observed in figure (a). Figure 1(b) demonstrates that this is unlikely to be the case. Figure (b) shows how SI income choices changed as a result of the 2011 reform which allowed previously restricted entrepreneurs (those with ownership

[10] Appendix Figure A.1 shows the distribution of the SI incomes of all unrestricted YEL owners in our baseline sample. We see that many business owners choose round numbers when picking the value of SI income, but otherwise we do not observe notable clustering at specific values in the distribution.

shares between 31–50%) to switch to the unrestricted scheme. Figure 1(b) shows a large reduction in SI income immediately after the reform. By 2014, the SI contributions of the newly unrestricted owners converge to SI levels of the always unrestricted owners. This implies that once entrepreneurs are allowed to deviate from the mandatory social insurance coverage and contributions, they significantly reduce them. Finally, Figures 1(c)-(d) illustrate how the SI income choice varies with demographic characteristics (additional evidence available in Appendix Figure A.3). Across all demographic characteristics, SI/LI is smaller for those with larger incomes. When controlling for income, SI is generally lower for younger individuals but we see no differences in SI choice among men and women.

Why do entrepreneurs choose a lower level of SI contributions when free to do so. We shed light on this by combining administrative data on SI contributions and survey results. Figure 2 shows the distribution of the survey responses on the reasons for low insurance coverage (left y-axis) and the actual average SI income choice (SI/LI) underlying each answer category (right y-axis) for all YEL entrepreneurs (including sole proprietors and the owners of partnership firms). First, the figure shows that plans to work during retirement (22% of respondents), lack of trust in the social insurance system (19.5%) and liquidity constraints (24.5%) are the most common stated reasons for a low SI income choice. Also, plans to sell the firm (12%) and private pension plans (15%) are also among common stated reasons for low SI coverage. Instead, less fewer than 5% of respondents indicated an update delay or simultaneous TyEL insurance coverage as their reason for low SI income choice. Note that the respondents could indicate several reasons for low insurance contributions in the survey, and therefore the share of respondents in all the categories exceed 100%.

A striking finding from Figure 2 is that there appears to be no correlation between the stated reasons for low SI income choice and the actual chosen SI income. Despite the stark differences in stated reasons, the choices of SI income are, on average, very similar across these groups. If anything, those who are also insured by the TyEL system due to, for example, working as an employee outside of their firm, seem to have a slightly higher

SI/LI compared to other groups, which is the opposite of what one might expect. Overall, the evidence suggests that the low willingness to pay for SI among entrepreneurs cannot be assigned to any single reason. It seems that various factors and circumstances, such as insufficient funds and lack of trust in the SI system among entrepreneurs, are all driving low take-up of social insurance among entrepreneurs.

Figure 2 shows that many entrepreneurs plan on privately saving the contributions they are not making to the social insurance program, their actual saving behavior appears to contradict this statement. Figure 9 plots personal capital income in the treatment and control groups around the 2011 reform. Personal capital income captures the additional savings of the owner.Figure 9 shows that the treatment group owners indeed increased their personal capital income after the reform. This suggests that at least some of the reduced SI contributions are crowded out by other forms of savings. This result matches the survey evidence above.

In addition to personal capital income, firm owners could accumulate savings through their firms or save ways that are not observable in our administrative data (such as informally). These include, for example, private pension insurance or other more complicated savings instruments that do not necessarily produce taxable returns until they are eventually collected. We analyze the role of private savings in pension insurance in more detail in the next section by studying both contributed pensions and total individual incomes after retirement for both TyEL and YEL owners. Finally, a potential additional channel for private savings is investments abroad, which we may not observe if they are not reported to Finnish authorities. Therefore, our evidence on the crowd out of social insurance needs to be interpreted as a lower bound estimates.

5 Social Insurance Coverage and Claims

Because YEL can contribute as much as they want, they can sort according to their risk type. For example, individuals who expect to retire sooner or become sick are able to elect higher levels of SI coverage. This ability to sort according to one's risk type should result in a positive relationship between one's risk type and one's chosen insurance level. We provide three pieces of evidence to test the extent of adverse selection. First, in Section 5.1, we compare retirement choices by age and plot the average pension and gross income conditional on retirement for the control and treatment groups. Second, in Section 5.2, we implement the classical positive correlation tests, measuring how risks and SI choices are correlated. Third, in Section 5.3, we study anticipatory responses by examining whether business owners increase their SI coverage just prior to a predictable claim event and decrease their SI coverage thereafter.

5.1 Pension Claims and Crowd-out

Panel (a) of Figure 3 shows the cumulative shares of entrepreneurs who claim pension benefits by age for both TyEL and YEL entrepreneurs. The claiming differences between the two groups are not dramatically different.[11] The proportion of individuals receiving pension benefits rises rapidly and in a similar manner for both the control and treatment groups up to the regulatory retirement age of 63. Starting at 63, the treatment group drops below the control group. This suggests that there is a small negative correlation between pension claiming age and the size of the benefit.

Panel (b) of Figure 3 shows a substantial difference between the pension benefits of TyEL and YEL owners. The figure shows that the pension benefits of TyEL owners are 15-20% higher than those of YEL owners throughout the age distribution. Average pension income naturally increases the closer we get to full retirement age in both groups, but the

[11] Note that those individuals who claiming below 58 are mostly claiming disability benefits which explains why the claiming shares are low.

difference in pension income between these owners is stable across ages. This finding confirms that the differences in SI coverage choices between TyEL and YEL owners documented above leads to sizeable differences in pension benefit entitlements.

Above, we discussed evidence from Figure 2 showing that many YEL owners state that they save (or plan to save) privately instead of insuring themselves through the public SI system. Panel (c) of Figure 3 tests this crownd out effect by plotting average annual total gross income from all sources, including pension income, entrepreneurial income, and various capital income sources for the control and treatment groups. The figure shows that the gap in average pension income between TyEL and YEL owners shown in panel (b) is almost completely erased by the higher levels of other income of YEL owners compared to TyEL owners. This finding indicates that despite the lower SI coverage choices and pension benefits, YEL owners do not appear to lag in total income because they tend to save more privately.

One potential source of private savings is for business owners to save within their own firm and draw income from it once they retire. Panel (d) of 3 shows firm-level wealth divided by the ownership share of the retired business owner. The graph shows higher levels of financial in the treatment group, suggesting that this channel is an important part of the crowd-out mechanism. Note that this difference is not driven by differences in firm sizes in the control and treatment groups. In Appendix B Figure B.1 we plot total assets of firms of retired business owners divided by their ownership share. We find that firms in the control group are a little larger than in the treatment group, which mitigates the concern that the differences in Panel (d) are due to differences in firm sizes.

5.2 Positive Correlation Tests

We implement positive correlation tests (Chiappori and Salanie, 2000) to study the general relationship between individuals' SI coverage choice and SI benefit claims. This analysis conflates adverse selection responses with moral hazard responses, since both lead to a positive

relationship between one's SI coverage choice and claims.

We conduct this analysis on all unrestricted entrepreneurs in our baseline sample. We group these individuals by bins based on their SI income relative to their labor earnings (SI/LI_i^t), treating every person-year as a separate observation. We then measure the average claims in each bin to evaluate how SI income choices are related to benefit usage. We present this analysis for all claims and separately for each benefit type. For sick pay and parental leave, we analyze the relationship between SI income and benefit days, and for pensions we study the link between SI coverage and retirement age.

Figure 4 shows the results of the positive correlation tests. It shows all claims in panel (a), pensions in Panel (b), sick pay in Panel (c), and parental pay in Panel (d). The analysis on pensions focuses on the correlation between SI income and retirement age, where a negative correlation would indicate that those with the highest contributions retire sooner than others. For sick pay and parental leave, we estimate the correlation between SI income and the number of days the benefit was claimed.

Panel (a) of Figure 4 shows a small positive relationship between all benefit claims and the chosen SI coverage level. Despite the fact that the YEL scheme provides an opportunity to freely adjust contributions, and we have shown that individuals tend to reduce them, their choice of coverage is not strongly correlated with their claiming behavior.

Panels (b)–(d) of Figure 4 also show small correlation between SI coverage and claims for pensions, sick pay and parental leave. Those with higher SI income tend to start claiming pension benefits slightly sooner than those with smaller coverage, and those with higher SI/LI_i^t tend to claim more sick pay and parental leave. All these correlations are economically small but statistically significant. Finally, in Appendix Figure C.1 we show that these results are robust to focusing only on individuals who claim benefits, rather than all individuals as in Figure 4.

5.3 Anticipation of Future Claims

We test whether unrestricted entrepreneurs in our baseline sample increase their SI incomes just before a predictable claim event. We plot SI/LI_i^t three years before and after a major claim is made using the following specification:

$$SI/LI_i^t = \alpha + \beta_{-2} \cdot t_{-2} + \beta_{-1} \cdot t_{-1} + \beta_0 \cdot t_0 + \beta_1 \cdot t_1 + \beta_2 \cdot t_2 + X_{it} + \varepsilon_{it}, \tag{1}$$

The coefficients β_j, $j = -2, ..., 2$ reflect anticipatory responses to a claim event. We implement this specification for sick pay and parental leave. We also estimate it for retirement decisions using data from seven years before retirement. Once an individual retires, they typically stop making SI contributions, and therefore we do not include post-event indicators for this outcome.

Figure 5 shows how entrepreneurs modify their contribution rates before retirement (panel a), and before and after experiencing sickness (b) or having a child (c). For retirement decisions, we observe a gradual increase in contributions starting 4 years before retirement. However, the average increase is relatively small in magnitude – less than 5% compared to the level of contributions seven years prior to the retirement decisions. Nevertheless, these contribution increases result in significant pension benefit increases since each euro of contributions increases one's pension by the same amount. Therefore, if one discounts contributions appropriately, shifting one's contributions towards later years can be strategically optimal.

For sickness and parental leave, the benefits received are calculated based on SI contributions made in the 12 months preceding the claims. This could allow individuals to increase their benefits by increasing reported SI incomes prior to anticipated claims. For both of these we observe an increase in SI income in the year of claiming or a year before, relative to the level of SI income three years prior to the claim. However, this anticipatory

response is very small – well under 5% of SI income and only apparent for sick pay.

Overall, the evidence in Figure 5 provides evidence of small anticipatory responses: some entrepreneurs do adjust their contributions when expecting a future claim. However, given the small magnitude of these effects, entrepreneurs do not appear to "game the system" in any dramatic way.

6 Effects of the 2011 Reform

The standard positive correlation tests (and anticipatory response estimates) conflate adverse selection and moral hazard, since both are expected to lead to a positive relationship between one's claims and one's SI coverage choice. In our setting, the lack of strong positive relationship between claims and insurance discussed in Section 5.2 suggests that moral hazard and adverse selection effects are weak. But in principle, there could be large advantageous selection canceling out moral hazard effects and leading to small positive correlations. In this section, we present a framework that allows us to separately estimate the extent of moral hazard, and thus differentiate between potential adverse selection and moral hazard responses. We also analyse the crowding out effects of the 2011 reform.

6.1 Methods

We use an event study analysis of the 2011 reform to estimate how the SI income and the number of benefit days claimed change for treated business owners relative to the control group. We estimate the following equation:

$$Outcome_{it} = \sum_{\substack{\ell=2006 \\ \ell \neq 2010}}^{2014} \beta_\ell \; Treat_i \; 1_{t=\ell} + Treat_i + \eta_t + \delta X_{it} + \varepsilon_{it}, \tag{2}$$

where subscript i identifies business owners, and t year. δ_t are year fixed effects, and X_{it} are individual controls including age, gender, municipality, and industry of the firm. The

coefficients of interest β_ℓ measure the average responses of treated individuals relative to a control group. We omit the year 2010 from the regression, so the estimates show the responses relative to one year before the 2011 reform.

Our treatment group consists of individuals whose business ownership share was between 31–50% in 2010. We use two comparison groups. Our first control group, *the always restricted*, consists of business owners who own between 10% and 30% of their company shares in 2010. These individuals remain in the TyEL scheme, and therefore cannot freely choose their SI contributions throughout the period we study. Our second control group, *the always unrestricted*, consists of business owners who own 50–70% of their company shares in 2010. These owners are free to choose their SI contributions throughout the period we study. In the main analysis, we provide the results using the first control group. Arguably, this group remains untreated throughout the period, and thus satisfies the assumptions of a canonical difference-in-differences model (Tazhitdinova and Vazquez-Bare, 2023). Nonetheless, we show that the results are very similar when using the second control group instead. Note that our event study design is robust to the issues highlighted by de Chaisemartin and D'Haultfoeuille (2020); Sun and Abraham (2021); Callaway et al. (2021); Goodman-Bacon (2021) because the treatment occurs in the same year for all treated units.

The key identifying assumption is that the treatment (31–50% ownership share) and control (10–30 or 51–70% ownership share) groups would have behaved similarly in the absence of the reform. This is commonly referred to as the parallel trends assumption. We evaluate this assumption by comparing the evolution of our main outcome variables for the treatment and control groups prior to the reform. We show support for this assumption for both SI income and benefits claims below.

Another potential threat to identification is that ownership shares could respond to the 2011 reform, meaning that entrepreneurs could self-select into YEL or TyEL insurance status as a response to the reform. However, we find no empirical evidence supporting this threat. Appendix Figure E.1 shows the shares of the owners with changes in ownership

from less than 30% to more than 30%, and from more than 50% ownership to less than 50% in 2007–2015. Overall, changes in ownership shares across these thresholds is rare (less than 3% of all owners), and there are no significant changes in this share around the 2011 reform. This alleviates the concern that owners might manipulate their ownership shares as a response to the 2011 reform.

6.2 Changes in Social Insurance Contributions

First, we study how treated entrepreneurs, relative to our two control groups, change their SI coverage and future benefit entitlements when given more freedom to choose their SI level of coverage. Figure 6 shows how SI income choices changed as a result of the 2011 reform, using specification (2).

Panel (a) shows that the SI incomes of the treatment and the control groups (those with ownership shares between 10–30% or 51–70%) evolve similarly in the years before the reform, thus validating the parallel trend assumption.

Moreover, this figure shows a large reduction in SI income in the treatment group after the 2011 reform. The reform led to a sharp decrease in the average SI/LI replacement rate by 0.05, and by over 0.15 by 2014. Eventually, the SI contributions of the newly unrestricted owners converge to the SI income levels of the always unrestricted owners by 2014 (see Appendix Figure A.2). This indicates that once entrepreneurs are allowed to deviate from the mandatory social insurance coverage and contributions, they significantly reduce them. This implies that entrepreneurs are not willing to pay for social insurance as much as it is required in the regular system for TyEL owners or wage earners in Finland. Also, the figure shows that the results are similar irrespective of the choice of the control group, i.e. whether using the always unrestricted or restricted owners as the comparison group for the treated owners.[12]

[12]Appendix Figure A.2 shows the time series evolution of SI/LI among the treatment group and the always unrestricted control group. The figure shows that the average difference-in-differences estimate is caused by a clear and immediate reduction in SI/LI among the treated entrepreneurs after 2011 and not,

Figure 6 (b) shows that the response to the reform was heterogeneous. We divide the treated entrepreneurs into three groups based on the observed change in SI income: i) those with SI/LI below 0.8, ii) between 0.8 and 1.1 or iii) above 1.1 in the year right after the 2011 reform. Approximately 14% of the treated owners increased their coverage (group i) while others mostly decreased it (groups ii and iii). We observe that a large fraction of treated owners in group iii) (53%) decreased their SI income by more than 40% by 2014, which indicates that many entrepreneurs prefer a much lower SI coverage than what the more strictly mandated system would require.

Appendix Figure A.3 shows how the SI income choice varies with demographic characteristics. Across all demographics, SI/LI is smaller for those with larger incomes. When controlling for income, SI is generally lower for younger individuals and unmarried individuals. However, men and women, as well as individuals with or without children choose similar levels of SI coverage.

6.3 Measuring Moral Hazard Responses

6.3.1 Conceptual Framework

Next, we use the 2011 reform to analyze how SI claims change due to the reform. This approach enables us to separate adverse selection from moral hazard. However, the interpretation of these estimates require additional assumptions on the evolution of the underlying risk profiles of the treatment and control groups.

In our conceptual framework, a business owner i's SI claim in year t can be represented by the sum of two components: his naturally-occurring claims $True(risk_i^t)$, which are determined by the owner's true risk type $risk_i^t$, and his moral hazard response $MH(SI_i^t/LI_i^t)$. The latter is assumed to be driven by the generosity of his replacement rate SI_i^t/LI_i^t, the ratio of reported social insurance income relative to his labor income. Thus, $Claim_i^t = True(risk_i^t) + MH(SI_i^t/LI_i^t)$. For simplicity, we assume for now that business

for example, by an increase in SI/LI among the always unrestricted owners.

owners only vary in their risk type, and there is no randomness in claims across years.

Prior to 2011, business owners whose business share was between 30% and 50% contributed according to their income level, so that a given business owner's social insurance income was the same as their income, i.e. $SI_i^{pre} = LI_i^{pre}$. Since all business owners faced the same replacement rate, their moral hazard components were the same, $MH(SI_i^{pre}/LI_i^{pre}) = MH(SI_j^{pre}/LI_j^{pre})$. After 2011, treated business owners (ownership share 30–50%) were able to choose SI_i^{post} according to their risk type. Figure D.1 illustrates the incentives of these individuals. Generally speaking, lower-risk individuals (individual A in Figure D.1) prefer lower insurance coverage $SI_i^{post} < LI_i^{post}$, while higher-risk individuals (individual D) prefer higher coverage $SI_i^{post} > LI_i^{post}$. Importantly, note that since the reform does not directly affect business owners' risk types, $True(risk_i^{post}) = True(risk_i^{pre})$. Therefore, in this deterministic setting, a simple difference of each individual's claims before and after the 2011 reform recovers each individual's moral hazard response:

$$Claim_i^{post} - Claim_i^{pre} = MH(SI_i^{post}/LI_i^{post}) - MH(SI_i^{pre}/LI_i^{pre}). \tag{3}$$

Therefore, if moral hazard responses are prevalent, we expect the observed claims of the treatment group to reduce after the 2011 reform, on average. As shown in Figure 6, the treatment group entrepreneurs drastically reduced their SI coverage relative to the control group when given freedom to choose over their contribution levels. Therefore, a moral hazard response would lead to reduced claims after the reform, as the lower contribution levels lead to lower benefits after the reform for the treatment group.

In practice, the underlying assumption $True(risk_i^{post}) = True(risk_i^{pre})$ may not hold for idiosyncratic reasons. For example, risk types are unlikely to stay constant over time and claims may vary from year to year for various other reasons. Thus our identification of moral hazard relies on two specific assumptions: (1) individual risk types do not change as a result of the reform, and (2) the risk profiles of the treated and control individuals

evolve similarly over time. In other words, we allow a given individual's risk-based claims $True(risk_i^t)$ to fluctuate over time for each individual i, but assume that the nature of these fluctuations is exogenous to the ownership share status and is similar for treated and control group individuals.

The first assumption allows us to separate potential moral hazard responses from adverse selection using the 2011 reform. When $True(risk_i^{post}) = True(risk_i^{pre})$, the difference in claiming behavior between the treatment and control groups after the reform delivers us an estimate for moral hazard response. This assumption is plausibly satisfied due to the nature of the reform and the fact that the treatment status is determined by the pre-reform ownership share.

The second assumption is the standard parallel trends assumption, but it allows us to account for exogenous fluctuations in claims over time. In practice, in order to recover the moral hazard response using our event-study framework, we do not need to assume that the true risks of the treatment and control group individuals stay constant over time, but that they do not change differently across the groups. We evaluate this assumption by studying the SI claims of the groups prior to the 2011 reform, and show below that the development of SI claims is parallel between the treatment and control groups before the reform.

6.3.2 Moral Hazard: Results

Figure 7 shows the estimates using equation (2) and the always restricted business owners (ownership 10–30%) as the control group. This figure shows the number of benefit days claimed including all types of benefits (panel a), pensions (b), sick pay days (c) and parental leave days (d).

First, in all of these figures we observe no evidence of diverging trends in realized benefit claims between the treatment and control groups prior to the 2011 reform. This suggests that the treatment and control group follow parallel trends before the reform, implying that their risk profiles evolve similarly over time.

Panel (a) of Figure 7 shows that the reform resulted in the number of benefit days claimed increasing by 3 to 4 days per year. As the average total number of benefit days among treated entrepreneurs before the reform is only 3 days, the effect is sizable and approximately double the pre-reform level for them. This result is surprising since the majority of owners in the treatment group decreased their SI, and therefore one would expect a decrease in the number of benefit days claimed rather than an increase. Figures 7 (c) and (d) show that this increase is driven by increased reliance on sick pay and parental pay. In contrast, in panel (b) we observe no significant difference in pension claims after the reform. This suggests that the reduced SI coverage did not lead to a short-run increase in the likelihood of pension claims in the treatment group.

One potential explanation for the results in Figure 7 is that they are due to a small minority of individuals who actually increased their SI coverage after 2011. We test this possibility next in Figure 8, where we examine how SI claims changed depending on how individuals choose to change their reported SI income at the time of the reform. As above in panel (b) of Figure 6, we break treated business owners into three groups depending on the average post-reform SI income choice: those with SI/LI below 0.8, between 0.8 and 1.1 and above 1.1. If individual responses are in part driven by moral hazard considerations, we should see an increase in benefit claims for individuals who have increased their SI income, and a decrease in claims for individuals who have decreased their SI income.

Figure 8 provides mixed evidence in terms of moral hazard responses. On the one hand, we see a larger increase in sick pay and parental leave benefit days claimed among individuals who increased their SI income than those who decreased it. However, individuals who reduced their SI income appear to have increased their claims after the reform. These results indicate that there is no heterogeneity in SI claims after the reform by the chosen SI income, which suggests that moral hazard responses are not prevalent among entrepreneurs who have freedom to choose their SI coverage.

In Appendix Figures D.2 and D.3 we further explore whether responses are driven

by the extensive or the intensive margins. The increase seems to be driven by the extensive margin: we see an increase in the probability of claiming benefit. However there is no change in the number of days claimed when claiming benefit (intensive margin). Also, the figures show that the results are qualitatively equivalent when using the always unrestricted individuals as the control group. We return to the potential mechanisms explaining these surprising results below in Section 7.

6.4 Measuring Adverse Selection

6.4.1 Conceptual Framework

A well-known approach to estimating a lower bound on the extent of adverse selection is to measure the relationship between pre-reform claims and post-reform insurance choices. This approach shuts down the moral hazard channel by sorting individuals on ex-post immutable pre-reform claims, and therefore reveals to what extent plausibly higher-risk individuals choose contracts with higher coverage. However, this test may not reveal the full extent of adverse selection because risk types may change over time, making pre-reform claims an imperfect proxy for the current risk type. This is particularly likely in our setting where claims do not exhibit a high degree of correlation over time.

Thus, in order to estimate the extent of adverse selection, we need to separate the moral hazard component from the adverse selection one. Returning to our conceptual framework presented above, we can write

$$Claim_j^{post} - Claim_i^{post} = \underbrace{[True(risk_j^{post}) - True(risk_i^{post})]}_{AdverseSelection} + \underbrace{[MH(SI_j^{post}/LI_j^{post}) - MH(SI_i^{post}/LI_i^{post})}_{MoralHazard}. \quad (4)$$

This condition illustrates the fact that after the reform of 2011, differences in the claims of treated individuals reflect the sum of adverse selection and moral hazard responses.

In this deterministic setting, we can use condition (3) and the fact that $MH(SI_j^{pre}/LI_j^{pre}) = MH(SI_i^{pre}/LI_i^{pre})$ to estimate the moral hazard component:

$$MoralHazard = [MH(SI_j^{post}/LI_j^{post}) - MH(SI_j^{pre}/LI_j^{pre})] - [MH(SI_i^{post}/LI_i^{post}) - MH(SI_i^{pre}/LI_i^{pre})], \quad (5)$$

and therefore back out the extent of adverse selection from (4).

In practice, the identifying assumptions $True(risk_i^{post}) = True(risk_i^{pre})$ and $MH(SI_j^{pre}/LI_j^{pre}) = MH(SI_i^{pre}/LI_i^{pre})$ may not hold for idiosyncratic reasons. In addition to facing fluctuating risk types and risk preferences, business owners may vary in the magnitude of moral hazard responses. We will account for these types of heterogeneity by controlling for individuals' demographic characteristics and using income controls. However, we will not be able to separate adverse selection from moral hazard if the two are correlated. For example, if high-risk individuals exhibit higher levels of moral hazard, even when holding the replacement rate constant (i.e. $SI_i^{pre}/LI_i^{pre} = SI_j^{pre}/LI_j^{pre}$), then our measure of adverse selection will be biased upward.

Thus to estimate the extent of actual adverse selection, we use equation (4) to recover the extent of adverse selection by subtracting moral hazard responses estimated in Section 6.3.2 from the total differences in claims observed in Figure 4. Since we are not able to recover moral hazard response for each individual, we measure the extent of adverse selection for three groups of business owners: individuals who chose SI coverage with $SI/LI \leq 0.8$, $0.8 \leq SI/LI \leq 1.1$, and $SI/LI > 1.1$.

6.4.2 Adverse Selection: Results

We first examine the relationship between pre-reform claims and post-reform insurance choices in Figure C.3. We find no relationship between one's pre-reform claims and post-reform SI replacement rate choice, indicating no apparent adverse selection in SI coverage

choice.

We estimate the extent of actual adverse selection results using equation (4) in Table 2.

6.5 Crowd out

We use the 2011 reform to examine whether other income sources change as a response to the sharp decrease in SI income among the treated entrepreneurs. These types of crowd-out effects were discussed above in Section 5.1 in terms of realized pension claims and gross incomes among retired business owners. In addition to this evidence, Figure 9 illustrates how personal capital income develops in the treatment group in comparison to the control groups around the 2011 reform. Personal capital income captures the additional savings of the owner that produce taxable returns. Figure 9 shows that the treatment group owners indeed increased their personal capital income after the reform. This tentatively suggests that at least some of the reduced SI contributions are crowded-out by other forms of savings immediately after the reform.

7 Potential Mechanisms: Information and Learning

Overall, our results indicate that adverse selection is small and moral hazard responses are non-existent among entrepreneurs who have a large degree of freedom in choosing their SI coverage and contributions. This suggest that individual risks do not play a major role in the SI coverage decisions of entrepreneurs, even though many of them choose a low level of SI contributions and coverage. Furthermore, our findings on realized SI claims after the reform indicate that entrepreneurs actually *increased* their SI claims after reducing their SI coverage after the reform of 2011. In this section, we try to make sense of these puzzling results.

One key issue that could affect SI choices is information. SI systems are typically

complicated, and individuals might not be aware of how the system works and how their choices affect future SI claims. Also, individuals' own risk perceptions might differ from their actual risks. Next, we discuss the potential roles of these factors using survey evidence on perceived health and knowledge and awareness of the SI system, combined with the actual SI choices of YEL entrepreneurs.

The survey results are presented in Figure 10. First, panel (a) of the figure shows the distribution of the answers on the question concerning the perceived health status (range from 0-10), and the average SI/LI chosen within each answer category. Overall, the respondents perceive their health status to be fairly good: fewer than 10% of answered that their health status is 6 or under that, while over 50% answered 9 or 10. However, there is no correlation between the chosen SI income level and perceived health status. This means that the SI coverage choices are, on average, very similar among individuals with different perceived health, which matches our previous results on the small correlation of observed SI claims and coverage choices.

Second, panel (b) of Figure 10 shows the distribution of answers to the following question: "Do you know what SI benefits you are entitled to?". The predetermined categories range from 1 (very well) to 4 (not at all). Fewer than 10% of respondents state that they know their benefit entitlements very well. This suggests that overall knowledge of the details of the SI system is lacking. Most of the answers are clustered in categories 2 and 3, and nearly 15% of the respondents answered that they do not know the benefits at all (category 4). We also find that SI contributions are increasing in the knowledge of the SI system, as the SI/LI ratio is slightly larger for those who state that they know the benefits well, compared to those who do not. This finding lends some support for our modest correlation between SI claims and the chosen SI coverage.

Third, panel (c) of Figure 10 shows the answers to a specific question on the awareness of the size of the sick pay benefit the YEL insured entrepreneur would be entitled to in case they get sick. Approximately 70% of the respondents state that they do not know

how much sick pay they would receive, which again highlights lack of knowledge. However, the chosen SI coverage does not vary by awareness: the SI coverage (SI/LI) is the same among both those who state that they know or do not know the amount of sick day benefits, which again suggest a low association between SI claims and coverage choices.

The lack of knowledge on the details of the SI system could explain at least some of the counter-intuitive results on the increased SI claims after the 2011 reform. As the reform introduced the YEL insurance system to a group of new entrepreneurs, this active change could have increased their knowledge about the benefits they are entitled to. Information on the details of the YEL system is easily available from, for example, the websites of the insurance companies that manage the YEL system. Therefore, when forced to make an active choice under the new SI system, the treated entrepreneurs moving into the YEL system might have learned about the benefits, leading them to apply for the claims more actively than those in the control group who remained in their old SI system. This interpretation is also supported by the fact that the increase in SI claims is coming from extensive margin responses rather than intensive margin, evidence provided in Appendix D Figure D.3. Given the low baseline knowledge about the system highlighted in panels (b) and (c) of Figure 10, this increased information could have prompted them to increase their SI claims, irrespective of their choice on SI coverage.

In addition to survey evidence, we test learning using administrative data. First, we study whether treated individuals – those who are new to the choice of SI income after 2011 – show increasingly positive relationship between claims and SI contributions over time. To do so, we compare the claims-SI coverage relationship immediately after the reform in 2011 to 3 years after in 2014. Panels (a) and (b) of Appendix Figure C.2 show the relationship for all claims. Overall, we do not see a large consistent increase in positive correlation for the treated individuals over time, suggesting that learning is not happening.

Our second test, shown in panels (c)-(d) of Appendix Figure C.2, explores whether the relationship between coverage and claims strengthens for second and future children

compared to the first child among those entrepreneurs who claim parental leave benefits. As having children is an event that can be planned and the timing of birth is usually known, learning about benefits and adjusting one's SI income accordingly could be more prevalent for this particular claim. However, Figure C.2 shows that there is no difference in the correlations between SI claims and the chosen SI coverage after the birth of the first child or subsequent ones. As those who have had their first child are presumably aware of the link between SI income and benefits, this evidence suggests that lack of information is not the driving force for the lack of significant correlation between SI claims and coverage choices, at least for the parental leave benefits.

8 Conclusion

TBA

References

Audoly, R. (2022): "Self-employment and Labor Market Risks," Mimeo.

Benzarti, Y., J. Harju, and T. Matikka (2020): "Does Mandating Social Insurance Affect Entrepreneurial Activity?" *American Economic Review: Insights*, 2, 255–268.

Boeri, T., G. Giupponi, A. B. Krueger, and S. Machin (2020): "Solo Self-Employment and Alternative Work Arrangements: A Cross-Country Perspective on the Changing Composition of Jobs," *Journal of Economic Perspectives*, 34, 170–195.

Callaway, B., A. Goodman-Bacon, and P. H. C. Sant'Anna (2021): "Difference-in-Differences with a Continuous Treatment," arXiv Working Paper 2107.02637.

Chetty, R. and A. Finkelstein (2013): "Chapter 3 - Social Insurance: Connecting Theory to Data," in *Handbook of public economics, vol. 5*, ed. by A. J. Auerbach, R. Chetty, M. Feldstein, and E. Saez, Elsevier, vol. 5 of *Handbook of Public Economics*, 111–193.

Chiappori, P.-A. and B. Salanie (2000): "Testing for asymmetric information in insurance markets," *Journal of Political Economy*, 108, 56–78.

de Chaisemartin, C. and X. D'Haultfoeuille (2020): "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects," *American Economic Review*, 110, 2964–2996.

Einav, L., A. Finkelstein, and M. R. Cullen (2010): "Estimating Welfare in Insurance Markets Using Variation in Prices," *The Quarterly Journal of Economics*, 125, 877–921.

Evans, D. S. and L. S. Leighton (1989): "Some Empirical Aspects of Entrepreneurship," *American Economic Review*, 79, 519–535.

Finkelstein, A. and K. McGarry (2006): "Multiple dimensions of private information: evidence from the long-term care insurance market," *American Economic Review*, 96, 938–958.

Finkelstein, A. and J. Poterba (2004): "Adverse selection in insurance markets: Policyholder evidence from the UK annuity market," *Journal of political economy*, 112, 183–208.

FSA (2010): "Työttömyyskassat 2010," Annual Report the of Financial Supervisory Authority.

Goodman-Bacon, A. (2021): "Difference-in-differences with variation in treatment timing," *Journal of Econometrics*, 225, 254–277.

Landais, C., A. Nekoei, P. Nilsson, D. Seim, and J. Spinnewijn (2021): "Risk-based selection in unemployment insurance: Evidence and implications," *American Economic Review*, 111, 1315–1355.

Lazear, E. P. (2004): "Balanced Skills and Entrepreneurship," *American Economic Review*, 94, 208–211.

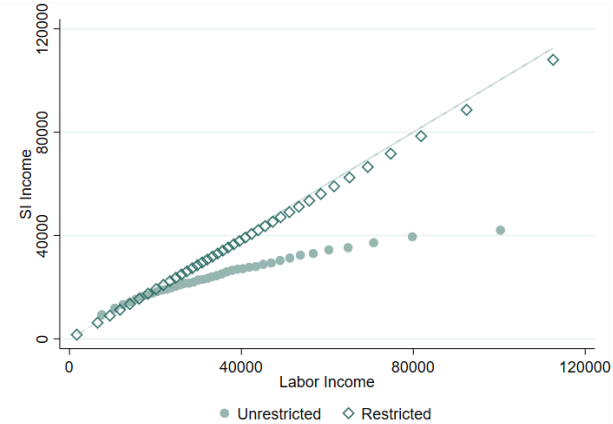
Levine, R. and Y. Rubinstein (2017): "Smart and Illicit: Who Becomes an Entrepreneur and Do They Earn More?" *The Quarterly Journal of Economics*, 132, 963–1018.

Sun, L. and S. Abraham (2021): "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects," *Journal of Econometrics*, 225, 175–199.

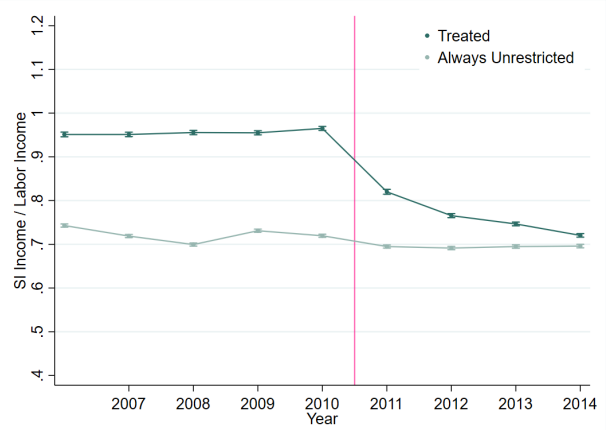
Tazhitdinova, A. and G. Vazquez-Bare (2023): "Difference-in-Differences with Unequal Baseline Treatment Status," NBER Working Paper 31063.

Figure 1: Choice of Social Insurance Coverage, YEL (unrestricted) vs. TyEL (restricted) Owners

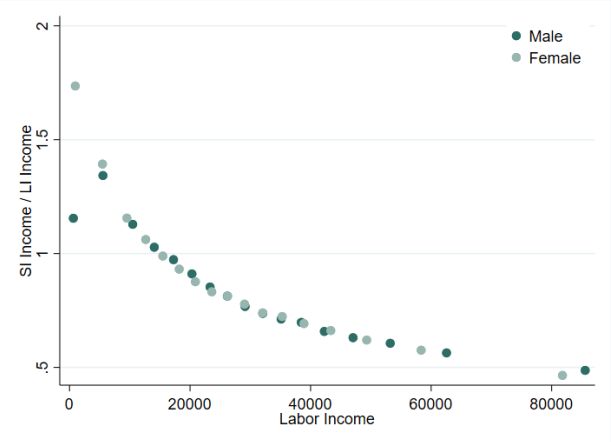
(a) SI Income Choice: Restricted vs Unrestricted



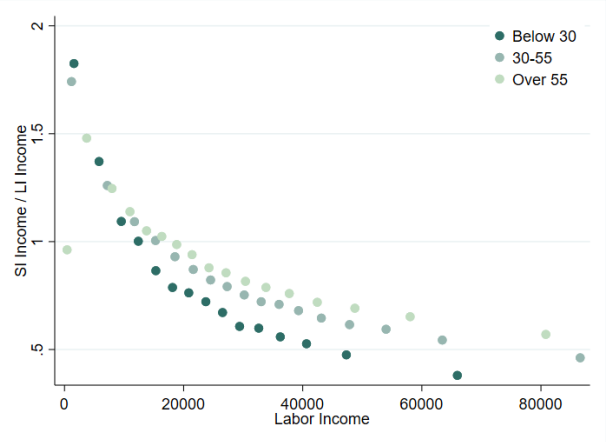
(b) SI Income Choice: Around 2011 Reform



(c) SI Income Choice: by Gender

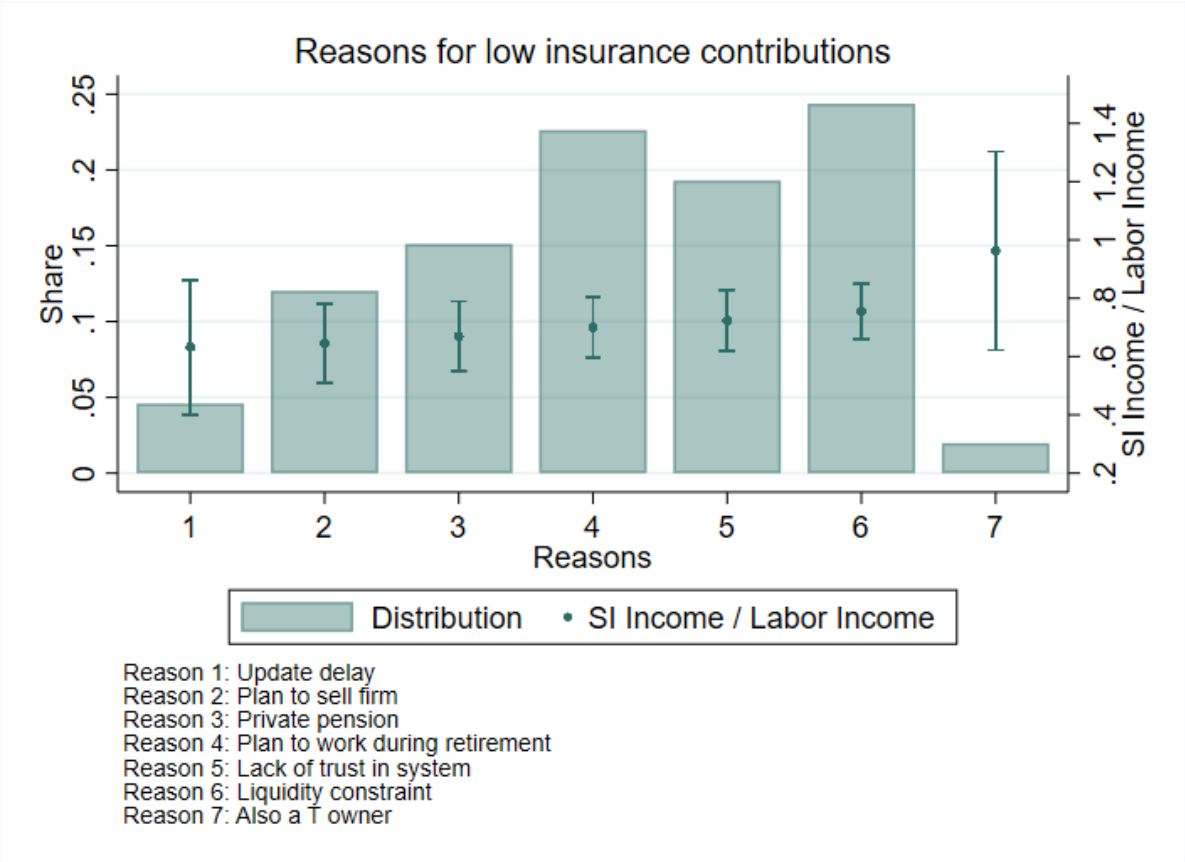


(d) SI Income Choice: by Age



Notes: Figure (a) shows the social insurance (SI) income relative to labor income (LI) for all restricted (TyEL) and all unrestricted (YEL) owners. Each point contains 2.5% of observations with respect to their group. Figure (b) shows the evolution social insurance income divided by labor income over time for treated individuals (ownership share between 30-50%) and the always unrestricted individuals (ownership share between 50-70%). Figures (c) and (d) show how the choice of SI income varies within each labor income bin by gender and age.

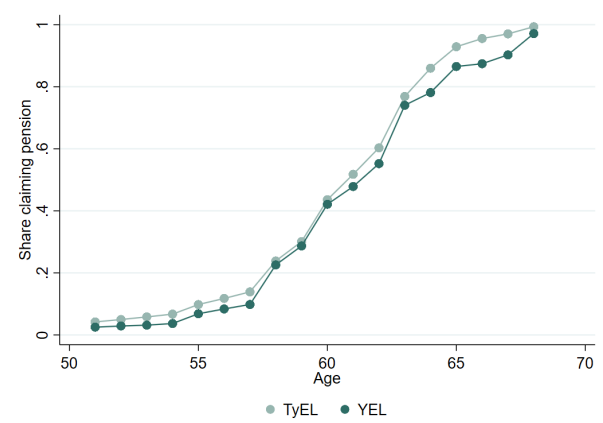
Figure 2: Actual SI Income Choice vs. Stated Reasons for Low Insurance Choice



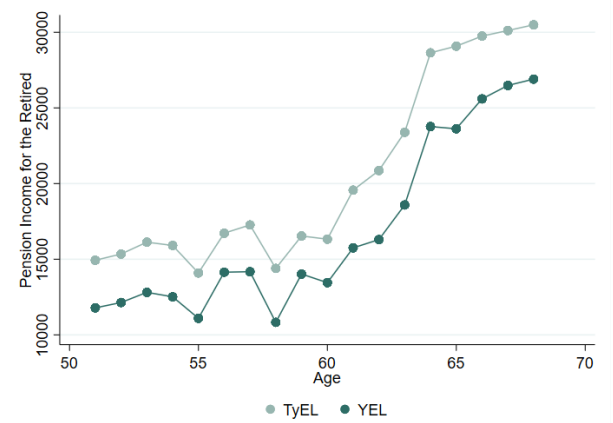
Notes: The figure shows the distribution on the answers to the survey question of what are the reasons for low YEL insurance contributions (left-hand side y-axis). The main answer categories include: 1) update delay on YEL income, 2) plan to sell the firm, 3) private pension savings, 4) plan to work during retirement, 5) lack of trust in the SI system, 6) liquidity constraints in paying SI contributions, and 7) simultaneous TyEL insurance. The figure includes the average social insurance income per labor income with 95% confidence interval within each answer category (right-hand side axis), measured for all survey respondents.

Figure 3: Retirement Choices and Crowd-out

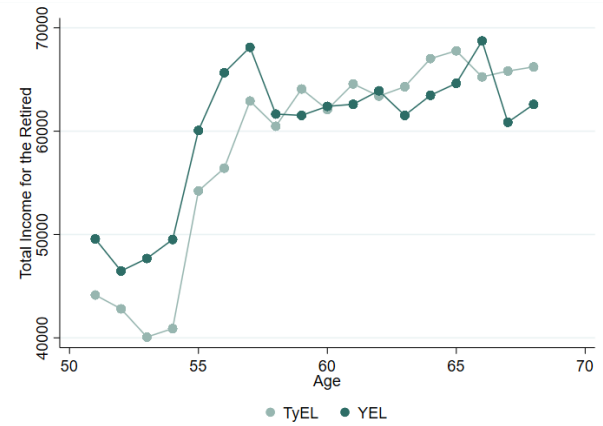
(a) Cumulative Pension Claiming by Age



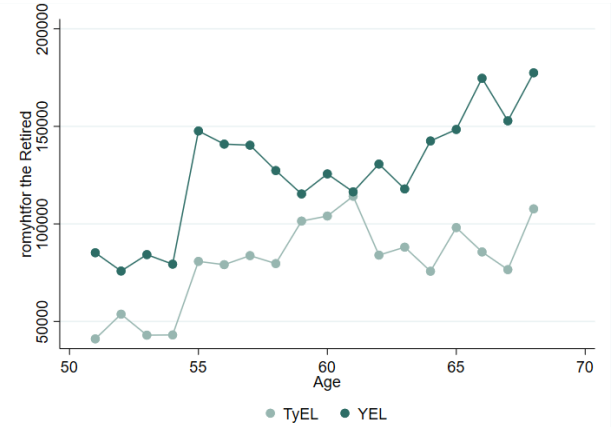
(b) Average Pension Income by Age



(c) Total Gross Income by Age

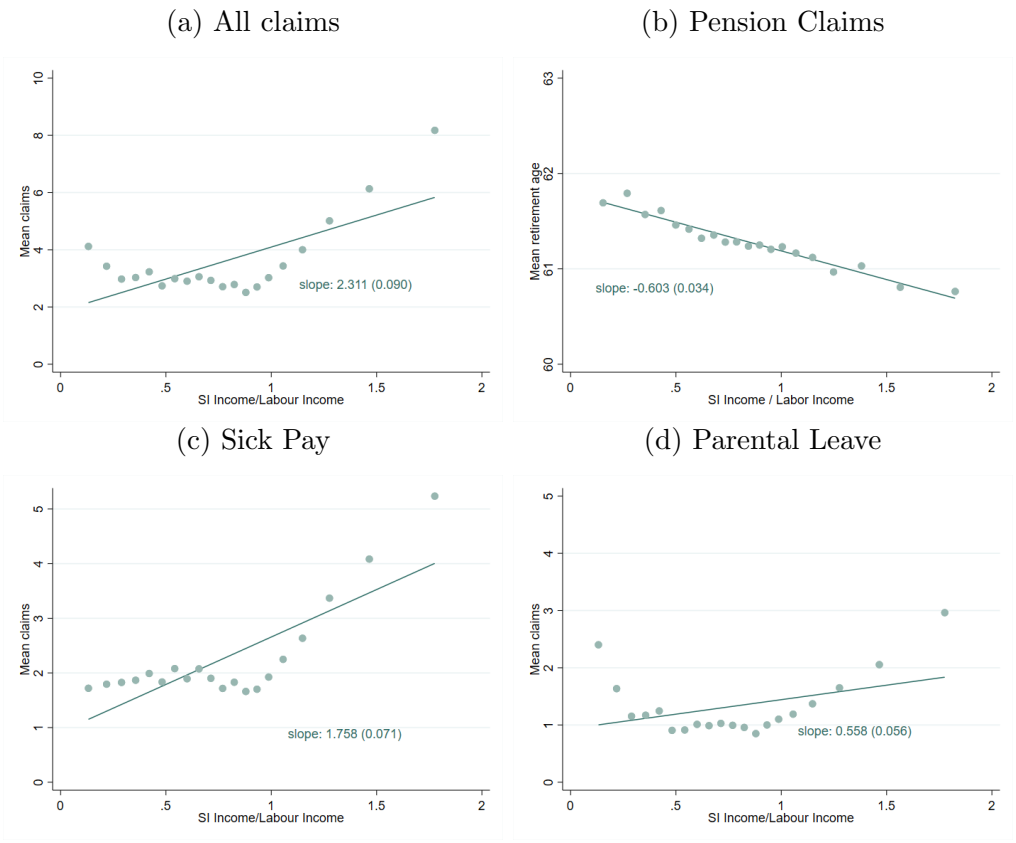


(d) Firm-level Financial Wealth per Owner



Notes: Panel (a) of the figure shows the cumulative share of those who claim pensions by age among all restricted (TyEL) and unrestricted (YEL) owners in our baseline sample. The maximum retirement age in Finland is 68, after which the share of pension income recipients is approximately 1 for both groups. Panel (b) shows the average pension income by age for TyEL and YEL owners among those who claim pensions, and panel (c) shows the average total income, including pensions, labor income and capital income from all sources, by age among those who claim pension income. Panel (d) shows shows the firm-level financial wealth divided by the ownership share. Financial wealth includes assets such as cash reserves and stock holdings that are not part of the business activities of the firm.

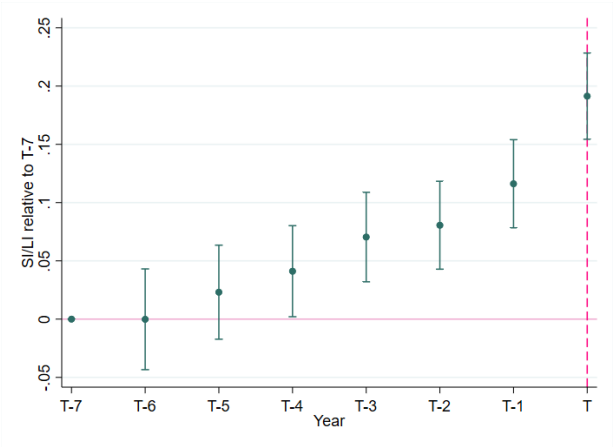
Figure 4: SI Coverage vs. Claims: Positive Correlation Tests



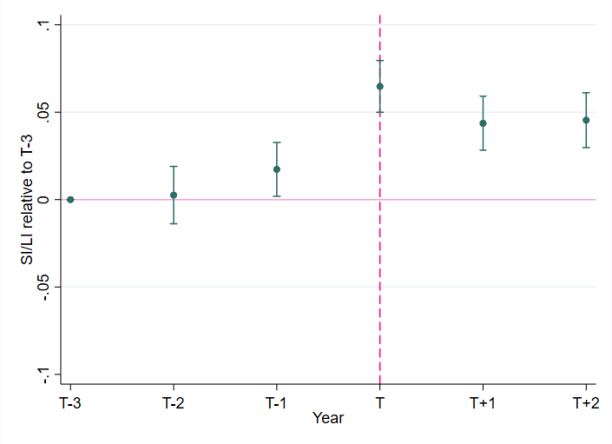
Notes: These figures show the average number of benefit days claimed by the unrestricted business owners in our core sample by bins of SI/LI. Each SI/LI bin contains 5% of person-year observations. The y-axis shows the average number of days claimed (including zeros). In panel (a) the outcome is the total number of claiming days. The graph in panel (b) plots the average retirement age by SI/LI choice, highlighting the relationship between SI coverage and retirement decisions. In panels (c) and (d) the outcomes are sick pay and parental leave days. The fitted lines are estimated from the raw data (i.e. person-year observations), and includes the following controls: age, gender, municipality, industry and total income. Intensive margin figures available in Appendix Figure C.1.

Figure 5: Anticipatory Responses to SI Claims

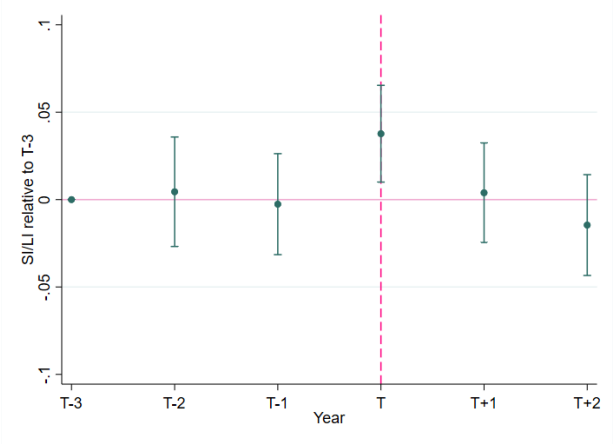
(a) Anticipation of Retirement



(b) Sick Pay



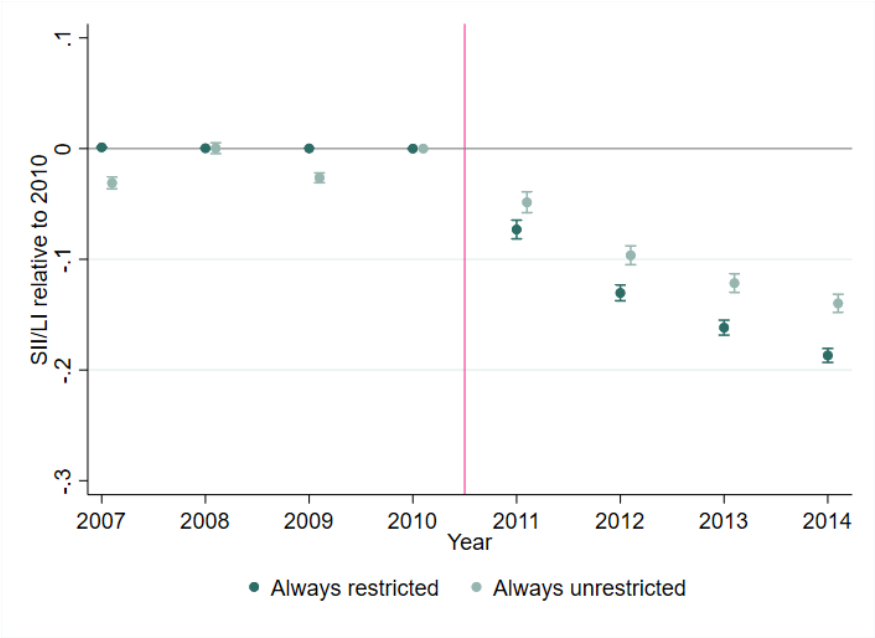
(c) Parental Leave



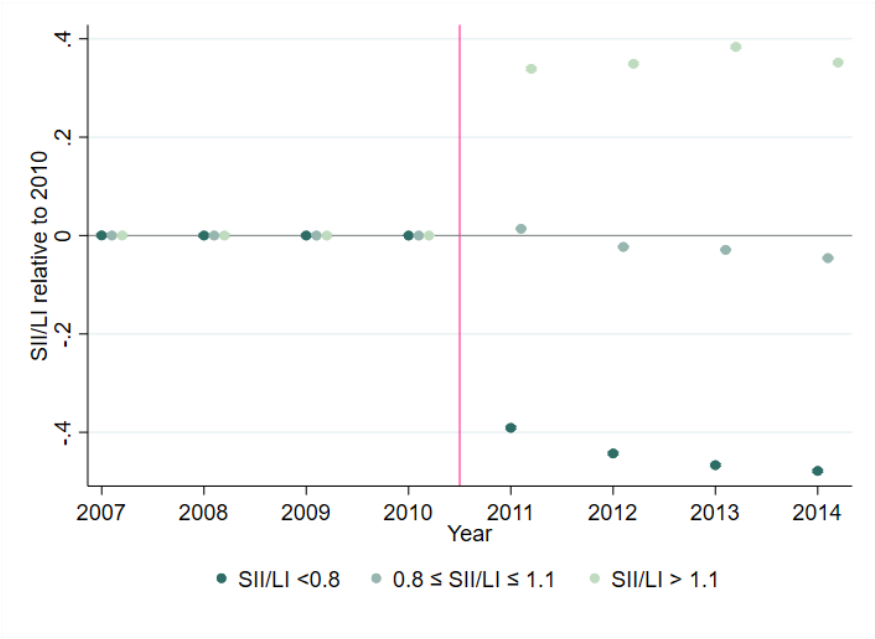
Notes: Figure shows the results of estimating equation (1) on the core sample of unrestricted entrepreneurs. Year T on the horizontal axis identifies the first year when an individual claims a benefit. Panel (a) studies the development of SI/LI seven years prior to retirement, and panels (b) and (c) three years before and after claiming sick pay and parental leave. The estimation includes as controls age, gender, municipality and industry, and year fixed effects. The 95% confidence intervals are derived from standard errors that are clustered at the individual level.

Figure 6: Choice of Social Insurance Coverage after 2011 Reform

(a) Response to the 2011 reform

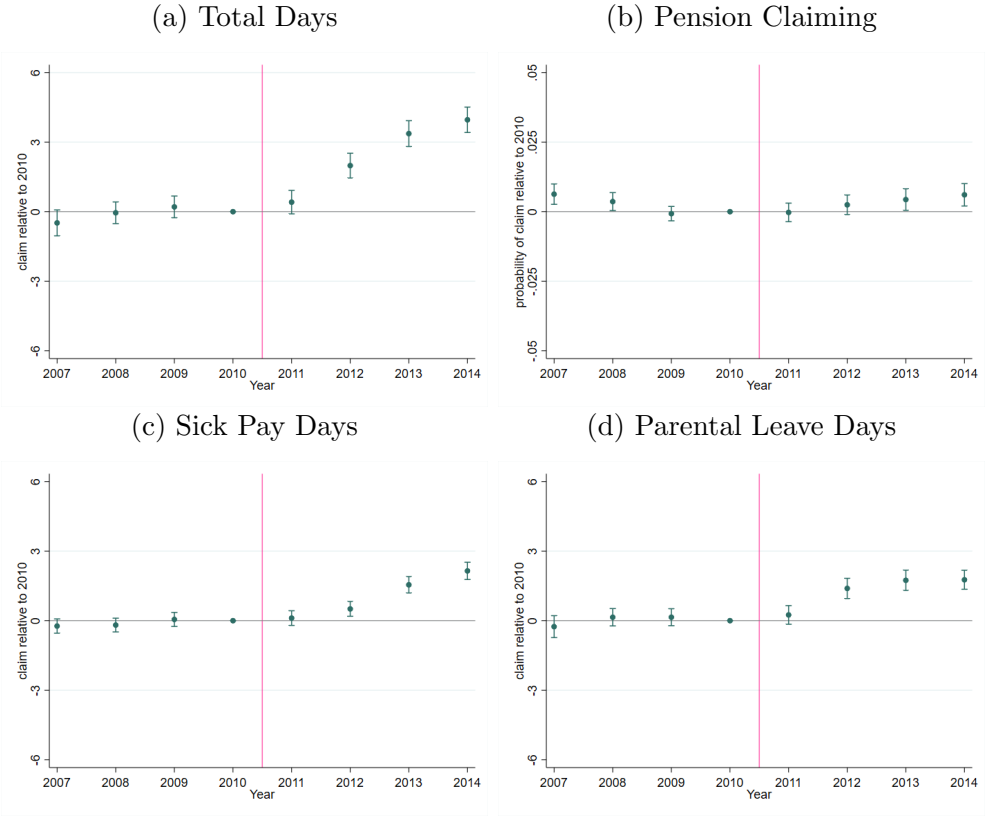


(b) Heterogeneity in Responses



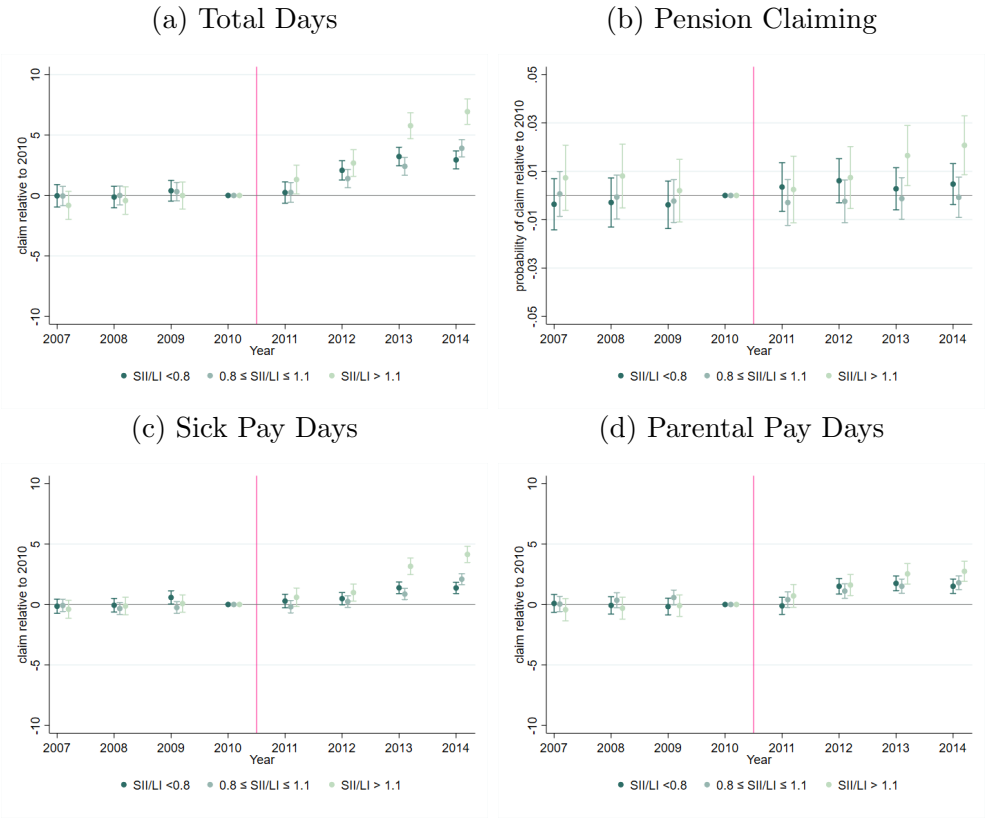
Notes: Panel (a) of the figure shows the results of estimating equation (2), where the outcome variable is SI income relative to labor income. The control groups consists of all always restricted (ownership share between 10% and 30%) and always unrestricted owners (ownership share between 51% and 70%). Panel (b) shows the same results when treated individuals are separated into three groups based on the average SI/LI in post-reform years (2011-2014): those with SI/LI below 0.8, between 0.8 and 1.1, and above 1.1. The control group is the always restricted owners (ownership share between 10% and 30%). Standard errors are clustered at the individual level.

Figure 7: Moral Hazard Responses



Notes: These figures show the results of estimating (2), where the outcome variable is the number of days per year an individual claims the benefit (including zeros). The control group consists of always restricted individuals (those with ownership share between 10% and 30%). In panel (a) the outcome is the total number of absent days, including absences due to sickness and parental leave. In Figures (b), (c) and (d) the outcomes are the likelihood of claiming pension benefits, and the number of sick pay and parental leave days, respectively. Standard errors are clustered at the individual level.

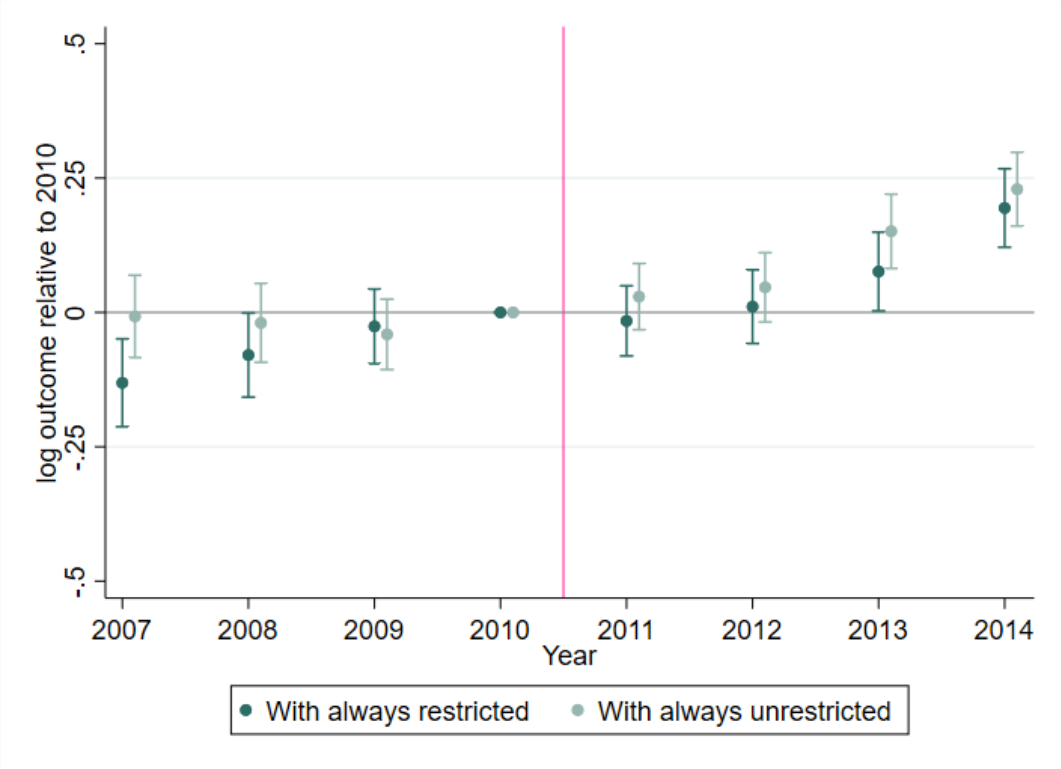
Figure 8: Moral Hazard Response Heterogeneity



Notes: These figures show the results of estimating (2), where the outcome variable measures the number of days per year an individual claims absence. In each figure, the treated individuals are separated into three groups based on the average SI/LI in post-reform years (2011-2014): those with SI/LI below 0.8, between 0.8 and 1.1, and above 1.1. The control group consists of all always restricted individuals (whose ownership share is between 10 and 30%). In panel (a) the outcome is the total number of absent days, including absences due to sickness and parental leave. In Figures (b), (c) and (d) the outcomes are the likelihood of claiming pension benefits, and the number of sick pay and parental leave days, respectively. Standard errors are clustered at the individual level.

Figure 9: Private Savings Before and After 2011 Reform

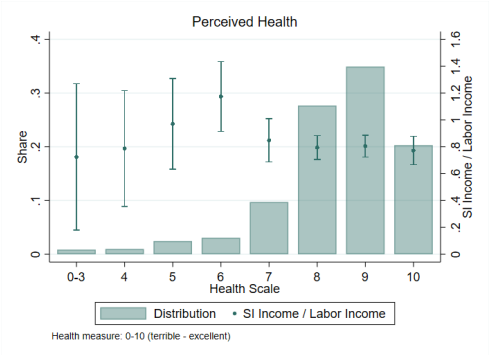
(a) Personal Capital Income



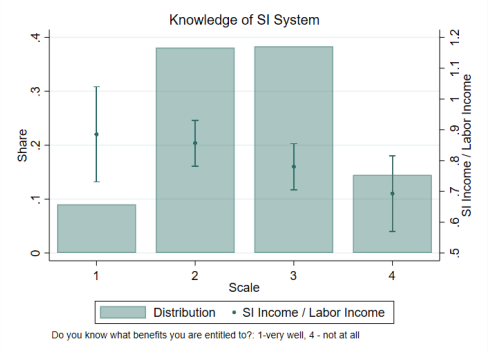
Notes: The figure shows the results of estimating equation (2), where the outcome variable is personal capital income. The control groups consist of all always restricted owners (ownership share between 10% and 30%) and always unrestricted owners (ownership share between 51% and 70%). Standard errors are clustered at the individual level.

Figure 10: Survey Results: Health and Knowledge about SI Coverage

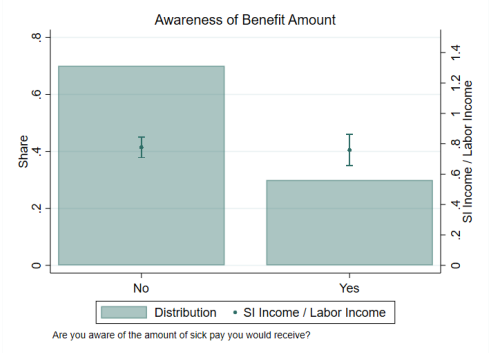
(a) Perceived Health



(b) Knowledge about SI Claims



(c) Awareness of SI Claims



Notes: The figure shows the distributions on the answers to the following survey questions (left-hand side axis): Evaluation of your own perceived health status on the scale from 0 to 10 in panel (a); Do you know what SI benefits you are entitled to, on the scale of 1 (very well) to 4 (not at all) in panel (b), and are you aware of the size of your sick pay benefit (yes or no) in panel (c). The figure includes the average social insurance income per labor income with 95% confidence intervals within each answer category of each question (right-hand side axis), measured for all survey respondents.

Table 1: Summary Statistics (year 2010)

Overall Observations	117,850 shareholders								
	Unrestriced (YEL) (55.8%)			Restricted (TyEL) (33.9%)			Treatment (TyEL → YEL) (10.3%)		
	Ext.	Mean	sd	Ext.	Mean	sd	Ext.	Mean	sd
Male	75.6%			63.6%			80.6%		
Age		48.4	11.13		46.71	14.36		42.48	9.51
SI Income		23148	15570		29960	24605		34709	19186
Labor Income		24610	22161		31048	25500		35926	20025
Insurance Contributions		4675	3759		6822	5593		7910	4374
Sick Days (proxy)	4.5%	64.71	70.15	1.9%	56.83	67.60	1.4%	52.31	57.60
Parental leave (proxy)	2.2%	64.35	73.31	1.7%	85.86	79.28	1.2%	68.71	83.08
Pension	17.5%	19787	15514	21.6%	22528	16488	2.8%	12067	10875

Notes: This table presents the summary statistics for our main sample in the year 2010.

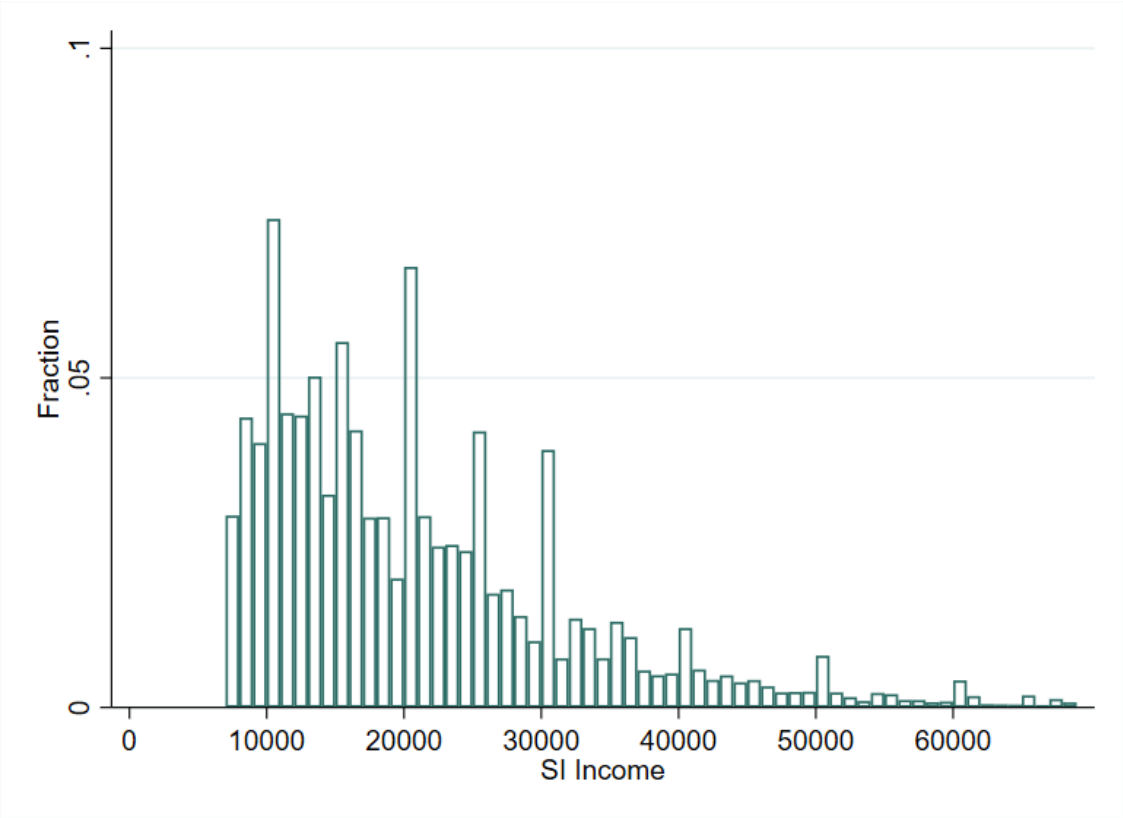
Table 2: Summary of Reduced Form Estimates

	Average	$SI/LI < 0.8$	$SI/LI \in [0.8, 1.1]$	$SI/LI > 1.1$
Moral Hazard Responses (DiD estimates):				
Average SI/LI change	-0.142^{***}	-0.453^{***}	-0.024^{***}	0.357^{***}
Overall Benefits	1.675^{***}	1.867^{***}	1.779^{***}	3.660^{***}
Sick Days	0.742^{***}	0.753^{***}	0.842^{***}	1.924^{***}
Parental Leave	0.858^{***}	1.062^{***}	0.913^{***}	1.707^{***}
Pension	0.000	0.002	0.005^{**}	0.004
Moral Hazard Responses – Extensive Margin (DiD estimates):				
Overall Benefits	0.023^{***}			
Sick benefits	0.022^{***}			
Parental Leave	-0.001			
Pension	0.000			
Moral Hazard Responses – Intensive Margin (DiD estimates):				
Overall Benefits	1.045			
Sick benefits	1.570			
Parental Leave	4.713^{*}			
Positive Correlation Tests:				
All Claims	2.311^{***}			
Sick Days	1.758^{***}			
Parental Leave	0.558^{***}			
Pension	-0.603^{***}			
Positive Correlation Tests – Intensive Margin:				
All Claims	3.145^{***}			
Sick Days	5.216^{***}			
Parental Leave	-15.850^{***}			

Notes: The table presents the reduced form estimates for moral hazard responses as well as the coefficients for the main positive correlation test. The control group used to form the estimates for the moral hazard responses is the always restricted. The heterogeneity results are also shown in the table. Here the control group is the always restricted group as well. The results are pooled difference in differences estimates for the pre and post years. The positive correlation coefficients represent the slope of the correlation line.

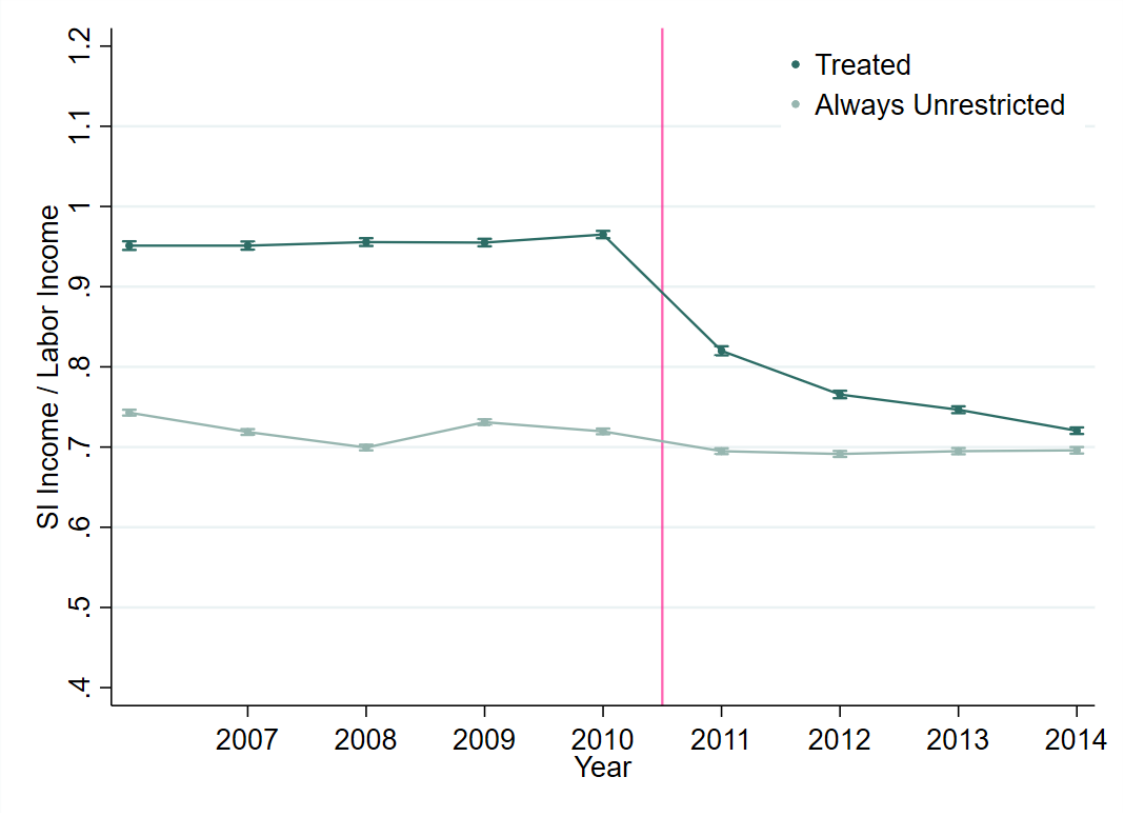
A Additional Results: Choice of SI Income Choice

Figure A.1: Distribution of SI Income of YEL owners



Notes: Figure shows the distribution of SI income in 2010 for the always unrestricted entrepreneurs in our baseline sample.

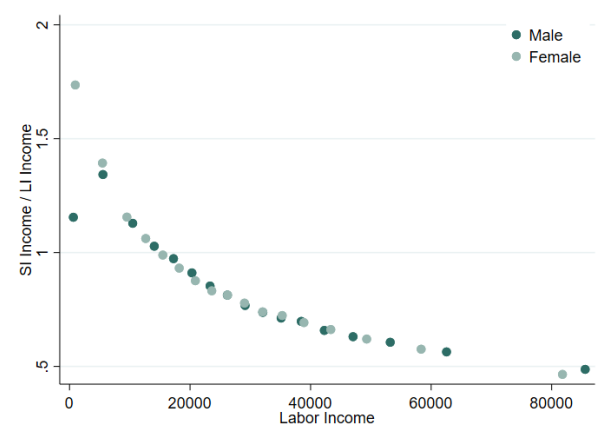
Figure A.2: Changes to Reported SI Income in the 2011 reform: Time Series



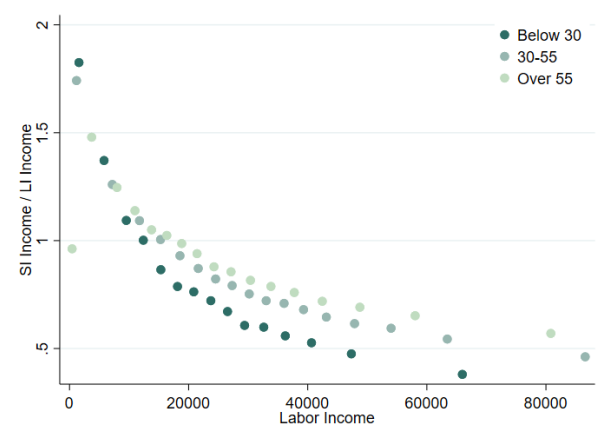
Notes: Figure shows the evolution of SI/LI (social insurance income divided by labor income) over time for treated individuals (ownership share between 30-50%) and the always unrestricted individuals (ownership share between 50-70%).

Figure A.3: Choice of SI Income by Characteristics

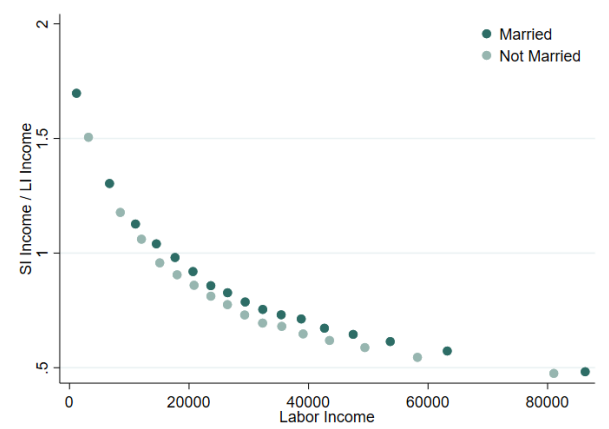
(a) SI Income Choice by Gender



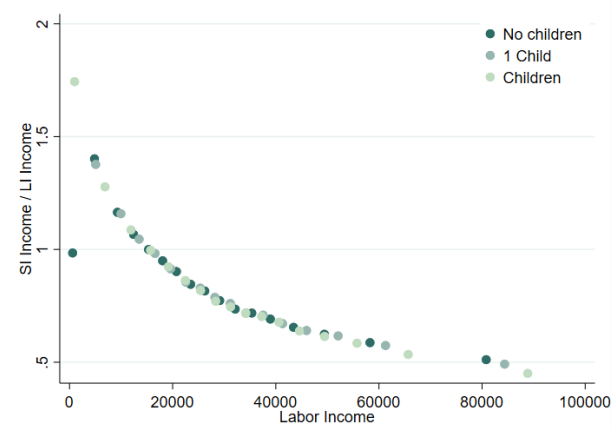
(b) SI Income Choice by Age



(c) SI Income Choice by Marital Status



(d) SI Income Choice by Children

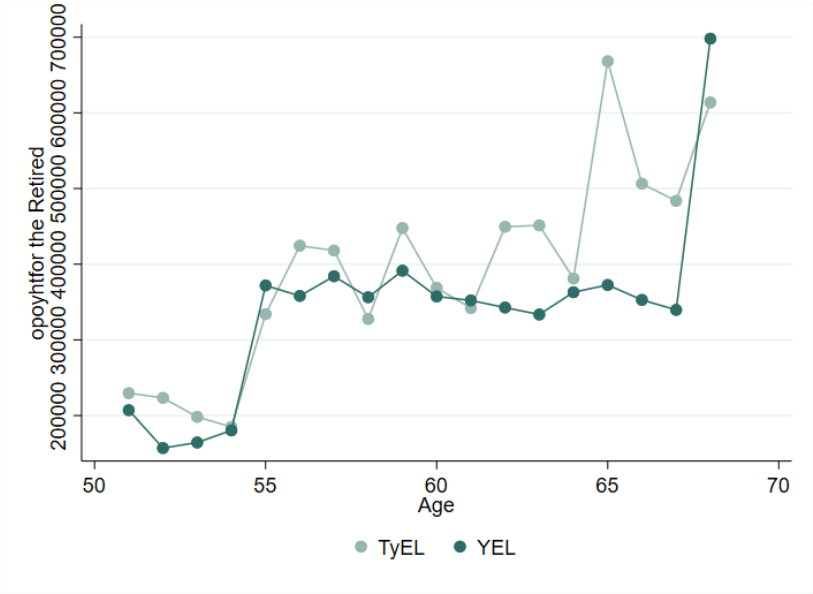


Notes: Figure shows the choice of SI income within each labor income bin by different characteristics: Gender (panel a), age groups (panel b), marital status (panel c) and the number of children (panel d). The figure shows that there are no significant differences in by gender or number of children. In contrast, the SI income is lower within each income group among younger entrepreneurs and those who are married.

B Additional Results: Pension Claims and Crowd-out

Figure B.1: Retirement Choices and Crowd-out: Additional Figures

(a) Firm-level Total Assets per Owner

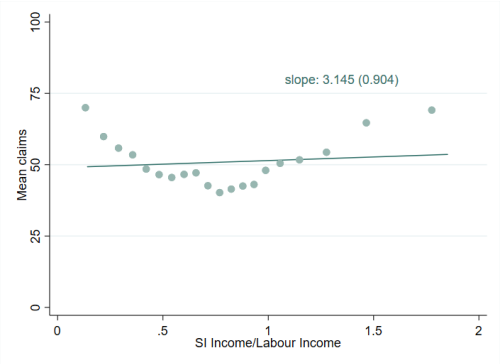


Notes: Panel (a) shows shows the firm-level total assets divided by the ownership share for the retired YEL and TyEL owners.

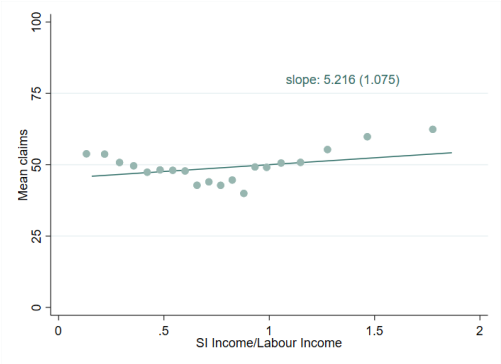
C Additional Results: Positive Correlation Tests

Figure C.1: Adverse Selection – Number of Days Claimed, Conditional on Claiming

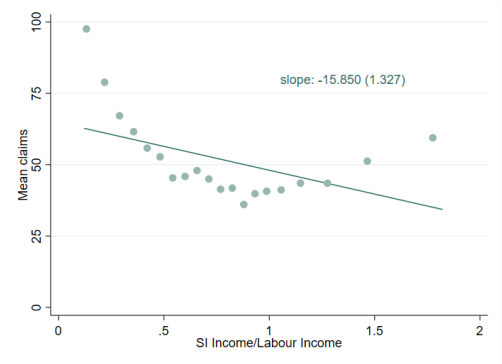
(a) All claims



(b) Sick Pay



(c) Parental Pay

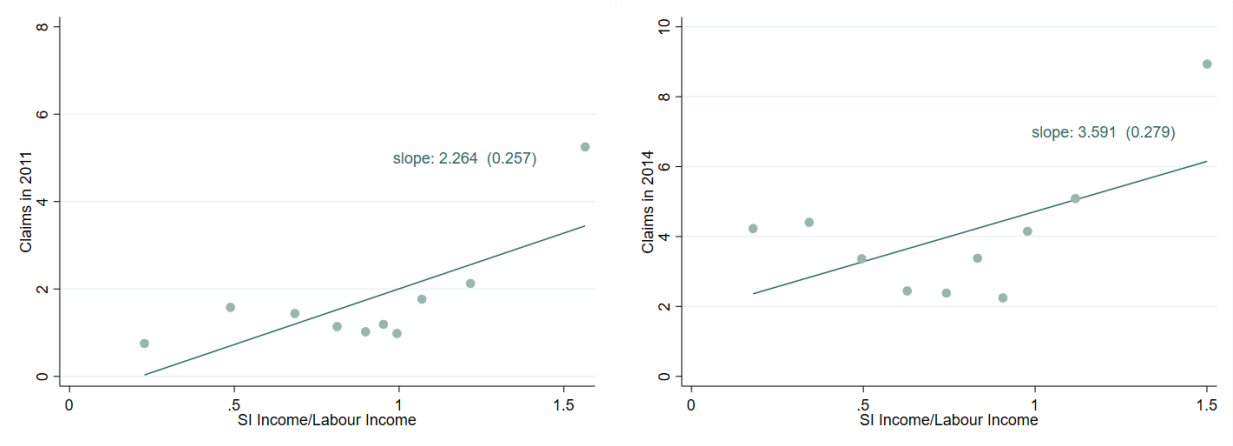


Notes: These figures show the average number of benefit days claimed by the unrestricted individuals, conditional on claiming, by bins of SI/LI. Each SI/LI bin contains 5% of person-year observations. The y-axis shows the average number of days claimed, conditional on claiming: in panel (a) the outcome is the total number of claimed days, in panel (b) the number of sick pay days, and panel (c) the number of parental pay days. The fitted line shown is estimated on the raw data (i.e. person-year observations), and includes the following controls: age, gender, municipality and industry.

Figure C.2: Learning over Time

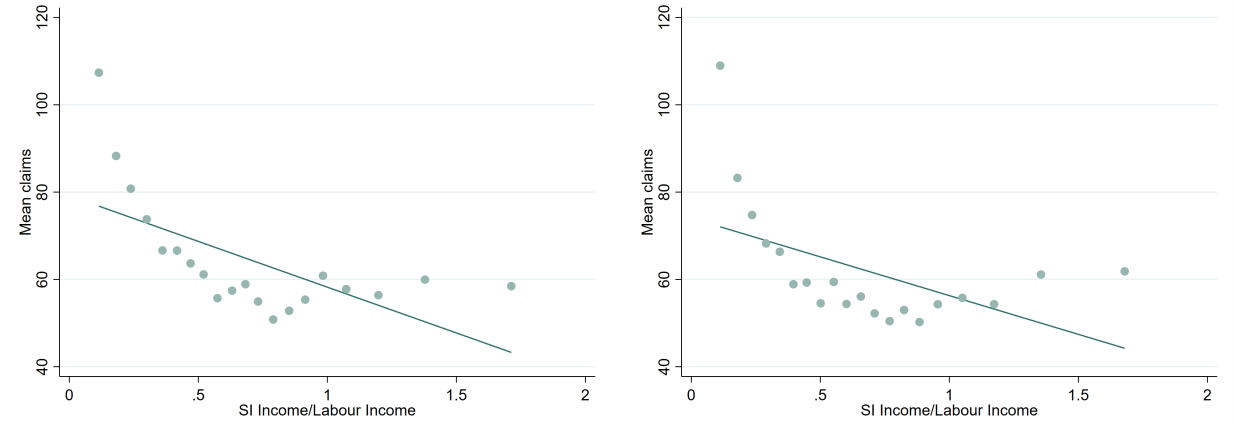
(a) Treated Individuals: 2011

(b) Treated Individuals: 2014



(c) Parental Leave: First Child

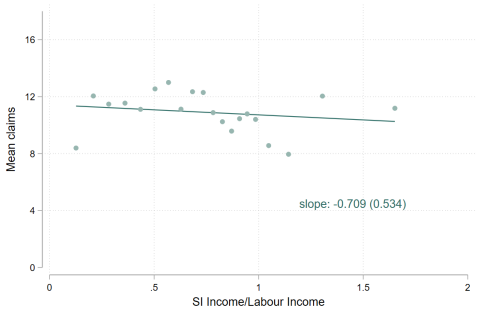
(d) Parental Leave: Second+ Child



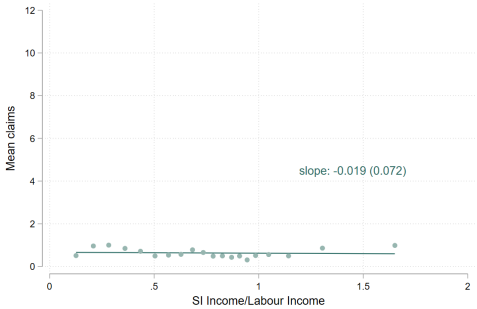
Notes: Figures (a) and (b) show the average number of benefit days claimed (including zeros) by the treated individuals in 2011 and 2014, by bins of SI/LI in 2011-2014. Each SI/LI bin contains 10% of 2011-2014 person-year observations. The fitted line shown is estimated on the raw data (i.e. person-year observations), and includes the following controls: age, gender, municipality and industry. Figures (c) and (d) show the average number of parental days claimed, conditional on claiming, all unrestricted individuals by bins of SI/LI. Each SI/LI bin contains 5% of person-year observations. The y-axis shows the average number of parental leave days claimed, conditional on claiming. Figures (c) shows the number of days claimed for the first child, and figure (d) for the second, third, etc child. The fitted line shown is estimated on the raw data (i.e. person-year observations), and includes the following controls: age, gender, municipality and industry.

Figure C.3: Pre-reform Claims and Post-reform Insurance Choice

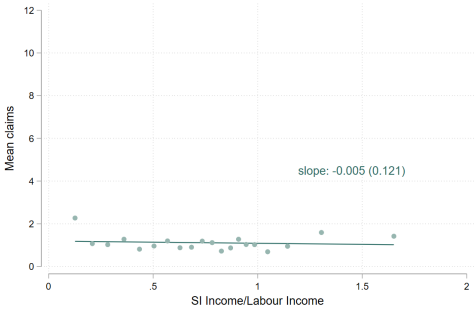
(a) All claims



(b) Sick Pay



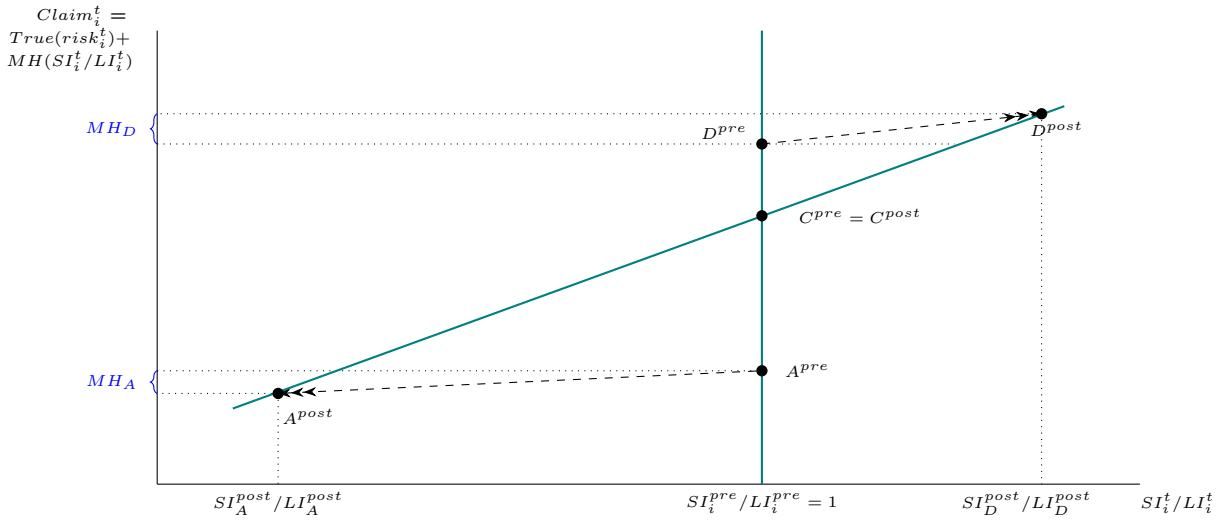
(c) Parental Leave



Notes: These figures show the average number of benefit days claimed by the treated individuals (those with ownership share between 30-50%) in 2006-2010 (Panel A) and in 2011-2014 (Panel B) by bins of SI/LI in 2011-2014. Each SI/LI bin contains 5% of 2011-2014 person-year observations. The y-axis shows the average number of days claimed (including zeros): in figures (a) the outcome is the total number of benefit days, and in (b) and (c) the number of sick pay and parental leave days. The fitted line shown is estimated on the raw data (i.e. person-year observations), and includes the following controls: age, gender, municipality and industry.

D Additional Results: Moral Hazard and Adverse Selection

Figure D.1: Illustration of the 2011 Reform Incentives and Identification Approach

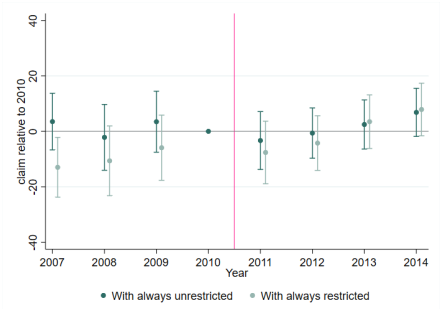


Notes: Prior to the reform, everybody contributed according to their income level, $SI_i^{pre} = LI_i^{pre}$ for all individuals. After the reform, individuals can choose SI income, and therefore sort according to their risk type: low risk types (individual A) are likely to choose lower-coverage insurance contracts with $SI_i^{post}/LI_i^{post} < 1$ while high-risk individuals (individual D) are likely to choose higher-coverage contracts with $SI_j^{post}/LI_j^{post} > 1$. Finally, some individuals may choose to report $SI_k^{post} = LI_k^{post}$ (individual C).

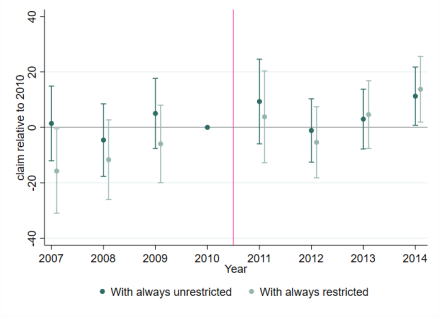
Differences in given a given individual's claims before and after the reform measure the extent of moral hazard: e.g., MH_A measures the moral hazard response from switching from contract with $SI_A^{pre}/LI_A^{pre} = 1$ to contract with $SI_A^{post}/LI_A^{post} < 1$. Differences in individuals' claims levels prior to the reform reveal the extent of risk type and preference heterogeneity present in the population. If individuals' risk types and claims are stable over time, then the correlation between post-reform insurance contracts SI_i^{post}/LI_i^{post} and pre-reform claims $Claim_i^{pre}$ reflect the extent of adverse selection. However, if risk types and claims are not stable over time, then one can recover the extent of adverse selection by subtracting the moral hazard component from the overall differences in claims between individuals with different insurance contracts. See discussion in Section 6.3.1.

Figure D.2: Moral Hazard Responses – Number of Days Claimed, Conditional on Claiming (Intensive Margin)

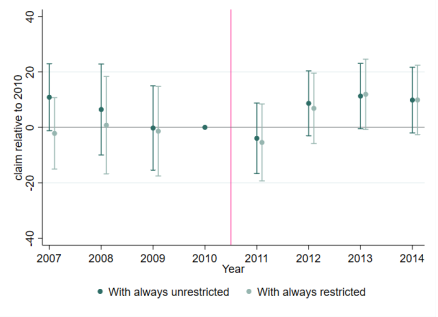
(a) Total Days



(b) Sick Pay Days



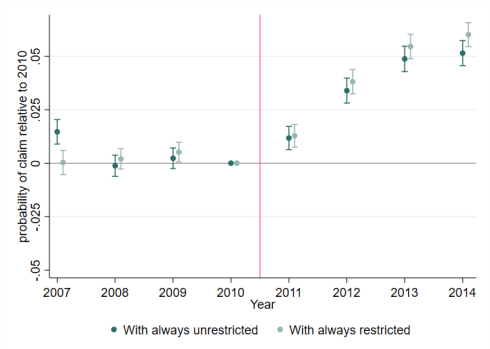
(c) Parental Pay Days



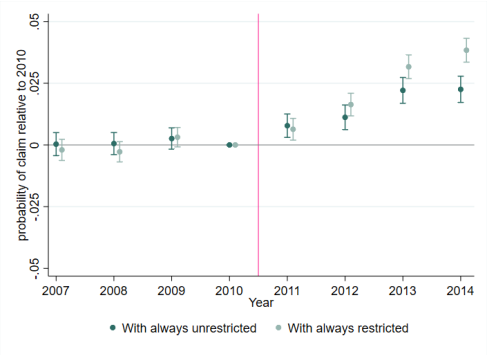
Notes: These figures show the results of estimating (2), where the outcome variable measures whether the individual, and the control group consists of all always restricted individuals (those with ownership share between 10% and 30%) or the all always unrestricted individuals (those with ownership share between 50% and 70%). In Figure (a), the outcome is the total number of absent days, including absences due to sickness and parental leave. In Figures (b), and (c) the outcome is the number of sick pay and parental leave days. Standard errors are clustered at the individual level, 95% confidence intervals shown.

Figure D.3: Moral Hazard Responses – Probability of Claiming (Extensive Margin)

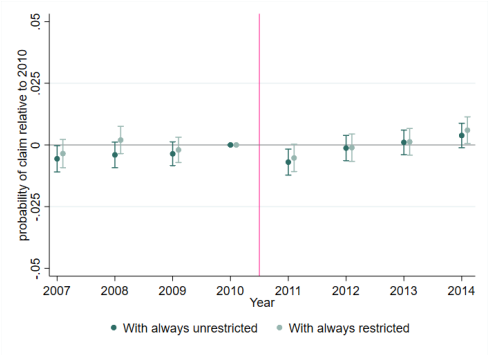
(a) Total Absent Days



(b) Sick Pay Days



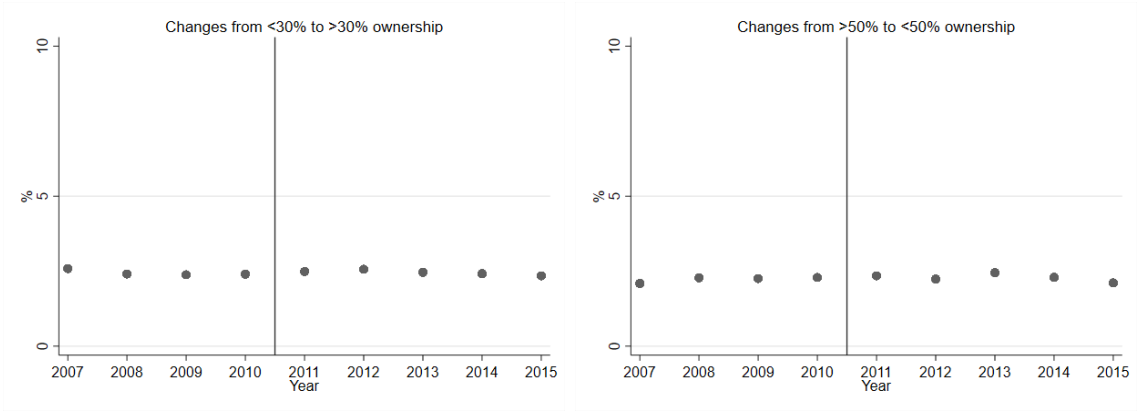
(c) Parental Pay Days



Notes:These figures show the results of estimating (2), where the outcome variable measures the number of days per year an individual claims absence, conditional on claiming, and the control group consists of all always restricted individuals (those with ownership share between 10% and 30%) or the always unrestricted individuals (those with ownership share between 50% and 70%). In Figure (a), the outcome is a dummy for any benefit days claimed (sick pay and parental leave). In Figures (b) and (c), the outcome takes value 1 if an individual is absent due to sickness or parental leave, and 0 otherwise. Standard errors are clustered at the individual level, 95% confidence intervals shown.

E Robustness Checks and Sensitivity

Figure E.1: Ownership share changes over time



Notes: These figures show the percent of individuals that switched ownership status from below 30% to above 30%, or and from above 50% to below 50%. In both cases, only approximately 2.5% of business owners changed their ownership status enough to move from treatment to control group or vice versa. Importantly, there is no change in the share of owners jumping across these thresholds at the time of the 2011 reform.