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ABSTRACT

This paper estimates the effect of a permanent income increase for the elderly on their health outcomes. Our regression discontinuity design exploits an eligibility cutoff in a Chilean basic pension program that grants monthly payments of 40 percent of the minimum wage to pensionless retirees. Four years after applying pension, recipients are 2.5 percentage points less likely to die, with lower incidence of respiratory and circulatory diseases. The effect is concentrated on pension recipients living without working-age relatives, who have more children if living with recipients. This seems explained by pre-existing income transfers from working-age relatives to retirees, which cease when payments begin. Results suggest that increasing income for older individuals could reduce health inequalities across income groups, and mitigate the inter-generational transmission of poverty by alleviating the financial burden imposed on younger relatives.

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CAF DEVELOPMENT BANK OF LATIN AMERICA

EL DINERO PUEDE COMPRARME VIDA. EL EFECTO DE PENSIONES BÁSICAS EN LA MORTALIDAD: UN ANÁLISIS DE REGRESIÓN DISCONTINUA

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RESUMEN

Este paper estima el efecto de aumentar el ingreso permanente a los adultos mayores en sus resultados de salud. Nuestro análisis de regresión discontinua explota el puntaje de corte del programa de "Pensión Básica" en Chile, el cual provee pagos mensuales equivalentes al 40 por ciento del sueldo mínimo a adultos mayores que no reciben pensiones. Cuatro años después de postular, los adultos mayores que obtuvieron el beneficio disminuyen en 2.5 puntos porcentuales sus probabilidades de fallecer, lo cual es explicado por una más baja probabilidad de tener episodios respiratorios y circulatorios. El efecto se concentra en aquellos beneficiarios que no viven con personas en edad laboral. Nuestro análisis exploratorio muestra que la existencia de transferencias de ingresos al interior del hogar, desde individuos que trabajan a adultos mayores, que se detiene una vez que los pagos comienzan explica este efecto. Los resultados sugieren que políticas que incrementan el ingreso de los adultos mayores puede reducir la inequidad en salud entre diferentes grupos socioeconómicos, y al mismo tiempo mitigar la transmisión intergeneracional de pobreza al reducir la carga financiara que los adultos mayores imponen sobre miembros más jóvenes en hogares pobres.

Money can buy me life. The Effect of a Basic Pension on Mortality: a Regression Discontinuity Design*

Enrico Miglino† Nicolas Navarrete H.‡ Gonzalo Navarrete H.∓ Pablo Navarrete H.⋆

Abstract

This paper estimates the effect of a permanent income increase for the elderly on their health outcomes. Our regression discontinuity design exploits an eligibility cutoff in a Chilean *basic pension* program that grants monthly payments of 40 percent of the minimum wage to pensionless retirees. Four years after applying pension, recipients are 2.5 percentage points less likely to die, with lower incidence of respiratory and circulatory diseases. The effect is concentrated on pension recipients living without working-age relatives, who have more children if living with recipients. This seems explained by pre-existing income transfers from working-age relatives to retirees, which cease when payments begin. Results suggest that increasing income for older individuals could reduce health inequalities across income groups, and mitigate the inter-generational transmission of poverty by alleviating the financial burden imposed on younger relatives.

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1 Introduction

Global life expectancy has dramatically increased in the last two centuries, however, this extraordinary health progress has not reached all members of society equally. Several studies find large and widening life expectancy inequalities across income groups in different countries, which persist at an old age [Chetty et al., 2016; Riley, 2001; WHO, 2017]. For instance, an OECD [2016] report shows that the richest 20 percent of 65-year-old Chileans live around 2.1 years longer than their peers in the poorest 20 percent. This report also indicates that the life expectancy gap at 65 can be even larger in wealthier countries, such as in Canada (4 years) or Australia (5 years).

Despite that the relationship between income and health inequalities has been well established in the literature [Kitagawa and Hauser, 1973; Kawachi and Kennedy, 1999; Benzeval et al., 2000; Blakely et al., 2000; Marmot, 2005; Mackenbach et al., 2008; Braveman et al., 2010; Woolf and Braveman, 2011; Waldron, 2013], whether an income increase at an old age could correct health inequalities remains debated.[1]

This paper identifies the causal effect of a permanent income increase for the elderly on their health status, using a unique administrative individual-level dataset from a pension program in Chile. Since 2011, individuals who are aged 65 or older and have no pension can apply to receive lifelong monthly payments of approximately 40 percent of the national minimum wage (*basic pension*). On receiving an application, the government calculates a specifically designed pension score that evaluates the applicant's risk of becoming poor. Using this score, the government assigns a basic pension to applicants who fall below the 60^{th} percentile of the score distribution. We observe that applicants are mostly women and almost all who were eligible for the pension in their first application (pension recipients) redeemed it. Furthermore, we observe that 21.2 percent of those who did not receive the basic pension in their first application made one or more subsequent submissions. This resulted in around 18 percent of those who only just missed out on the basic pension in the first application (pension non-recipients) obtaining it later. This means that a successful first application

[1] Several reasons could explain the positive correlation between income and health status. First, better health status could be the reason for higher income (reverse causality). Second, unobserved characteristics, such as higher ability or genetic factors, could explain both higher income and better health. Finally, health inequalities in the elderly population, may only be the result of accumulative conditions related to their economic status at earlier ages, such as different education level or exposure to air pollution. In all these cases, an increase in income at an old age should have little, if any, impact on the health status of an elderly person.

increased the probability of receiving a basic pension by 82 percent. We also show that pension recipients and non-recipients are locally comparable and do not manipulate the pension score in order to become recipients. Following from these findings, we implement a fuzzy regression discontinuity design to explore the causal effect of the pension on health outcomes.

We observe that receiving a pension causally decreases the probability of dying within four years after applying to the program by 2.5 percentage points (pp.), which represents 40 percent fewer deaths for those who receive the pension. As the basic pension represents 27% of average household income in our control group, we obtain a negative mortality-household income elasticity estimate of 1.5. We also observe that the pension recipients spend fewer days hospitalized in this four-year window, although this result is not statistically significant. Following the medical literature [Pitt et al., 2014; Eikelboom et al., 2017], we summarize treatment effects using the probability of ever 'suffering a medical episode' (hospitalization or death) and show that this decreases by 5.2 pp. within the first four years following the application.

A survival analysis shows that the effect on deaths manifests itself shortly after applying and grows monotonically over time. Improvements in health outcomes appear to be driven by fewer incidents of circulatory and respiratory diseases (e.g. heart attacks or pneumonia). These are often decompensations of a chronic conditions, such as heart attacks due to uncontrolled diabetes for circulatory diseases or acute pneumonias in patients with severe asthma for respiratory diseases. This might indicate that recipients spend their pension on better controlling chronic conditions which prevents them from having harmful acute episodes.[2]

Following the standard medical literature for aging and mortality [Garre-Olmo et al., 2013; Hawton et al., 2011], we conduct a separate analysis for different family structures.[3] Results show that applicants living alone or only with elderly family members at the moment of application are positively affected, while those living with working-age family members remain unaffected.[4] An exploratory analysis suggests that the lack of effects for applicants living with working-age family members is due to the pre-existence of intra-household trans-

[2]we provide evidence that does not support other mechanisms that could deliver similar results: buying a private health insurance, or reducing labor supply in the informal sector.

[3]We also report the heterogeneous analysis by gender and age. However, we focus this analysis on family structure since, close to the cutoff, most applicants are women (87 percent) and 65 years old (73 percent).

[4]Using the Chilean labor law, we classify applicants' family members in three exclusive groups: 1) *elderly* are women aged 60 and above, and men aged 65 and above; 2) *in working age* are men aged 16 to 64 and women aged 16 to 59; 3) *children* are those below 16 years of age. Given the small number of observations in this last category (931), we have not conducted any analysis using them as a separate group.

fers of income from working-age family members to applicants, which then stopped when applicants obtained the basic pension. In this sense the pension was cash-flow neutral for this particular group. Further evidence does not support other potential mechanisms that would deliver similar results, such as family size or better care provision from younger family members prior to receiving the pension.

When considering spillover effects on family members, we observe that elderly relatives are unaffected, but working-age family members living with a pension recipient have 0.04 more children per capita, nine months or more after applying. This result is in line with our hypothesis of intra-household transfers of income.

In the last part of the paper we show that the pension moves recipients from the 34.6$^{\text{th}}$ to the 46.9$^{\text{th}}$ percentile of the income distribution. Following this, in back-of-the-envelope computations, we estimate that the basic pension corrects around 45 percent of the life-expectancy gap between these 2 percentiles at the age of 65.

To the best of our knowledge, no prior study explores the *medium-term* effects of a quasi-randomly assigned income increase on elderly people and their family members' objective health outcomes using detailed administrative data in the present time. Cheng et al. [2016] is the study that most closely relates to ours. They study the 2009 rural pension program for workers in China and exploit survey data, as well as the time-varying implementation of the scheme across Chinese counties, finding no significant effects on mortality risk.

Few studies have also looked at the effects of income increases on mortality, but before important medical advances (e.g. the invention of antibiotics). Salm [2011] examines the effects of two pension laws in the early 1900s, which granted US veterans pension payments worth respectively 29.60 and 51.98 percent of average non-farm employees' income. They estimate a decrease in mortality by 11.5 and 29.6 percent with respect to population mortality for elderly white. This mortality decline was driven by infectious diseases in a time frame where antibiotics were not invented yet. In contrast with these findings, Snyder and Evans [2002] estimate that a notch in US social security payments, which increased family income for the 1917 cohort relative to the 1916 cohort by 4 percent, raised men's mortality rates of the richer cohort by 2.39 percent. They justify this surprising result pointing at earlier transitions to retirement and an associated increase in social isolation. These results can be reconciled with ours considering that the Chilean basic pension is given mostly to people that have never worked, so that social isolation from leaving the work environment plays a minor role.[5]

Finally, some studies also look at the effect of interrupting pension payments on the health outcomes of the elderly. Although this literature is related, the effect of a negative and temporary income shock might not mirror the effect of a positive and permanent income shock. In this literature, Jensen and Richter [2003] considered the effect of payment interruptions during the Russian pension crisis and found that pensioners who lost on average 24% of their household income were 5 pp more likely to die in the following two years, with a significant decline in caloric intake and medications.

The primary contribution of our paper is to provide, in the present times, estimates of the medium-term effects of an income increase on mortality and morbidity of beneficiaries and their household members, relying on both a clearly exogenous source of identifying variation and a rich set of objective health outcomes. In particular, we provide evidence suggesting that a discrete income increase of around 40 percent of the minimum wage for the elderly could correct in part the health disparities created by income inequalities over a lifetime. Results regarding working-age family members also suggest that an increase in income for the elderly could reduce the inter-generational transmission of poverty, by alleviating the financial burden imposed on younger family members. The findings of this paper are also relevant for the optimal design of pension programs by showing that they could improve the health of poor elderly people if properly designed, and thus encourage policy makers to implement policies that bring equality not just in younger groups of people, but also for people who are of retirement age.

The paper is organized as follows: Section 2 presents the basic pension program and Section 3 describes the data used in the paper. Section 4 explains the empirical strategy and Section 5 analyzes the regression discontinuity validity in further depth. Section 6 presents the results, Section 7 illustrates the potential mechanism behind the effects, and Section 9 concludes.

[5]Few studies have look at the effects of non-objective health outcomes. Behrman et al. [2011] evaluate the 2008 Chilean pension system reform and found insignificant "Intention to Treat effects" on self-reported health after one year of treatment. Johnston et al. [2009] show that self-reported health data tends to underestimate income-related inequalities in health because of measurement error. Galiani et al. [2016] find that a non-contributory pension scheme for rural elderly in Mexico improved their mental health. The authors also show that 71 percent of the pension is shared across household members, which is consistent with our finding of positive spillover effects on working age family members.

2 The Basic Pension

Since 1980, Chile has had a fully funded individual capitalization system, run by private pension fund companies, in which workers have to make monthly mandatory savings of 10 percent of their wage. When retired, workers receive a pension that depends on the amount saved during their working life.[6] As a consequence of this system, those who had not done any paid work received no pension.

During the 2005 presidential campaign, candidate Sebastian Piñera pointed out that this pension system was particularly unfair to housewives because they do an unpaid yet indispensable job for society: raising the family's children. He thus proposed to grant a pension fully funded by the government to housewives in the poorest households. Most of the other candidates agreed with this policy proposal, including future president Michelle Bachelet.

In 2006, Michelle Bachelet became the first female president of Chile. On March 11, 2008, President Bachelet signed ACT 20255 which establishes that not only housewives, but every citizen aged 65-year-old or older and with no retirement savings, would be eligible for a government pension. This pension consists of lifelong monthly payments of approximately 160 US dollars per month (*basic pension*). On average, throughout the period of analysis, the basic pension has corresponded to approximately 40 percent of the national minimum wage and 27 percent of average household income in our estimation sample [OECD, 2011; Ministerio de Trabajo y Prevision Social, 2011].[7]

To obtain the basic pension, individuals must first apply to the Pension Institute (PI). The application process is free and requires filling in a form at the municipality in which the pension applicant lives, or in any of the specialized governmental offices present in every town. Following the application, the PI calculates a *pension score*, specifically designed for assigning the basic pension and aimed to reflect the risk of elderly people being poor. This score is calculated in a different way from other government indexes, such as the *poverty score*, and is composed of 3 factors: 1) household income from assets, 2) labor income from

[6]Self-employed workers can voluntarily contribute to their pension account. Once people are retired, pension fund companies calculate the amount saved by each person. Then individuals choose from two options: 1) buying life insurance that guarantees them monthly payments until they die, or 2) obtaining monthly payments until they run out of funds.

[7]This is a weighted average of household income in 2012 that includes only households in a 500 point bandwidth from the cutoff and give more weight to households closer to the cutoff (exactly as in our main estimations).

elderly family member, and 3) potential labor income from working age family members.[8] Administrative records show that each of these three factors accounts for 60, 27 and 13 percent, respectively. Then, the pension score is adjusted for family size and the level of disability of its family members.[9]

Following the pension score, the PI uses an arbitrary cutoff to determine pension recipients. This cutoff has changed progressively over time from covering the lowest 40 percent of the most vulnerable elderly population, in July 2008, to covering the lowest 60 percent, since July 2011.[10]

Given that constructing the pension score requires the coordination of several public and private offices, it is calculated only for people that apply and no previous assessment is done for anyone before applying. This restricts the ability of pension applicants to know whether they will receive the basic pension ex-ante. After the decision has been made, applicants receive two pieces of information: whether or not they will receive the pension, and the reason why they will not receive it if the application was not successful.

3 Data and Descriptive Statistics

3.1 Pension and Health Datasets

Our analysis is based on administrative data provided by the Chilean government. For each application in 2011 and 2012, the PI provided us with information about the gender, age, nationality and town of residency of each applicant and each applicant's family member at the moment of application.[11]This dataset also includes the family's pension and *poverty* score, the application date, and the outcome of the application.

A second dataset from the Ministry of Health covers the health history of each applicant and family member from 2011 to 2016. This dataset contains information as to whether the person died, the date of death, and the cause of death.[12] It also provides information about

[8]The poverty score ("Puntaje de la Ficha de Proteccion Social") is a proxy means test based on actual and potential income, health status and family composition that allows the government to identify families living in poverty.

[9]For more details on the pension score, see Appendix section A.

[10]Appendix Table B1 shows the cutoff changes by date.

[11]We do not have access to applicants' data from previous years, as this was not systematically recorded before 2011. We also have family-level data on the components of the pension score in 2012, the year in which the PI started to systematically record them.

[12]Unfortunately, 13 percent of recorded deaths do not have a reported cause.

the type and number of vaccines given to applicants and family members, as well as any hospitalization with their corresponding dates, duration, and cause. The information for all variables was collected on applicants and family members receiving healthcare through both private and public health care systems.

We restrict our attention to applications submitted between July 1, 2011 and December 31, 2012. We do not use earlier applications to the basic pension because of the 60 percent cutoff point for eligibility introduced by the government in July 2011 (section 2). We also do not use applications beyond 2012, as the time span is too short to undertake a substantial medium-term analysis specific to this study. Given the fact that the most recent health data to which we have access is from December 2016, this allows us to measure health outcomes up to four years after the day of application.

We first focus our analysis on basic pension applicants. Then we conduct a separate analysis for their family members. For this purpose, we define three exclusive groups using the Chilean labor law: 1) men above 64 and women above 59 years old (elderly), 2) men between 16 and 64, and women between 16 and 59 years old (working age), and 3) individuals below 16 years old (children in school).[13] Given the small number of observations in this last group of family members (931), we center the analysis on the first two groups.

Finally, we observe that 21.2 percent of those who did not receive the basic pension in the first application (non-recipients) applied more than once. To avoid multiple-counting that could potentially bias our estimates, we keep in the sample only the first application made by each applicant in our period of interest.[14] In the final sample we count 121,548 observations, with 49,552 applicants, 27,057 elderly family members and 44,053 working age family members.

3.2 Descriptive Statistics

Table 1 reports descriptive statistics for applicants, elderly family members and working age family members at the moment of their first application. This table shows that 87.0 percent

[13] In Chile, the minimum legal age to claim private pension benefits is 65 for men and 60 for women. The minimum legal working age is set to 15 years old.

[14] As people submitting more than one application are self-selected, counting separately each application that they submit could cause biases. First, it could give an excessive weight to the applicants that applied more than one time. Second, if the type of applicants submitting more than one application is different (e.g. more motivated than the rest), we would give an excessive weight to this particular type of applicant. Both reasons could bias our estimation of the treatment effects.

of applicants got their first application approved and 75.8 percent of all applicants were female. The large share of female applicants could be the result of women being less likely to have private pension savings and suggests that the basic pension program has succeeded in targeting women as its main applicants. We also observe that the share of women among non-recipients is higher. A potential explanation for this pattern is that women with no retirement savings are more likely to have a partner who has some source of income (e.g. a private pension) than men with no retirement savings, and thus women are more likely to have a pension score above the 60th percentile.

The average applicant's age is around 66, which suggests that most applicants submit an application shortly after they reach the minimum application age (87 percent are 65-year-old). Non-recipient applicants tend to be around 2 years older than pension recipients. This could be explained because older people may have submitted an unsuccessful application before the change in the threshold, and applied again after the change in the threshold, but with the same result.

The average pension applicant is in the 25th percentile of the *poverty score* distribution, which shows that applicants tend to be very poor.[15] Looking at the poverty level by pension holder status, we observe that pension recipients are within the lowest 30 percent and non-recipient are within the lowest 40 percent of the distribution on average. This difference is not surprising as we expect poorer applicants to have a lower pension score. However, it is worth noting that even though the pension score cutoff is set at the 60th percentile, the average poverty level for recipients and non-recipient is well below the 60th percentile. This is likely to happen because the pension score incorporates factors that are not in the *poverty* score, such as capital income, which might classify families as richer. Then, the pension and *poverty* score are correlated (correlation: +0.206), but are far from being perfectly aligned.

The average family size is around 2.5 persons. Recipients are more likely to live alone, which is consistent with the objective of the pension to help people that do not have other source of income. A lower share of applicants living with an elderly person receive the pension because, as noted above, this other elderly person is likely to be a husband who has a private pension.

Looking at health characteristics of the applicants, we observe that within the six months

[15] According to the Ministry of Social Development [Ministerio de Desarollo, 2010], the 20th percentile is at 6,036 points, the 30th percentile at 8,500, and the 40th percentile at 10,320 points of the *poverty score*.

before the application they spent approximately half a day hospitalized, with no significant difference between recipients and non recipients. 27 percent of the applicants took a vaccine for Influenza, and 6 percent of them took a vaccine for Pneumonia. We also notice that pension recipients are less likely to receive an influenza vaccine, but more likely to receive a pneumonia vaccine. These slight differences in health variables do not seem to indicate a distinct health behavior between recipients and non-recipients before applying for the pension.

Elderly family members are, on average, five years older than applicants and, in the majority, are men (75.8 percent). This seems to indicate that most elderly family members are the husbands of female applicants. The average elderly family member spends half a day hospitalized, 30 percent of them received a vaccine for Influenza, and 2 percent of them received a vaccine for Pneumonia within the six months before the application. Overall, elderly persons living with recipient applicants seem to be poorer, again showing that the basic pension succeeds in targeting the most disadvantaged families.

Working age family members are, on average, 37 years old and almost equally distributed across genders. They also belong to larger families than individuals from the other two groups, with an average family size of 3.8 people. Not surprisingly, working age family members seem to be in a better health than applicants, spending only 0.23 days in hospital. We do not observe any significant difference between working age family members living with pension recipients and non-recipients, except for the *poverty score*.

Among pension applicants, we observe that 57 of them did not receive the pension, despite having scored below the threshold. These applicants either did not redeem the basic pension within one year (4 of them) or had their applications rejected because of reasons other than the pension score (e.g. they benefited from other public pension programs).

Table 1 also shows that 21 percent of non-recipient applicants submitted a further application (henceforth referred to as *serial applicants*) and 9.3 percent obtain a basic pension later. To analyze the characteristics of serial applicants, we regress an indicator for whether the person is a serial applicant against baseline covariates. Column 1 of Table 2 presents a series of bivariate regressions in which each baseline characteristic is entered separately, while columns 2, 3, and 4 show estimations that regress on multiple covariates simultaneously. This table shows that older and richer non-recipients are less likely to submit a further application, while those in larger family are more likely to be serial applicants. On the one hand, this could be explained because: 1) older non-recipients might perceive a lower present value of pension income (they expect to live for a shorter time), and 2) richer people see themselves as less likely to obtain the pension. On the other hand, people in larger families might be more likely to see changes in their family composition or income, which might affect their pension score and encourage them to apply again.

We also attempt to understand the characteristics of serial applicants that obtained the pension later by regressing a dummy indicator equal to 1 if the serial applicant received a basic pension four years after applying and 0 otherwise.[16] Table 3 shows that serial applicants that are richer and live with an elderly are less likely to receive a pension. Being richer implies a score that is further off from the cutoff, reducing the chances of success in a later application. Living with an elderly has the same effect because elderly relatives usually have pension income, which is one of the less volatile sources of income and the most relevant component in the applicants' pension score. In this case, changes in other dimensions, that might encourage applicants to submit a new application, could not produce a big difference in the final score.

4 Empirical Strategy

As some recipients did not redeem their basic pension and some non-recipients managed to obtain a basic pension later on, we can predict that the cutoff discontinuously changes the probability of receiving a basic pension, but not from zero to one hundred percent. Following this, we implement a Fuzzy Regression Discontinuity (FRD) design to estimate the causal effect of a basic pension on health outcomes.

4.1 Fuzzy Regression Discontinuity Design

To estimate the causal effect of the basic pension on the desired health outcome, we perform a Two-Stage Least Square regression. The set of equations is as follows:[17]

$$Health\ Outcome_{i,h} = f_0(\widetilde{Score_h}) + \beta_{LATE} Pension_h + Pension_h \times f_1(\widetilde{Score_h}) + u_{i,h} \quad (1)$$

where $Pension_h$ is instrumented using:

[16] If we do not restrict our analysis to serial applicants, but on non-recipients in general, the results are very similar to the ones in Table 2.

[17] Note that in these equations the score is centered at the cutoff to ensure that the treatment effect is the coefficient β_{LATE}.

$$Pension_h = g_0(\widetilde{Score_h}) + \beta D_h + \mathrm{D}_h \times g_1(\widetilde{Score_h}) + v_h \qquad (2)$$

and D_h is the household application dummy defined as follows:

$$D_h = \begin{cases} 1 & \text{if } \widetilde{Score_h} \leq 0 \\ 0 & \text{if } \widetilde{Score_h} > 0 \end{cases}$$

In this set of equations, $Health\ Outcome_{i,h}$ is one of the health outcomes described in Section 3 for the person i in the household h. Pension_h is a dummy indicator, equal to 1 if the applicant of the household h has received a basic pension 4 years after the first application and 0 otherwise. $Score_{g,h}$ is the score of the first application for the pension applicant of family g. The study tests the robustness of the results to different functional forms of f_j and g_j with $j = 0, 1$. In our preferred specification, f_j and g_j are polynomials of order 1 in $Score_h$. As a robustness check, we estimate Equation 1 and 2 with polynomials of order 2 in $Score_h$. [18] In further specifications, we also check the robustness of our results to the use of different sets of controls and non-parametric estimations.

In each regression, we use triangular kernels such that the weight of each observation decreases with the distance from the cutoff. The sample is restricted to a bandwidth of 500 points on either side of the threshold. As a robustness check, we also repeat our analysis using the mean-squared error optimal bandwidth approach proposed by Calonico et al. [2014].

In Equation 1, β_{LATE} captures the Local Average Treatment Effect (LATE) of a permanent increase in monthly income on the health outcomes of applicants close to the cutoff. Standard errors are clustered at province level in our main specification, but the results are robust to clustering at health district level.[19]

[18] The literature has used different polynomials for long. Gelman and Imbens [2014] shows that the polynomial order should not be higher than 2.

[19] There are 33 health districts and 54 provinces in Chile. The standard errors are clustered at province level in our preferred specification, because provinces coincide with health districts in most of the cases, but their number is sufficiently high to employ the law of large numbers and correctly use clustered standard errors. Clustering at health-district level does not change qualitatively the results of our estimates.

5 Regression Discontinuity validity

5.1 The Effect of the Score on Receiving a Pension

Figure 1 plots the probability of receiving a basic pension in the four years after the first application, for different pension score distances from the cutoff (the 'First Stage').[20] This figure shows that applicants whose score is just below the cutoff point in their first application (treatment group) are more likely to receive a basic pension in the next four years than those whose score is just above the cutoff (control group). Table 4 confirms these results and shows that being in the treatment group increases the likelihood of receiving a basic pension in the next four years by 82 pp. Figure 1 also shows some applicants that did not obtain the basic pension in their first application, but still received one later. The reasons for this were explained in subsection 3.2.

5.2 Continuity of Predetermined Covariates Around the Cutoff

Identification of the treatment effect requires that variables that could affect health outcomes, apart from the basic pension, change smoothly at the cutoff. To test this, we examine whether any of the predetermined covariates change discontinuously at the cutoff for applicants, elderly family members, and family members of working age - the so-called balance tests. Appendix figures C3-C6 graphically shows that predetermined covariates do not discontinuously change at the cutoff for any of the subgroups. Table 5 reports the results of t-test performed on coefficient β, in Equation 2, using as the dependent variable one of 12 individual and family characteristics. This table confirms the results and shows that only 3 out of 46 estimations present a significant coefficient at the 10 percent significance level. We do not believe this represents a systematic difference between treatment and control groups around the cutoff; given the large number of estimations, it is common to have few significant estimations at this level. For the covariates that are used to compute the pension score, we only have data for applicants in 2012. Table B4 in the Appendix conducts the balances test with this data and shows that one out of 44 estimations is significant at the 10 percent significance level. The evidence presented above suggests that the basic pension is as good as (locally) randomly assigned.

[20]As the focus of the paper is to analyze the effect of the basic pension, we take into account that applicants who were not successful in their first application might obtain the basic pension later.

5.3 Continuity of Applicants' Frequency Around the Cutoff

Another identifying assumption is that applicants cannot manipulate their pension score in order to become pension recipients. The assumption would fail if, for instance, more motivated applicants, who happen to be healthier, are able to adjust their pension score to be below the cutoff.

To formally confirm the absence of manipulation, we perform the test developed by McCrary [2008]. Here we use the frequency of applications in 10 score-point bins as the dependent variable in Equation 2 and in a bandwidth of 500 points above and below the cutoff. As shown in Figure 2, we do not find any significant discontinuity in the frequency of applicants (t-statistic of -1.019 and p-value of 0.309), elderly family members (t-statistic of -1.576 and p-value of 0.115) or working age family members (t-statistic of -0.459 and p-value of 0.647) at the cutoff. The same result is obtained when we use the novel manipulation test constructed by Cattaneo et al. [2017], which employs a local polynomial density estimation technique that avoids pre-binning of the data.[21]

This result is not surprising given that the pension score is not computed until the person applies for the basic pension, so the applicant (and the government) does not know the score beforehand. This piece of evidence suggests that applicants do not manipulate the score in order to become pension recipients.

6 Results

6.1 The Effect of Receiving a Pension on Applicants' Health

Panel A of Figure 3 shows the causal effect of receiving a basic pension in the first application on the probability of dying within four years after applying (henceforth referred to as *mortality*). This panel indicates that pension recipients are less likely to die when compared to non-recipients. Table 6 confirms this results and shows that receiving a basic pension significantly decreases the probability of dying by 2.5pp. As the average probability of dying for non-recipients is 6.3 percent, the basic pension reduces the mortality of applicants who received it in their first application by 40 percent. As the basic pension represents 27% of

[21] Using this method, the t-statistic and p-value when we consider: 1) applicants are 1.641 and 0.101; 2) elderly family members are -0.034 and 0.971; and 3) working age family members are 0.1722 and 0.863, respectively.

average household income in our control group, we obtain a negative mortality-household income elasticity estimate of 1.5 for the linear specification.

Since the pension has an effect on the probability of dying, we cannot estimate its causal effect on the days of hospitalization: the lifetime of the population on each side of the cutoff is not comparable. With this caveat, we still show the effect on the number of days that applicants spent in hospital, from the date of application to the last day we can observe them (four years after applying or the moment of death). Even though pension recipients have more days available to be hospitalized (because of their lower mortality rate), the point estimates in Table 6 suggest that, if anything, they spend fewer days in hospital, although the effect is not statistically significant.

As a way to summarize treatment effects on health outcomes and circumvent the survival bias, we follow the medical literature and use as an outcome variable a dummy indicator equal to 1 if the applicant had either been hospitalized or died (medical episode) in the four years after applying.[22] Table 6 shows that pension recipients are 5.0 pp less likely to experience a medical episode in the four years after applying. As around one third of non-recipients experienced a medical episode in this period, the basic pension reduces the probability of experiencing a medical episode by 15 percent.

To check the robustness of these estimations, we show that pension effects hold when using: 1) non-parametric estimations (Table 7), 2) different sets of controls (Table 8), and 3) different bandwidths (Figure 4). Point estimates are remarkably similar to our preferred-linear-specification coefficients when we use these different specifications. This suggests that not only qualitative results hold, but also size effects seem not sensible to the use of different specifications.

Figure 7 illustrates the timing of the mortality effect by showing the share of survivor applicants within 4 years from application, adjusted by the score deviation from the cut-off (adjusted survival curve).[23] This Figure shows that the mortality effect manifests itself shortly after the first application and grows almost monotonically over time, reaching a maximum at the end of the studied period. This piece of evidence suggests that the beneficial

[22]What we call 'medical episode' is commonly referred to as 'primary outcome' in the medical literature [Pitt et al., 2014; Eikelboom et al., 2017].

[23]We use a Cox proportional hazards model to estimate each survival curve, and adjust it for score deviation and score deviation squared. As in the regressions, we compare applicants within a 500-point bandwidth and use triangular weights to give more weight to the applicants closer to the cutoff.

effects of the basic pension take little time to have an effect and tend to accumulate over time.

6.2 The Heterogeneous Effects on Applicants

Table 9 shows the effect of the basic pension on different subgroups of applicants. We start by following the standard medical literature on aging (e.g. Garre-Olmo et al. [2013]; Hawton et al. [2011]), and explore the heterogeneous effects depending on the family structure of the applicants. Panel A of this Table shows that pension recipients living alone or with elderly family members (without a working age family member) seem strongly affected, with a significant reduction in their mortality rate of 5.2 pp. On the other hand, Panel B suggests that those living with at least one working age family member remain unaffected. The same pattern arises when looking at the number of days of hospitalization and the probability of having a medical episode. Here, pension recipients living without a working age family member spend 2.7 less days in hospital and are between 11 pp. less likely to experience a medical episode. These results are highly significant in the linear and quadratic specifications.[24]

Figure 7 shows the survival analysis for applicants with and without working age family members. This figure shows that applicants living without working age relatives are the main drivers of this dynamic effect across the whole sample, whereas applicants living with working age relatives see virtually no improvements over time.

We also explore heterogeneous effects in other dimensions such as age and gender. The only statistical difference we find across these dimensions is that applicants older than 65 see a significantly negative effect on days of hospitalization (2.3 less days in hospital), whereas days of hospitalization for 65-year old applicants are virtually unchanged. Given the high homogeneity of our sample in the bandwidth (76 percent are women and 83 percent are 65 years of age), we cannot rule out the presence of other small differential effects. We interpret these results as lack of statistical power rather than lack of heterogeneous effects.

[24]This set of results is also robust to the use of non-parametric estimations (TableB7) and controls (Table B7). These two subsamples of applicants do not seem to manipulate the score in order to be below the cutoff, as test statistics for the McCrary test are -0.486 and -0.976 for applicants living with and without working age relatives, respectively (Figure C2). Moreover the two subsample seem also locally comparable: out of 10 available covariates none is significant for applicants living with, and 1 is significant for without working age relatives in our preferred-linear-specification (Table B5).

6.3 The Effect on Family Members

Panel A of Table 10 shows that elderly family members seem to be unaffected by having a relative that receives the basic pension. On the other hand, Panel B of Table 10 provides evidence suggesting that working age family members living with pension recipients have 0.05 more children per capita, nine months or later after applying. As our data only identifies mothers and not fathers of newborn children, in Panel C we conduct the same analysis focusing on working age women that are in fertility age (16-44 years of age) and estimate that they give birth to 0.14 more children per capita, nine months or later after applying. This corresponds to an increase of 83 percent with respect to the control mean. The heterogeneity of spillover effects could depend on several reasons. For instance, elderly family members, who are mainly older male partners of the applicants, could use their share of the pension for goods that are not health-conducive. Another reason could be that applicants' willingness to share the pension is higher with respect to their children than to their partners.

In an exploratory analysis, we analyze whether the health of newborn children is affected by the pension, even though the treatment and control groups of mothers are not comparable: the number of childbirths is positively affected by the pension. Panel C of Table 10 do not show any significant discontinuity in terms of weeks of pregnancy, weight or height of the first child. Although the basic pension significantly encourages working age family members to have more children, we do not find evidence that it affects the health of the newborn.

Finally, in an exploratory analysis, we inspect whether the pension improves health conditions of working age family members older than fertility age (men between 50-64 and women between 45-59 years of age). Panel D shows that they appear to be between 3.7pp less likely to die. Although this is an exploratory analysis, the result strikingly contrasts with the null effect for elderly family members.

7 Potential Mechanisms

In this section we show, first, that the decrease in mortality is driven by fewer cases of respiratory and circulatory diseases, which could be explained by improvements in social and lifestyle factors. Second, we show that the effect is concentrated on applicants living without working age family members, arguably due to an intra-household transfer of income that stops when pension payments begin.

7.1 Why mortality and medical episodes decrease

To gain an insight into which diseases drive the effects, Table 11 disaggregates medical episodes and shows that most of these effects are driven by a reduction in the probability of suffering from a circulatory (e.g. heart attacks) or respiratory disease (e.g.pneumonia). It is worth noting that deaths or hospitalizations for these reasons are often decompensations of a chronic condition. For example, deaths for circulatory diseases are often heart attacks due to uncontrolled diabetes or hypertension, and deaths for respiratory diseases are often pneumonia in patients with severe asthma.

The decrease in respiratory diseases does not appear to be driven by an increase in the use of vaccines. As we can see in Table 12, we do not find any significant effect of the pension on the number of vaccines for influenza or for pneumonia in the four years after applying for any of the subgroups.

Two main mechanisms could rationalize this result. On the one hand, the income increase may allow applicants to purchase medicines or medical treatments that they could not have afforded in the absence of the pension. This seems unlikely because: 1) medicines and medical treatments in Chile are free for all non-rare diseases, including the circulatory and respiratory diseases that drive the pension effect,[25], and 2) the cost of a private health insurance is greater than the pension amount.[26]

On the other hand, the income increase can improve recipients' control of their chronic condition and prevent acute episodes of the same disease, through non-subsidized goods and services. For instance, they could use the money to pay for transportation costs in order to attend medical check-ups on a more regular basis and avoid the interruption of prescribed medical treatments [Dahlgren and Whitehead, 1991; Jensen and Richter, 2003]. Recipients could also use the money to purchase health-improving goods, such as vitamin-richer food [Bartali et al., 2006; Cederholm et al., 1995; Ortega et al., 1997]. This hypothesis would imply that the benefits of the income increase should be greater for people who care more

[25]Since 2005, the Chilean plan for universal access to treatment and drugs ("Plan de Accesos Universal de Garantias Explicitas", AUGE in acronym form) granted universal-free access to drugs and procedures for the most common diseases in the country, covering up to 88 percent of them. The system virtually covers the entire population: only 1 percent of patients report that their disease is not covered by *AUGE* and more than 90 percent report to have access to the doctor when needed [CASEN, 2011]

[26] In 2011, a basic private insurance plan in Chile had an average monthly cost of $175 for a 65-year old and $218 for a 69-year old, whereas the basic pension was around $160 per month. Only 5 percent of the bottom 60 percent of the income distribution has a private health insurance.

for their health. Although we do not have direct information on the health-consciousness of the applicants, we can use as a proxy for healthy behaviours whether the applicant took a vaccine for Influenza or Pneumonia in the six months before applying. As we can see in Table 13, applicants that are vaccinated are more positively affected by the pension, with a significantly larger drop in medical episodes. This piece of evidence, plus the fact that households with elderly family members in the bottom 60 percent of the income distribution consume a large fraction of their income (43 percent) on food and transportation [INE, 2011], seem to suggest that the income increase interacts more with applicant that are health-conscious, allowing them to better control their chronic disease and prevent acute episodes.

7.2 Stronger effect for pensioners living without working age family

Few channels could explain why recipients who live with a working age family member do not benefit from the pension. First, this could be the result of some ex-ante transfer of income from working age family members to applicants, which stopped when applicants started to receive pension payments. In this sense, the pension income would be cash flow neutral for this particular group of pension recipients, but it would also imply a positive income shock for their working age family members. The positive spillover effects for these in terms of fertility and mortality that we have shown in Table 10 are consistent with this hypothesis.

Another explanation could be that living with working age family members is a proxy for some other family characteristic. For example: 1) families with working age members may be larger, which may dilute the effect of the basic pension when family income is pooled; or 2) the effect of the basic pension might be attenuated if applicants are already receiving proper care from younger relatives.[27] To test whether having a working age family member is a proxy for family size, Appendix Table B8 shows the same analysis using only applicants that have a family size of two (the most frequent family size in our sample). From this, family size seems to be only a secondary driver of the effect. Although the effect on medical episodes becomes significant for applicants living with a person in the working age group, the results on mortality remain qualitatively unchanged. Applicants living with an elderly

[27] For instance, before getting the pension, applicants may have received sufficient care if they had young family members (e.g. their children), but insufficient care if they had none. The pension might help applicants living only with old family members to pay for a nurse or to go to the doctor, services that are less needed if already covered by young members in the family.

person show significantly lower mortality rates, whereas applicants living with a person in the working age are not affected by the basic pension.

To test whether having a working age family member is related to receiving proper care from younger relatives we look at panel A and B of Table 14, and see whether applicants living with only female working age family members - who are the most likely care provider, according to the Chilean household survey CASEN [2011] - are less likely to die or suffer from a medical episode. We do not observe any heterogeneity across this dimension and, thus, this hypothesis does not have a strong empirical support.

To sum up, the effects are particularly concentrated among pension recipients living alone or with another elderly person, but those elderly relatives do not see any improvement in their health conditions. On the other hand, pension recipients living with working age relatives seem unaffected, but their working age relatives seem to have more children. A plausible explanation to reconcile these findings is that, before receiving the pension, working age family members shared a certain part of their income with the applicant. After receiving the pension, working age family members stop giving money to the applicant, so that the net income effect for the applicant is ultimately reduced or nullified. Conversely, working age family members receive additional income from the pension and they use it to have more children.

8 Estimation of the income increase correction on life expectancy gains.

In an attempt to estimate how much of the life expectancy gap across income groups could be corrected at the age of 65, we gather information from several sources and show that around 45.5 percent of this gap can be corrected for the elderly in our sample.

We first use data from the Chilean household survey to retrieve the whole household income distribution of the Chilean population CASEN [2011]. Second, using household income data on 2012 applicants, we find that applicants in the bandwidth are at the 34.6 th of the income distribution at the moment of application, and reach the 46.9 th percentile after receiving the pension.[28] Third, we use data from OECD [2016] to estimate the life expectancy gap at 65 between these two income percentiles. The OECD report displays data on the

[28] This is again a weighted average with triangular weights that attributes more relevance to applicants closer to the cutoff

life expectancy of the 20 th, 50 th and 80 th income percentiles in Chile, disaggregated by gender. We recover the life expectancy for each percentile by using the reported three data points and interpolating the points in between. For the interpolation, we use a linear and a quadratic fit, weighting for the gender composition of our sample (Figure 9). Interestingly, both approximations lead to similar estimates of the life expectancy gap between the two percentiles of interest, which is around 0.47 years.

In the second part of the computation, we estimate the life expectancy gain of pension recipients with respect to non-recipients in the bandwidth. In this computation, we face the complication that only 4 years after the first application are observable, which means that we cannot observe the empirical rate of survivors for all ages, but only up to the age of 69. To circumvent this issue, first we use the empirical shares of survivor recipients and non-recipients between the ages of 65 and 69, adjusted by the score deviation from the cutoff. Then, for each year of age from 70 onwards, we use the national mortality rates, weighted by gender and region to replicate the characteristics of our sample. We consider this as a conservative estimate of the real life expectancy gain from the pension, since we use the same national mortality rate for recipients and non-recipients after 69, despite the mortality effect of the pension appears to accumulate over time. This computation shows that the life expectancy gain of recipients with respect to non-recipients is around 0.22 years (Figure 9).

As the life expectancy gain of recipients with respect to non-recipients is 0.22 years and the life expectancy gap between the two respective income percentiles is 0.47 years, we estimate that an income increase from the 34.6 th to the 46.9 th income percentile can close around 45.5 percent of the corresponding life-expectancy gap at the age of 65.

9 Concluding remarks

In this paper, we explored how a permanent income increase to retired people affects recipients' and their family members' health outcomes. For this purpose, we implemented a regression discontinuity design that exploits an arbitrary cutoff from a large basic pension program in Chile.

We find that pension recipients are 40 percent less likely to die within four years from the application submission, with an absolute decrease in the mortality rate of 2.5 pp. We also observe that pension recipients are 15 percent less likely to experience a medical episode, with an absolute decrease of 5.0 pp. These improvements in health outcomes appear to be driven by circulatory and respiratory diseases. The results suggest that health inequalities can at least partially be corrected at the last stage of life. In particular, back-of-the-envelope computations suggest that around 45 percent of the life-expectancy gap can be corrected at the age of 65. This set of results call for the action of policies that can fix gaps in health status not just in younger groups of people, but also for people who are in retirement age. This set of results could also shed some light for countries in which social benefits depends on how long beneficiaries are expected to live (e.g. Medicare in US). As these types of schemes can be regressive, because richer people live longer, these types of policies can make the benefit structure of these programs more progressive on a lifetime basis by reducing mortality differences across income percentiles.

The validity of our results can only cautiously be extended to other populations: while we find that a permanent income increase has a positive health effect mainly on elderly female non-workers, previous papers found zero or negatives effects on elderly male workers. This might suggest that a pure income increase have different effects, depending on the characteristics of the beneficiaries. In this sense, future policies could be more efficient if they take into account the characteristics of the beneficiaries, such as their gender, family structure and health habits, and call for innovative ways to deal with interventions for low-income elderly people.

The health effects of the pension are particularly strong for pension recipients living without working age family members, while we observe no effect for applicants living with working age family members. On the other hand, we observe that pension recipients' family members in working age have more children per capita. A plausible explanation for this result is that working age family members stop transferring labor income to their elderly, as soon as the elderly start receiving pension payments. This last result suggests that poor elderly relatives impose a financial burden on younger family members, showing that this is also a potential channel in which poverty can be transmitted from one generation to another. In this sense, these types of policies might reduce the inter-generational transmission of poverty by reducing the financial burden imposed on poor working age parents and allowing them to invest more in their own future and the future of their children.

Several studies show that the effectiveness of health interventions, such as construction of health clinics or provision of medicines, is often limited. Moreover, it is often difficult to maintain these health centers' full function, considering the costs of medicines and trained personnel. Our paper suggests that a potentially more effective action to improve the health of the elderly female population is simply by granting direct cash transfers.

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Table 1: Characteristics of pension recipients and non-recipients when applying

		Applicants only			Elderly			Working-age		
	Difference	All	Recipient	Non-Recipient	All	Recipient	Non-Recipient	All	Recipient	Non-Recipient
Female share	0.151***	0.758	0.738	0.889	0.242	0.270	0.112	0.493	0.494	0.489
		(0.428)	(0.440)	(0.314)	(0.428)	(0.444)	(0.316)	(0.500)	(0.500)	(0.500)
Age (years)	2.108***	66.19	65.91	68.02	71.22	71.11	71.73	37.10	37.19	36.39
		(3.715)	(3.358)	(5.188)	(7.148)	(7.241)	(6.678)	(12.35)	(12.44)	(11.57)
Family size	0.170***	2.482	2.460	2.629	2.883	2.917	2.725	3.797	3.779	3.937
		(1.185)	(1.203)	(1.038)	(1.132)	(1.152)	(1.023)	(1.354)	(1.366)	(1.242)
Live alone	-0.150***	0.178	0.198	0.0481						
		(0.383)	(0.398)	(0.214)						
Live with 1 person	0.121***	0.420	0.405	0.526						
		(0.494)	(0.491)	(0.499)						
Live with 2 people	0.031***	0.234	0.230	0.261						
		(0.423)	(0.421)	(0.439)						
Live with 3 or more people	-0.002	0.167	0.168	0.165						
		(0.373)	(0.373)	(0.372)						
Live with elderly person	0.235***	0.533	0.503	0.738						
		(0.499)	(0.500)	(0.440)						
Live with working-age person	-0.019***	0.532	0.534	0.515						
		(0.499)	(0.499)	(0.500)						
Live with person below 16	-0.004**	0.0130	0.0134	0.00981						
		(0.113)	(0.115)	(0.0986)						
Poverty score	3813.850***	6969.9	6475.5	10289.4	7961.9	7349.2	10786.4	7778.5	7459.3	10279.5
		(3826.7)	(3504.3)	(4226.0)	(3587.7)	(3191.8)	(3942.3)	(3629.7)	(3459.9)	(3944.4)
No. days hospitalization	-0.194	0.579	0.604	0.410	0.577	0.601	0.465	0.229	0.225	0.261
		(8.983)	(9.559)	(2.987)	(4.866)	(5.132)	(3.383)	(3.294)	(2.812)	(5.822)
Took Influenza vaccines	0.080***	0.273	0.263	0.342	0.309	0.299	0.358	0.0716	0.0700	0.0842
		(0.446)	(0.441)	(0.474)	(0.464)	(0.459)	(0.480)	(0.258)	(0.256)	(0.278)
Took Pneumonia vaccines	-0.016***	0.0637	0.0658	0.0494	0.0222	0.0218	0.0243	0.000389	0.000356	0.000644
		(0.245)	(0.249)	(0.217)	(0.148)	(0.147)	(0.154)	(0.0197)	(0.0189)	(0.0254)
No. childbirths								0.00974	0.00964	0.0105
								(0.0999)	(0.0991)	(0.106)
No. serial applicants	1,384	19	1,365							
No. serial applicants who got the pension	619	19	600							
No. pension recipients who did not get the pension	57	57	0							
Observations		49552	43129	6423	27057	22234	4823	41163	36505	4658

Notes: The table shows the means and standard deviations (in parentheses) of the covariates for 3 subsamples: applicants; elderly family members; and working-age family members. *Female* is the share of individuals in the subsample that are female. *Age* is the age of individuals measured in years. *Family size* is the number of people in the family. *Poverty score* is the the poverty level of the family with respect to the Chilean population. *No. elderly members*, *No. working-age family members*, and *No. family members below 16* represent the number of family members in each subgroup. *No. days hospitalization* is the number of days of hospitalization before the applicant in the family applied for the pension. *Took Influenza vaccine* and *Took Pneumonia vaccine* are the share of individuals that took these vaccines within the 6 months before the applicant in the family applied for the pension.

Table 2: The Effect of Baseline Covariates on the Probability of Applying Multiple Times

	(1) bivariate	(2) multivariate	(3) multivariate	(4) multivariate
Female share	-0.0343*	0.0307	0.0271	0.0236
	(0.0163)	(0.0164)	(0.0165)	(0.0149)
Age (years)	-0.0118***	-0.00924***	-0.108***	-0.0635**
	(0.000973)	(0.000982)	(0.0223)	(0.0202)
Poverty score	-0.0227***	-0.0215***	-0.0210***	-0.0181***
	(0.00117)	(0.00124)	(0.00126)	(0.00115)
No. days hospitalization	-0.000760	0.000584	0.000505	0.000794
	(0.00171)	(0.00165)	(0.00165)	(0.00149)
Took Influenza vaccines	0.0497***	0.0686***	0.0724***	0.0193
	(0.0107)	(0.0107)	(0.0107)	(0.0109)
Took Pneumonia vaccines	-0.0344	-0.0971***	-0.106***	-0.00990
	(0.0236)	(0.0235)	(0.0236)	(0.0214)
Family size	0.0137**		0.0203**	0.0225***
	(0.00492)		(0.00721)	(0.00649)
Live with elderly person	-0.0546***		-0.0116	-0.00882
	(0.0116)		(0.0139)	(0.0125)
Live with working-age person	0.0365***		-0.0113	-0.0222
	(0.0102)		(0.0159)	(0.0143)
Live with person below 16	0.0739		0.00378	-0.0445
	(0.0518)		(0.0513)	(0.0483)
FIXED EFFECTS	NO	NO	NO	YES
N		6423	6423	6423

Notes: Data is for pension non-recipients (unsuccessful first application). In all regressions, the dependent variable is a dummy equal to 1 if the pension non-recipient applied again later and 0 otherwise. For ease of interpretation, the Poverty score is rescaled (dividing by 1000). In Column (1) we run a bivariate regression for each one of the variables. In the other columns we run one multivariate regression using all the specified variables. Fixed effects are health-district and month-of-application fixed effects. Standard errors are clustered at the province level. * significant at 10%, ** significant at 5%, *** significant at 1%

Table 3: The Effect of Baseline Covariates on the Probability of Ever Getting the Pension for Non-Recipients

	(1) bivariate	(2) multivariate	(3) multivariate	(4) multivariate
Female share	-0.165***	-0.0986*	-0.0835*	-0.0558
	(0.0402)	(0.0408)	(0.0409)	(0.0408)
Age (years)	-0.0140***	-0.0108**	-0.00983**	-0.00712*
	(0.00346)	(0.00351)	(0.00356)	(0.00357)
Poverty score	-0.0297***	-0.0263***	-0.0245***	-0.0256***
	(0.00320)	(0.00336)	(0.00342)	(0.00342)
No. days hospitalization	0.000772	0.00198	0.00218	0.00173
	(0.00515)	(0.00506)	(0.00504)	(0.00496)
Took Influenza vaccines	0.0248	0.0497	0.0496	-0.0416
	(0.0275)	(0.0273)	(0.0272)	(0.0299)
Took Pneumonia vaccines	-0.00101	-0.0280	-0.0354	0.0295
	(0.0672)	(0.0665)	(0.0663)	(0.0673)
Family size	-0.00779		0.0255	0.0321
	(0.0125)		(0.0180)	(0.0178)
Live with elderly person	-0.156***		-0.125***	-0.109**
	(0.0287)		(0.0338)	(0.0334)
Live with working-age person	0.0180		-0.0599	-0.0541
	(0.0271)		(0.0413)	(0.0408)
Live with person below 16	-0.0513		-0.0938	-0.103
	(0.118)		(0.117)	(0.120)
FIXED EFFECTS	NO	NO	NO	YES
N		1365	1365	1365

Notes: Data is for pension non-recipients (unsuccessful first application). In all regressions, the dependent variable is a dummy equal to 1 if the pension non-recipient obtains the pension after applying again and 0 otherwise. For ease of interpretation, the Poverty score is rescaled (dividing by 1000). In Column (1) we run a bivariate regression for each one of the variables. In the other columns we run one multivariate regression using all the specified variables. Fixed effects are health-district and month-of-application fixed effects. Standard errors are clustered at the province level. * significant at 10%, ** significant at 5%, *** significant at 1%

Table 4: First stage regressions

Variables	Regression	RD_coeff	Se	t_stat	Bandwidth	Observations	Control_mean	R_squared
pension	Linear	0.820***	(0.011)	72.95	500	8,499	0.139	0.765
pension	Quadratic	0.825***	(0.018)	45.50	500	8,499	0.139	0.765

Notes: The table shows the first stage regression based on Equation 2. "Pension" is a dummy variable taking value of 1 if the applicant ever receives the pension. The "Regression" column indicates the degree of the polynomial used in the regression. The "RD coef", "Se" and "t stat" columns report the point-estimate, standard error and t-statistic of the RD coefficient, respectively. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions we use standard errors clustered by province and triangular kernels such that the weight of each observation decreases with distance from the cutoff. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 5: Balance tests

Variables	Regression	RD_coeff	Se	t_stat	Bandwidth	Observations	Control_mean	R_squared
Panel A: Applicants								
Female share	Linear	-0.0160	(0.015)	-1.016	500	8,499	0.888	0.00100
Female share	Quadratic	-0.0180	(0.022)	-0.849	500	8,499	0.888	0.00200
Age (years)	Linear	-0.372	(0.236)	-1.578	500	8,499	67.62	0.0130
Age (years)	Quadratic	-0.446	(0.314)	-1.422	500	8,499	67.62	0.0130
Days hospitalization 0.5 years before applying	Linear	-0.131	(0.154)	-0.851	500	8,499	0.496	0
Days hospitalization 0.5 years before applying	Quadratic	-0.279	(0.216)	-1.295	500	8,499	0.496	0
Took Influenza vaccine 6 months before applying	Linear	-0.0250	(0.020)	-1.281	500	8,499	0.345	0.00100
Took Influenza vaccine 6 months before applying	Quadratic	-0.0320	(0.030)	-1.042	500	8,499	0.345	0.00100
Took Pneumonia vaccine 6 months before applying	Linear	0.017**	(0.008)	2.019	500	8,499	0.0520	0.00100
Took Pneumonia vaccine 6 months before applying	Quadratic	0.0140	(0.012)	1.150	500	8,499	0.0520	0.00100
Family size	Linear	-0.00800	(0.040)	-0.192	500	8,499	2.638	0
Family size	Quadratic	-0.0290	(0.063)	-0.456	500	8,499	2.638	0
Poverty score	Linear	64.69	(181.386)	0.357	500	8,499	9933	0.0110
Poverty score	Quadratic	-249.1	(278.844)	-0.893	500	8,499	9933	0.0120
Live with elderly person	Linear	0.0160	(0.018)	0.872	500	8,499	0.711	0.00700
Live with elderly person	Quadratic	0.00200	(0.027)	0.0650	500	8,499	0.711	0.00700
Live with working-age person	Linear	-0.00400	(0.018)	-0.214	500	8,499	0.539	0.00300
Live with working-age person	Quadratic	-0.00400	(0.028)	-0.129	500	8,499	0.539	0.00300
Live with person below 16	Linear	0.00200	(0.004)	0.396	500	8,499	0.0100	0
Live with person below 16	Quadratic	0.00300	(0.008)	0.355	500	8,499	0.0100	0.00100
Municipal_Income_pc	Linear	-2.465	(4.250)	-0.580	500	8,483	147.5	0.00100
Municipal_Income_pc	Quadratic	-1.393	(5.712)	-0.244	500	8,483	147.5	0.00100
App. from metropolitan area	Linear	-0.0290	(0.020)	-1.482	500	8,499	0.378	0
App. from metropolitan area	Quadratic	-0.0160	(0.022)	-0.747	500	8,499	0.378	0.00100
Panel B: Elderly								
Female share	Linear	0.032**	(0.016)	2.016	500	5,722	0.104	0.00200
Female share	Quadratic	0.0300	(0.022)	1.371	500	5,722	0.104	0.00200
Age (years)	Linear	-0.608*	(0.358)	-1.702	500	5,722	71.78	0.00600
Age (years)	Quadratic	-0.304	(0.475)	-0.640	500	5,722	71.78	0.00600
Days hospitalization 0.5 years before applying	Linear	-0.0380	(0.093)	-0.404	500	5,722	0.424	0.00100
Days hospitalization 0.5 years before applying	Quadratic	0.00400	(0.171)	0.0230	500	5,722	0.424	0.00100
Took Influenza vaccine 6 months before applying	Linear	-0.0260	(0.029)	-0.899	500	5,722	0.374	0.00200
Took Influenza vaccine 6 months before applying	Quadratic	-0.0130	(0.042)	-0.317	500	5,722	0.374	0.00200
Took Pneumonia vaccine 6 months before applying	Linear	0.00100	(0.006)	0.0830	500	5,722	0.0210	0.00100
Took Pneumonia vaccine 6 months before applying	Quadratic	0.00100	(0.012)	0.124	500	5,722	0.0210	0.00100
No. childbirths 6 months before applying	Linear	0	(0.000)	.	500	5,722	0	
No. childbirths 6 months before applying	Quadratic	0	(0.000)	.	500	5,722	0	
Panel C: Working age Family members								
Female share	Linear	0.0360	(0.030)	1.197	500	6,885	0.478	0.00200
Female share	Quadratic	0.0440	(0.051)	0.859	500	6,885	0.478	0.00200
Age (years)	Linear	-0.503	(0.582)	-0.864	500	6,885	36.62	0
Age (years)	Quadratic	-0.583	(0.798)	-0.730	500	6,885	36.62	0
Days hospitalization 0.5 years before applying	Linear	-0.0660	(0.057)	-1.158	500	6,885	0.219	0
Days hospitalization 0.5 years before applying	Quadratic	-0.0500	(0.081)	-0.620	500	6,885	0.219	0.00100
Took Influenza vaccine 6 months before applying	Linear	-0.0150	(0.012)	-1.257	500	6,885	0.0850	0.00200
Took Influenza vaccine 6 months before applying	Quadratic	-0.00600	(0.015)	-0.409	500	6,885	0.0850	0.00200
Took Pneumonia vaccine 6 months before applying	Linear	0	(0.000)	-0.955	500	6,885	0	0
Took Pneumonia vaccine 6 months before applying	Quadratic	0	(0.000)	0.951	500	6,885	0	0.00100
No. childbirths 6 months before applying	Linear	0.00600	(0.006)	1.008	500	6,885	0.00900	0
No. childbirths 6 months before applying	Quadratic	0.00300	(0.010)	0.287	500	6,885	0.00900	0.00100

Notes: The table shows balance tests for predetermined characteristics at the moment of the first application. Number of days of hospitalization, vaccines and childbirths are within 6 months before applying. The "Regression" column indicates the degree of the polynomial used. The "RD coef", "Se" and "t stat" columns report the point-estimate, standard error and t-statistic of the RD coefficient. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean of non-recipients in the bandwidth. In all regressions, we use standard errors clustered by health district and triangular kernels. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 6: Applicants' Health Outcomes in 4 years from application

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Mortality rate	Linear	-0.025**	0.0120	-0.021**	(0.010)	500	8,499	0.0630	0.00100
Mortality rate	Quadratic	-0.040**	0.0180	-0.033**	(0.015)	500	8,499	0.0630	0.00100
No. days of hospitalization	Linear	-0.762	0.770	-0.657	(0.640)	500	8,499	4.116	0.00100
No. days of hospitalization	Quadratic	-0.886	1.296	-0.727	(1.095)	500	8,499	4.116	0.00100
Had a medical episode	Linear	-0.050**	0.0210	-0.042**	(0.018)	500	8,499	0.328	0.00200
Had a medical episode	Quadratic	-0.069**	0.0340	-0.057**	(0.028)	500	8,499	0.328	0.00200

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 7: Applicants' Health Outcomes in 4 years from application using non-parametric estimations

Variables	Regression	conventional_coeff	conventional_SE	Bias_corrected_coeff	Bias_corrected_SE	Bandwidth	Control_mean	Observations
Mortality rate	non-parametric	0.021**	0.0100	0.033**	0.0150	500	0.0640	49,552
No. days of hospitalization	non-parametric	0.657	0.603	0.727	0.937	500	3.947	49,552
Had a medical episode	non-parametric	0.042*	0.0230	0.057*	0.0300	500	0.309	49,552

Notes: The table shows the results of non-parametric estimations on health outcomes within 4 years from the applicant's application. The "Conventional coeff' and "conventional SE" columns report the point-estimate and standard error of the nonparametric estimation. The "Bias corrected coeff' and "Bias corrected SE" columns report the point-estimate and standard error using after correcting for the bias of the non-parametric estimation. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 8: Applicants' Health Outcomes in 4 years from application using controls

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Mortality rate	Linear	-0.023*	0.012	-0.019*	(0.010)	500.000	8,449	0.063	0.098
Mortality rate	Quadratic	-0.040**	0.018	-0.033**	(0.015)	500.000	8,449	0.063	0.098
No. days of hospitalization	Linear	-0.386	0.812	-0.351	(0.684)	500.000	8,449	4.116	0.039
No. days of hospitalization	Quadratic	-0.385	1.434	-0.312	(1.202)	500.000	8,449	4.116	0.039
Had a medical episode	Linear	-0.045**	0.020	-0.037**	(0.017)	500.000	8,449	0.328	0.048
Had a medical episode	Quadratic	-0.054*	0.032	-0.044	(0.027)	500.000	8,449	0.328	0.048

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. In each estimation we used as controls: health service fixed effects, time fixed effects, age fixed effects, days of hospitalization before appliying, rehospitalizations before applying, number of vaccines before appliying, gender, poverty score, family size, number of applicants per family, sex, number of elderly family members, number of working age family members, number of children in the family, municipal income level. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 9: Applicants' Health Outcomes in 4 years from application: family structure, gender and age

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: Applicants without working age family members									
Mortality rate	Linear	-0.052***	0.0190	-0.045***	(0.016)	500	3,647	0.0710	0.00300
Mortality rate	Quadratic	-0.074**	0.0290	-0.063**	(0.025)	500	3,647	0.0710	0.00400
No. days of hospitalization	Linear	-2.632***	0.769	-2.250***	(0.658)	500	3,647	4.464	0.00300
No. days of hospitalization	Quadratic	-3.242***	0.985	-2.762***	(0.846)	500	3,647	4.464	0.00400
Had a medical episode	Linear	-0.111***	0.0420	-0.093**	(0.036)	500	3,647	0.339	0.00500
Had a medical episode	Quadratic	-0.159**	0.0700	-0.136**	(0.061)	500	3,647	0.339	0.00600
Panel B: Applicants with at least one working age family member									
Mortality rate	Linear	-0.00200	0.0180	-0.00100	(0.014)	500	4,852	0.0560	0
Mortality rate	Quadratic	-0.0100	0.0260	-0.00900	(0.021)	500	4,852	0.0560	0.00100
No. days of hospitalization	Linear	0.846	1.313	0.635	(1.061)	500	4,852	3.820	0.00100
No. days of hospitalization	Quadratic	1.060	2.241	0.906	(1.830)	500	4,852	3.820	0.00100
Had a medical episode	Linear	0.00100	0.0390	0	(0.032)	500	4,852	0.318	0.00100
Had a medical episode	Quadratic	0.00600	0.0600	0.00600	(0.049)	500	4,852	0.318	0.00200
Panel C: Female applicants									
Mortality rate	Linear	-0.024**	0.0100	-0.020**	(0.008)	500	7,403	0.0600	0.00100
Mortality rate	Quadratic	-0.030*	0.0160	-0.025*	(0.014)	500	7,403	0.0600	0.00100
No. days of hospitalization	Linear	-0.808	0.750	-0.703	(0.629)	500	7,403	4.120	0.00100
No. days of hospitalization	Quadratic	-0.923	1.246	-0.770	(1.064)	500	7,403	4.120	0.00100
Had a medical episode	Linear	-0.053**	0.0240	-0.044**	(0.020)	500	7,403	0.323	0.00200
Had a medical episode	Quadratic	-0.072**	0.0360	-0.061*	(0.031)	500	7,403	0.323	0.00200
Panel D: Male applicants									
Mortality rate	Linear	-0.0510	0.0510	-0.0390	(0.039)	500	1,096	0.0860	0.00500
Mortality rate	Quadratic	-0.143*	0.0860	-0.111	(0.066)	500	1,096	0.0860	0.0150
No. days of hospitalization	Linear	-0.431	2.275	-0.354	(1.726)	500	1,096	4.090	0.00100
No. days of hospitalization	Quadratic	-0.947	3.615	-0.751	(2.813)	500	1,096	4.090	0.00300
Had a medical episode	Linear	-0.0420	0.110	-0.0330	(0.083)	500	1,096	0.367	0.00400
Had a medical episode	Quadratic	-0.0730	0.149	-0.0570	(0.115)	500	1,096	0.367	0.00800
Panel F: 65-year-old applicants									
Mortality rate	Linear	-0.0160	0.0110	-0.0120	(0.009)	500	6,282	0.0400	0.00200
Mortality rate	Quadratic	-0.0190	0.0200	-0.0160	(0.017)	500	6,282	0.0400	0.00300
No. days of hospitalization	Linear	-0.140	1.059	-0.148	(0.842)	500	6,282	3.792	0.00100
No. days of hospitalization	Quadratic	0.110	1.623	0.131	(1.292)	500	6,282	3.792	0.00100
Had a medical episode	Linear	-0.0400	0.0300	-0.0310	(0.024)	500	6,282	0.298	0.00100
Had a medical episode	Quadratic	-0.0420	0.0510	-0.0340	(0.042)	500	6,282	0.298	0.00100
Panel G: older than 65 applicants									
Mortality rate	Linear	-0.0220	0.0320	-0.0210	(0.028)	500	2,217	0.102	0.00300
Mortality rate	Quadratic	-0.0560	0.0540	-0.0510	(0.049)	500	2,217	0.102	0.00400
No. days of hospitalization	Linear	-2.335***	0.783	-2.051***	(0.705)	500	2,217	4.687	0.00200
No. days of hospitalization	Quadratic	-3.240**	1.461	-2.881**	(1.286)	500	2,217	4.687	0.00300
Had a medical episode	Linear	-0.0570	0.0400	-0.0500	(0.036)	500	2,217	0.379	0.00200
Had a medical episode	Quadratic	-0.102	0.0890	-0.0910	(0.082)	500	2,217	0.379	0.00200

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 10: Health outcomes in 4 years from application: family members, by age

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: Elderly family members									
Mortality rate	Linear	0.00100	0.0160	0	(0.013)	500	5,722	0.124	0
Mortality rate	Quadratic	-0.00100	0.0250	-0.00100	(0.021)	500	5,722	0.124	0
No. days of hospitalization	Linear	0.511	1.221	0.443	(1.045)	500	5,722	5.730	0
No. days of hospitalization	Quadratic	1.040	1.759	0.885	(1.505)	500	5,722	5.730	0
Had a medical episode	Linear	0.0410	0.0350	0.0340	(0.030)	500	5,722	0.388	0
Had a medical episode	Quadratic	0.0610	0.0680	0.0520	(0.058)	500	5,722	0.388	0.00100
Panel B: Working age family members									
Mortality rate	Linear	-0.00900	0.00600	-0.00700	(0.005)	500	6,885	0.0110	0.00100
Mortality rate	Quadratic	-0.00900	0.00700	-0.00700	(0.006)	500	6,885	0.0110	0.00100
No. days of hospitalization	Linear	0.589	0.523	0.471	(0.406)	500	6,885	1.915	0
No. days of hospitalization	Quadratic	1.483	1.074	1.128	(0.834)	500	6,885	1.915	0
Had a medical episode	Linear	0.0140	0.0230	0.0110	(0.018)	500	6,885	0.218	0
Had a medical episode	Quadratic	0.0250	0.0330	0.0190	(0.026)	500	6,885	0.218	0
No. childbirhs after 9 months from application	Linear	0.046***	0.0120	0.036***	(0.009)	500	6,885	0.0530	0.00200
No. childbirhs after 9 months from application	Quadratic	0.056***	0.0170	0.042***	(0.013)	500	6,885	0.0530	0.00200
Panel C: Female family members in fertility age									
No. childbirhs after 9 months from application	Linear	0.140***	0.0420	0.102***	(0.029)	500	2,058	0.169	0.00500
No. childbirhs after 9 months from application	Quadratic	0.188***	0.0520	0.129***	(0.035)	500	2,058	0.169	0.00600
Weeks of pregnancy of first child	Linear	0.241	0.529	0.169	(0.389)	500	527	38.38	0.00300
Weeks of pregnancy of first child	Quadratic	-0.416	0.895	-0.302	(0.636)	500	527	38.38	0.0110
Weight of first child (kg)	Linear	0.109	0.124	0.0720	(0.090)	500	525	3.310	0.00700
Weight of first child (kg)	Quadratic	0.114	0.220	0.0830	(0.165)	500	525	3.310	0.00900
Height of first child (cm)	Linear	-0.385	0.532	-0.320	(0.387)	500	526	49.16	0.00700
Height of first child (cm)	Quadratic	-0.812	1.077	-0.592	(0.744)	500	526	49.16	0.00900
Panel D: Working age family members out of fertility age									
Mortality rate	Linear	-0.037***	0.0140	-0.031**	(0.012)	500	2,901	0.0370	0.00300
Mortality rate	Quadratic	-0.054***	0.0200	-0.046**	(0.018)	500	2,901	0.0370	0.00400
No. days of hospitalization	Linear	-1.146	1.434	-0.960	(1.221)	500	2,901	3.227	0
No. days of hospitalization	Quadratic	-1.690	1.840	-1.407	(1.585)	500	2,901	3.227	0.00100
Had a medical episode	Linear	-0.0300	0.0430	-0.0250	(0.036)	500	2,901	0.245	0
Had a medical episode	Quadratic	-0.0310	0.0500	-0.0250	(0.043)	500	2,901	0.245	0.00100

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes of family members within 4 years from the application of the applicant in the family. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicates the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In Panel A, B and C, data covers the 4 years following the application of the applicant in the family. In Panel D, data covers from 9 months after the date of application to 4 years after the date of application. In all regressions, we control for month-of-application and health district fixed effects. In Panel D, the regression on height, weight and weeks of pregnancy of the first child are conditional on having a child, so their results must be interpreted with caution. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 11: Mortality and medical episodes by cause in 4 years from application

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: Applicants									
Medical episode for circulatory disease	Linear	-0.0140	0.0100	-0.0110	(0.008)	500	8,499	0.0480	0
Medical episode for circulatory disease	Quadratic	-0.0230	0.0150	-0.0190	(0.013)	500	8,499	0.0480	0
Medical episode for respiratory disease	Linear	-0.00800	0.00700	-0.00600	(0.006)	500	8,499	0.0150	0.00100
Medical episode for respiratory disease	Quadratic	-0.0140	0.0100	-0.0110	(0.009)	500	8,499	0.0150	0.00100
Medical episode for tumor	Linear	-0.0100	0.0110	-0.00800	(0.009)	500	8,499	0.0370	0.00100
Medical episode for tumor	Quadratic	0	0.0160	0	(0.013)	500	8,499	0.0370	0.00100
Medical episode digestive or nutritional disease	Linear	-0.0140	0.0130	-0.0120	(0.011)	500	8,499	0.0550	0
Medical episode digestive or nutritional disease	Quadratic	-0.029*	0.0170	-0.024*	(0.014)	500	8,499	0.0550	0.00100
Panel B: Applicants without working age family members									
Medical episode for circulatory disease	Linear	-0.043***	0.0160	-0.037***	(0.014)	500	3,647	0.0530	0.00300
Medical episode for circulatory disease	Quadratic	-0.077***	0.0250	-0.066***	(0.022)	500	3,647	0.0530	0.00500
Medical episode for respiratory disease	Linear	-0.022***	0.00800	-0.018***	(0.007)	500	3,647	0.0160	0.00300
Medical episode for respiratory disease	Quadratic	-0.037***	0.0120	-0.031***	(0.010)	500	3,647	0.0160	0.00400
Medical episode for tumor	Linear	-0.0160	0.0110	-0.0140	(0.009)	500	3,647	0.0370	0.00100
Medical episode for tumor	Quadratic	-0.00800	0.0170	-0.00700	(0.014)	500	3,647	0.0370	0.00200
Medical episode digestive or nutritional disease	Linear	-0.0100	0.0230	-0.00800	(0.020)	500	3,647	0.0560	0
Medical episode digestive or nutritional disease	Quadratic	-0.0150	0.0380	-0.0130	(0.033)	500	3,647	0.0560	0.00100

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on the probability of dying by cause of death within 4 years from the applicant's application. Nutritional or digestive diseases include also endocrine diseases, such as diabites. Tumors include all types of malignant tumors. Circulatory or respiratory diseases include all diseases to the circulatory system (e.g. heart attacks) and the respiratory system (e.g. pneumonia). The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. The regressions last three variables in Panel A are comp * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 12: Vaccines in the 4 years after applying: applicants by family structure

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: Applicants									
Influenza vaccines (per year) after applying	Linear	0.00300	0.0200	0.00200	(0.016)	500	8,499	0.398	0
Influenza vaccines (per year) after applying	Quadratic	-0.0250	0.0250	-0.0210	(0.021)	500	8,499	0.398	0.00100
Pneumonia vaccine after applying	Linear	0.0110	0.0280	0.00900	(0.023)	500	8,499	0.289	0.00100
Pneumonia vaccine after applying	Quadratic	0.00500	0.0380	0.00500	(0.031)	500	8,499	0.289	0.00200
Panel B: Applicants without working age family members									
Influenza vaccines (per year) after applying	Linear	0.0100	0.0220	0.00900	(0.019)	500	3,647	0.402	0
Influenza vaccines (per year) after applying	Quadratic	-0.0210	0.0310	-0.0170	(0.027)	500	3,647	0.402	0.00200
Pneumonia vaccine after applying	Linear	-0.00600	0.0250	-0.00600	(0.022)	500	3,647	0.282	0.00100
Pneumonia vaccine after applying	Quadratic	0.0210	0.0430	0.0190	(0.037)	500	3,647	0.282	0.00300
Panel B: Applicants with working age family members									
Influenza vaccines (per year) after applying	Linear	-0.00300	0.0270	-0.00200	(0.022)	500	4,852	0.395	0
Influenza vaccines (per year) after applying	Quadratic	-0.0280	0.0460	-0.0230	(0.038)	500	4,852	0.395	0
Pneumonia vaccine after applying	Linear	0.0270	0.0420	0.0210	(0.034)	500	4,852	0.294	0.00300
Pneumonia vaccine after applying	Quadratic	-0.00200	0.0580	-0.00300	(0.049)	500	4,852	0.294	0.00300

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 13: Health outcomes in 4 years from application: applicants by vaccine status before applying

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: Vaccinated for Influenza and Pneumonia six month before applying									
Mortality rate	Linear	-0.046**	0.021	-0.037**	(0.017)	500.000	2,819	0.072	0.003
Mortality rate	Quadratic	-0.077**	0.036	-0.059**	(0.029)	500.000	2,819	0.072	0.004
No. days of hospitalization	Linear	-2.489*	1.287	-2.035**	(1.002)	500.000	2,819	4.554	0.004
No. days of hospitalization	Quadratic	-2.751	2.094	-2.216	(1.635)	500.000	2,819	4.554	0.005
Had a medical episode	Linear	-0.131***	0.037	-0.104***	(0.030)	500.000	2,819	0.371	0.009
Had a medical episode	Quadratic	-0.190**	0.076	-0.148**	(0.060)	500.000	2,819	0.371	0.011
Panel B: Not-vaccinated for Influenza and Pneumonia six month before applying									
Mortality rate	Linear	-0.014	0.015	-0.011	(0.013)	500.000	5,680	0.058	0.001
Mortality rate	Quadratic	-0.021	0.023	-0.019	(0.021)	500.000	5,680	0.058	0.001
No. days of hospitalization	Linear	0.125	1.147	0.096	(0.978)	500.000	5,680	3.879	0.000
No. days of hospitalization	Quadratic	0.245	1.634	0.162	(1.468)	500.000	5,680	3.879	0.001
Had a medical episode	Linear	-0.008	0.033	-0.006	(0.028)	500.000	5,680	0.304	0.000
Had a medical episode	Quadratic	-0.003	0.045	-0.006	(0.039)	500.000	5,680	0.304	0.001

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 14: Health outcomes in 4 years from application: applicants by gender of working-age family members

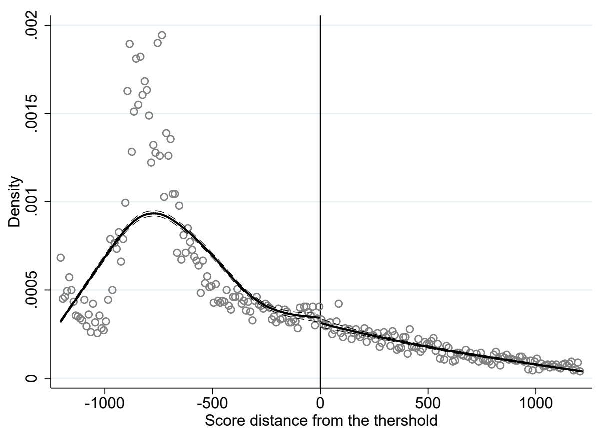
Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: Applicants with only female family members									
Mortality rate	Linear	0.00600	0.0220	0.00600	(0.019)	500	2,514	0.0490	0.00200
Mortality rate	Quadratic	0.0150	0.0300	0.0110	(0.027)	500	2,514	0.0490	0.00300
No. days of hospitalization	Linear	-0.503	1.470	-0.476	(1.263)	500	2,514	4.314	0.00100
No. days of hospitalization	Quadratic	-0.809	2.190	-0.658	(2.013)	500	2,514	4.314	0.00100
Had a medical episode	Linear	-0.0260	0.0510	-0.0220	(0.044)	500	2,514	0.315	0.00100
Had a medical episode	Quadratic	-0.0190	0.0740	-0.0160	(0.066)	500	2,514	0.315	0.00100
Panel B: Applicants with only male family members									
Mortality rate	Linear	0.00100	0.0400	0	(0.032)	500	1,050	0.0700	0.00100
Mortality rate	Quadratic	-0.0110	0.0740	-0.0100	(0.060)	500	1,050	0.0700	0.00300
No. days of hospitalization	Linear	3.048	3.087	2.320	(2.573)	500	1,050	3.864	0.00900
No. days of hospitalization	Quadratic	5.586	6.065	4.381	(5.113)	500	1,050	3.864	0.0180
Had a medical episode	Linear	0.0150	0.0800	0.00900	(0.065)	500	1,050	0.331	0.00700
Had a medical episode	Quadratic	0.0690	0.107	0.0540	(0.087)	500	1,050	0.331	0.0100

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, data covers the 4 years following the application of the applicant. In all regressions, we control for month-of-application and health district fixed effects. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

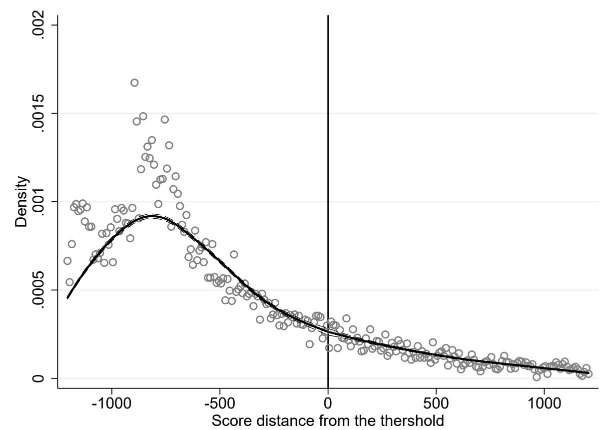
Figure 1: First-stage graph

Notes: Each circle is the average probability of obtaining the pension for the applicants at their first application in the corresponding 50-point bin. The solid and dashed lines represent the predicted values and associated confidence interval, respectively, using a quadratic polynomial regression based on Equation 2.

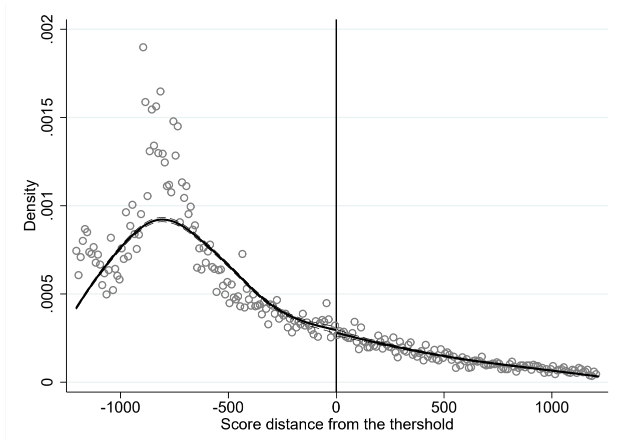
Figure 2: McCrary's tests



(A) Elderly family members



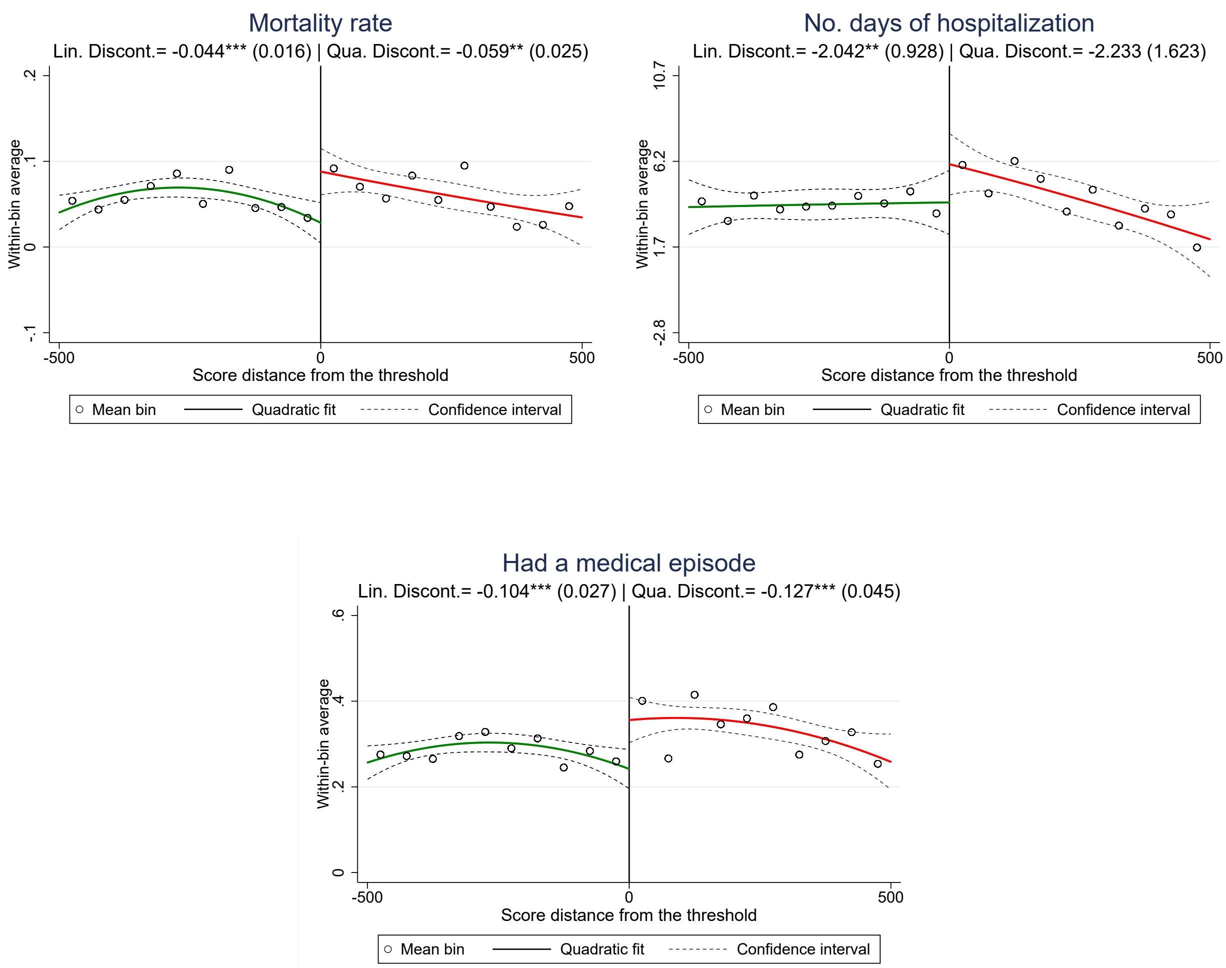
(B) Working-age family members



(C) Applicants

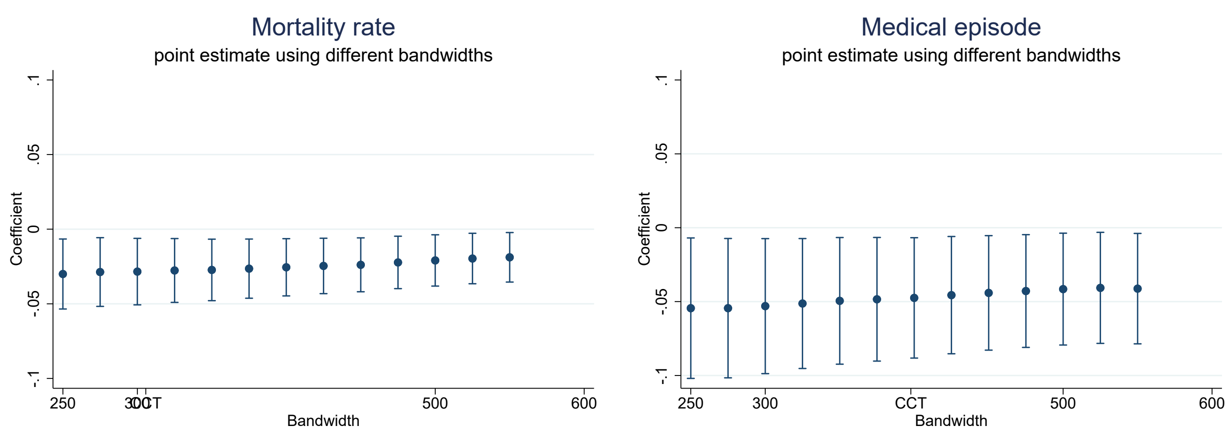
Notes: These figures show the density of individuals in 10 score-point bins. The solid line plots fitted values from a local linear regressions of frequency on the pension score, separately estimated on both sides of the cutoff. The thin lines represent the 95% confidence intervals that are set at 95 percent confidence level.

Figure 3: Effect of the Pension Score on Mortality, Cumulative days of Hospitalization and Medical Episodes of Applicants



Notes: Each graph shows the average value of the corresponding Variable conditional on the score distance from the cutoff. The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and confidence interval, respectively, using a quadratic polynomial in the Reduced Form regression.

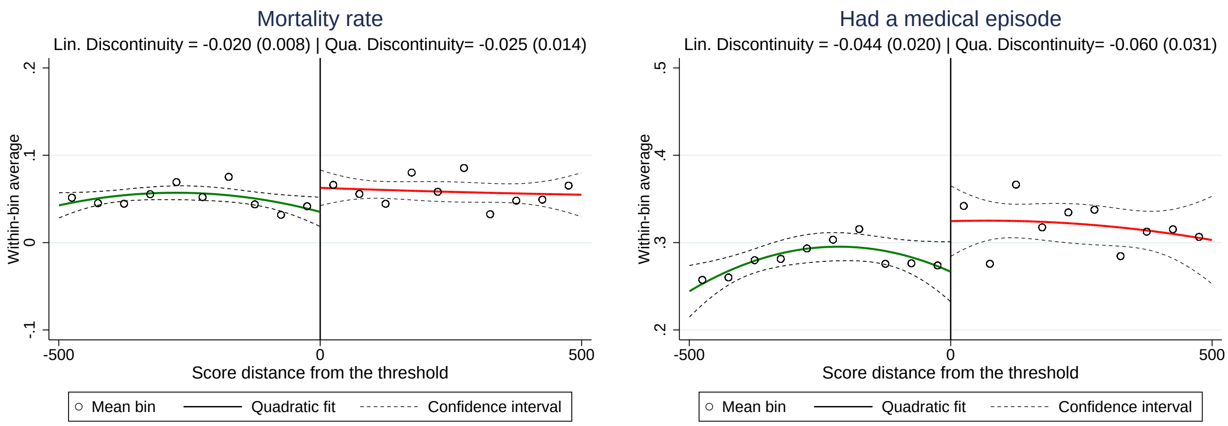
Figure 4: Robustness of the results to the use of different bandwidths



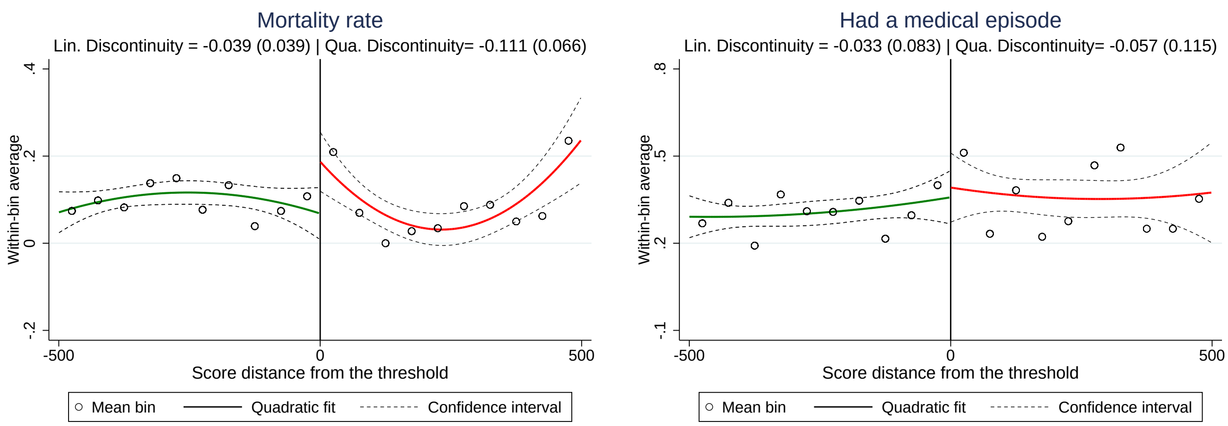
Notes: Each graph shows the point estimate and the standard error of a non-parametric estimation for the correspoding bandwidth. The confidence interval are calculated using a 90% confidence level.

Figure 5: Effect of the Pension Score on Mortality and Medical episodes of Applicants by gender, age and age of family members

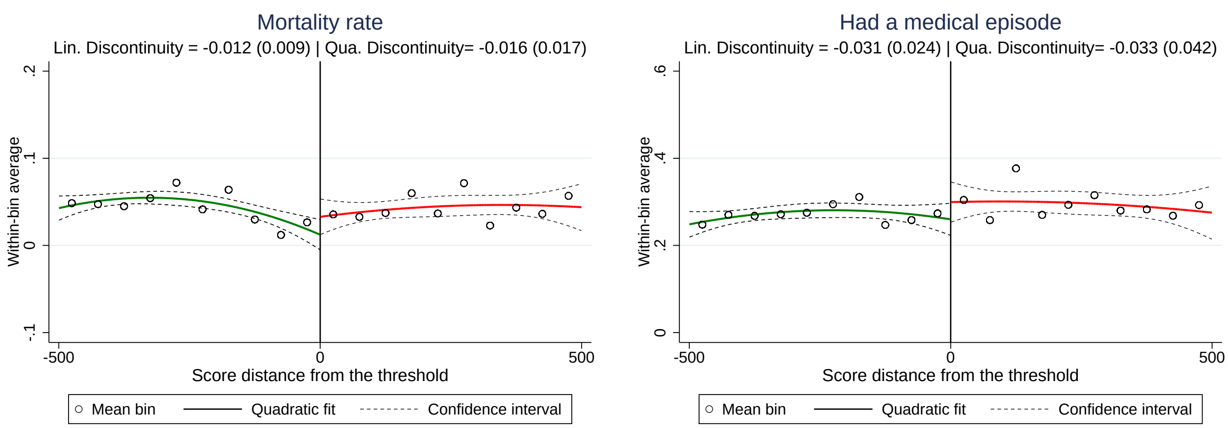
(A) Female Applicants



(B) Male applicants



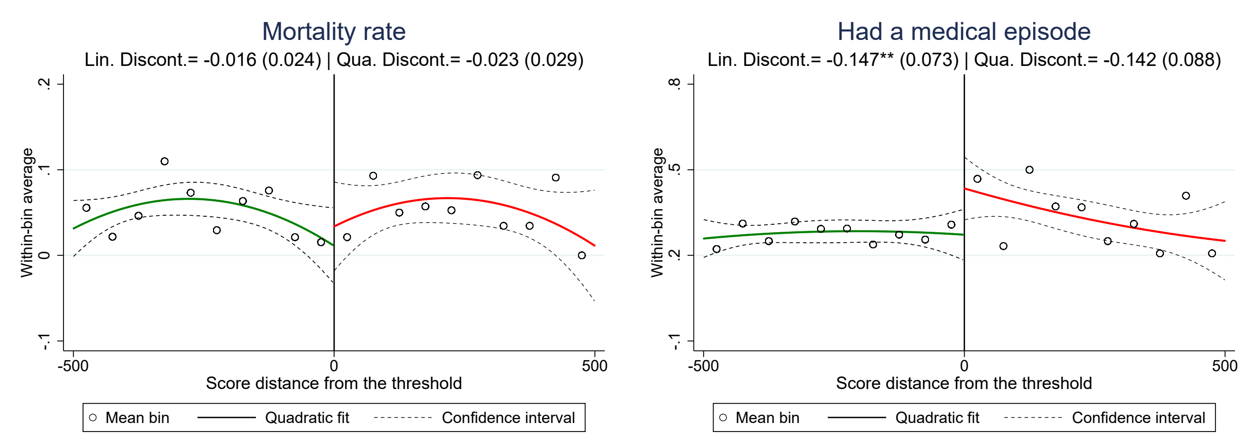
(C) 65-year-old applicants



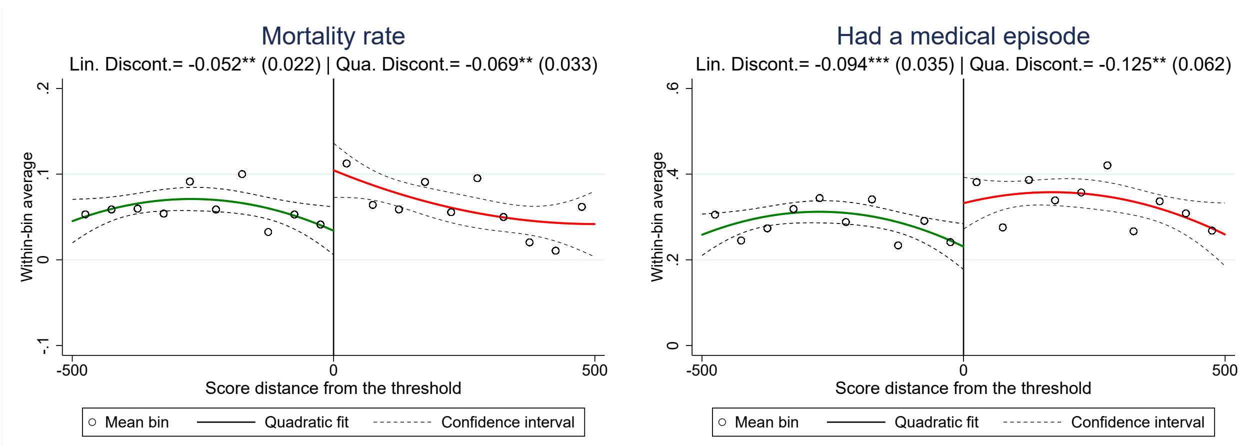
Notes: Each graph shows the average value of the corresponding Variable conditional on the score distance from the cutoff. The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and confidence interval, respectively, using a quadratic polynomial in the Reduced Form regression.

Figure 6: Effect of the Pension Score on Mortality and Days of Hospitalization of Applicants by gender, age and age of family members

(A) Applicants with working-age family members



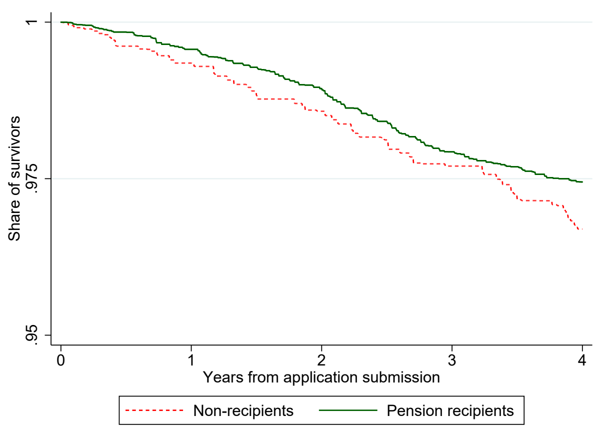
(B) Applicants without working-age members



Notes: Each graph shows the average value of the corresponding variable conditional on the score distance from the cutoff. The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and confidence interval, respectively, using a quadratic polynomial in the Reduced Form regression.

Figure 7: Share of survivor applicants within 4 years from application, adjusted by the score deviation from the cutoff.

(A) Adjusted using a polinomial of order 1 in score



(B) Adjusted using a polinomial of order 2 in score

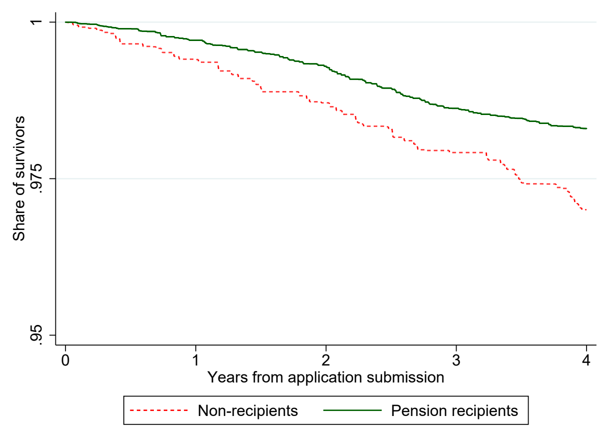
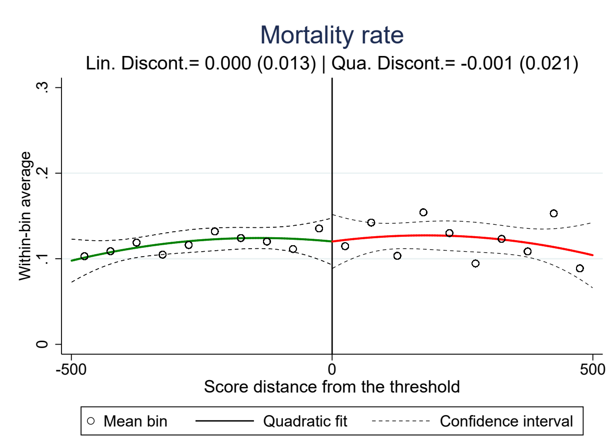
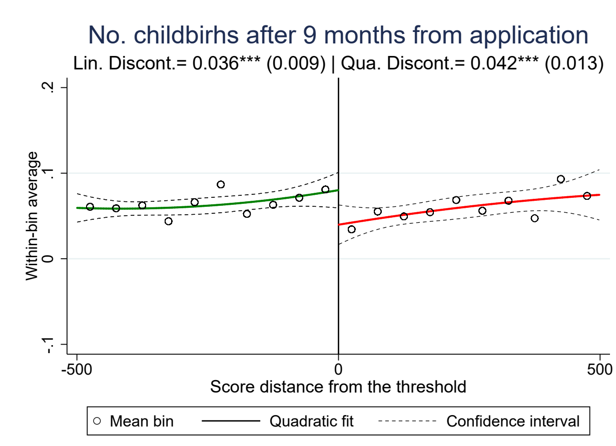


Figure 8: Effect of the Pension Score on Mortality and Fertility of Family members

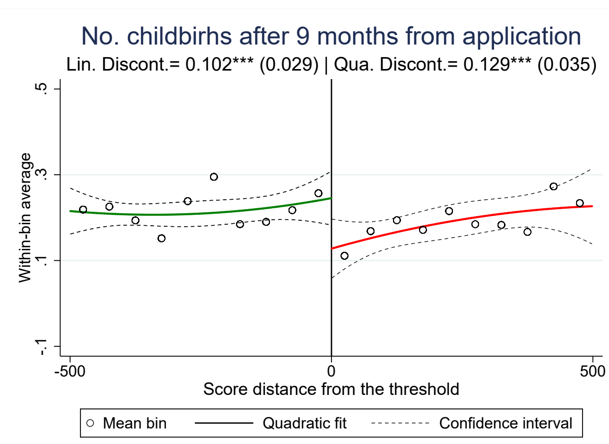
(A) Elderly family members



(B) Family members in working age



(C) Female family members in fertility age

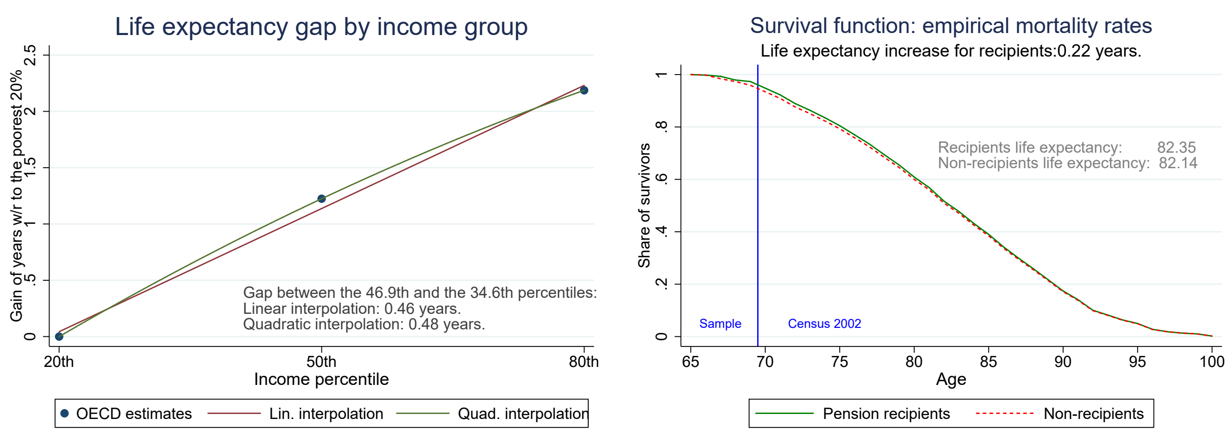


(D) Family members in working/not fertility age

Notes: Each graph shows the average value of the corresponding Variable conditional on the score distance from the cutoff . The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and associated confidence interval, respectively, using a quadratic polynomial in the Reduced Form regression

Figure 9: Back-of-the-envelop-estimation

(A) Life expectancy gap　　　　(B) Share of survivors



Notes: The left panel shows data from OECD [2016] report. We interpolate the life expectancy gap between income groups using a linear and quadratic fit. The left panel shows the life expectancy gain between pension recipients and non recipients. The empirical shares of survivor (recipients and non-recipients) is dsiplayed for ages between 65 and 69, adjusted by the score deviation from the cutoff. Then, for each year of age from 70 onwards, we use the national mortality rates, weighted by gender and region to replicate the characteristics of our sample.

Appendix A The Pension Score

The pension score was created with the sole purpose of determining pension recipients and has no further use for any other public agency or government benefit. This score is calculated as follows:

$$\text{Pension score}_{g} = \frac{\sum_{i}^{n_g} \left\{ \left(\text{CGI}_{i,g} * (1 - \text{p}_{i,g}) + \text{Y}_{i,g} * \text{p}_{i,g} \right) + \text{YP}_{i,g} \right\}}{\text{IN}_g} * F \tag{3}$$

Where:

- $CGI_{i,g}$ is the capacity to generate income of person i in family group g. This is the potential labor wage that each household member could receive in the labor market. Certain household members have a potential wage of 0, such as those above 64 and below 16 years old, students under 25, or disabled family members. Two facts are worth noting: 1) the equation that determines potential labor wages is not known by the public, and 2) factors that could ultimately increase real wages in the labor market (e.g. further years of education) will increase these potential wages.

- $Y_{i,g}$ is the labor income for person i in family group g. The National Tax Service provides this information. In case the Tax Service records do not show any income from a particular person, the PI uses the self-reported measure collected from the *poverty score*.

- $p_{i,g}$ is a labor income 'ponderator' for person i in family group g, which assigns a different relative weight to the capacity to generate income and labor income for each individual. This ponderator gives more weight to CGI for younger individuals, and this weight decreases with age (see Appendix Table B2).[29]

- $YP_{i,g}$ is income from pensions, financial assets, and any other income source not considered in $Y_{i,g}$ for person i in family group g. The National Tax Service and the private

[29] With this ponderator, the government attempts to diminish the effect of potential strategic behavior from working age family members deciding to not report certain income sources. For example, if a working age family member younger than 50 is not reporting 100 USD of income, that will at most count as not reporting 1 US dollar in the pension score.

companies administering the pension funds provide this information. If these institutions do not show any record for a particular person, the PI uses the self-reported measure collected from the *poverty score*.

- IN_g is the needs index for family group g. This evaluates the degree of "dependence" in the family considering the age and disability of each family member. A family member older than 65 years has a moderate level of dependence. A family member in the national register of disabled persons has a severe level of dependence. Appendix Table B3 shows the full scale of dependence.

- n_g is the number of people in the family group g.

- g is the family group relevant for the pension score. These are household members who pool income with the applicant and have the following level of closeness: the husband or wife, a partner who is the parent of one of the household members, household members younger than 18 years of age, household members younger than 25 years of age who are studying, and/or disabled household members between 18 and 65 years of age.

- F is a monotonic transformation factor to convert the results in the pension score scale.

For applicants in 2012, $\text{CGI}_{i,g}$, $\text{Y}_{i,g}$, and $\text{YP}_{i,g}$ represent on average 13 percent, 27 percent, and 60 percent of the numerator of the pension score, respectively. This shows that labor income is relatively less important than other factors. On the other hand, the money that family members receive from pensions or other financial assets seems to be the most relevant factor in the pension score for the average applicant.[30]

A.1 Pension Payments

Pension payments cease if the recipient spends more than 90 days abroad in a single calendar year. The person can apply again, but she has to prove 270 days of continuous residency in Chile in the year before applying. Payments also cease if the recipient does not collect any pension money within six months. In this case, pension recipients have another six months to ask the PI to restitute the payments, otherwise the pension expires. People in this category

[30]Note that $\text{CGI}_{i,g}$, $\text{Y}_{i,g}$, and $\text{YP}_{i,g}$ are not the only factors of the pension score, as the disability and age of family members affect the denominator of the score.

can apply again for a basic pension without any restriction. Finally, payments immediately cease when the pension recipient dies.

Appendix B Tables

Table B1: Basic Pension Coverage Evolution

Period	Coverage
From July 1st, 2008 to June 30th, 2009	40 percent
From July 1st, 2009 to August 31st, 2009	45 percent
From September 1st, 2009 to June 30th, 2010	50 percent
From July 1st, 2010 to June 30th, 2011	55 percent
From July 1st, 2011	60 percent

Table B2: Labor Income Ponderator

Women Age	Men Age	$p_{i,g}$
16 a 51	16 to 56	0,1
52	57	0,2
53	58	0,3
54	59	0,4
55	60	0,5
56	61	0,6
57	62	0,7
58	63	0,8
59	64	0,9
60 or more	65 or more	1,0

Table B3: Dependence Index

Factor	Level of Dependance
1	Healthy
1,2353	Self-sufficient
1,4706	Low Dependance
1,8235	Moderate Dependance
2,3774	Severe Dependance

Table B4: Balance tests on other covariates. Year 2012 only

Variables	Regression	RD_coeff	Se	t_stat	Bandwidth	Observations	Control_mean	R_squared
Total household income	Linear	0.300	(10.208)	0.0290	500	4,072	728.1	0.292
Total household income	Quadratic	-13.65	(14.303)	-0.955	500	4,072	728.1	0.293
CGI	Linear	-24.942**	(12.043)	-2.071	500	4,072	78.89	0.00300
CGI	Quadratic	-35.75	(22.839)	-1.565	500	4,072	78.89	0.00300
Y	Linear	28.50	(36.620)	0.778	500	4,072	251.0	0.00200
Y	Quadratic	-7.435	(52.473)	-0.142	500	4,072	251.0	0.00300
YP	Linear	-28.20	(36.467)	-0.773	500	4,072	477.1	0.0490
YP	Quadratic	-6.220	(47.116)	-0.132	500	4,072	477.1	0.0490
p	Linear	-0.0140	(0.024)	-0.576	500	4,072	1.946	0.00200
p	Quadratic	-0.0280	(0.039)	-0.703	500	4,072	1.946	0.00200
Needs index (IN)	Linear	-0.0340	(0.021)	-1.609	500	4,072	2.010	0.00100
Needs index (IN)	Quadratic	-0.071**	(0.033)	-2.172	500	4,072	2.010	0.00200
Net fee income	Linear	-3.240	(6.432)	-0.504	500	4,072	35.69	0.00200
Net fee income	Quadratic	2.814	(11.058)	0.255	500	4,072	35.69	0.00200
Net working salary	Linear	-3.991	(19.995)	-0.200	500	4,072	189.0	0.00300
Net working salary	Quadratic	-42.31	(27.307)	-1.550	500	4,072	189.0	0.00400
Other non-taxable income	Linear	36.11	(30.905)	1.168	500	4,072	24.03	0.00100
Other non-taxable income	Quadratic	33.42	(38.907)	0.859	500	4,072	24.03	0.00100
Net pension income	Linear	5.875	(18.698)	0.314	500	4,072	411.5	0.0540
Net pension income	Quadratic	26.20	(28.445)	0.921	500	4,072	411.5	0.0540
Avg. no students	Linear	-0.0210	(0.016)	-1.275	500	4,072	0.0610	0.00200
Avg. no students	Quadratic	-0.0380	(0.023)	-1.626	500	4,072	0.0610	0.00200

Notes: The "Applicants" panel uses variables just for applicants. In this panel, the *Needs index* and *No.student family members* are omitted because they vary at family level. The variables in "All observations by family" panel correspond to the average of the corresponding variable over all family members. The first five variables are the factors used for the pension score formula (Equation 3), explained in section 2. The *Dependence index* is indicates the individual level of dependence of each family member (see the one presented in Table B3) and it is used to constructsummed over family members to construct the family Needs Index. emphNo. student family members is the number of students in the applicant's family. *CGI, Y, YP, Net fee income, Net working salary Other non-taxable income, Net pension income, and Net capital income* are converted in 2012 US dollars, using the average official exchange rate of that year (1 US dollar= 486.5 Chilean pesos, Bank [2017]). In all regressions we use standard errors clustered by province. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table B5: Balance tests by family structure

Variables	Regression	RD_coeff	Se	t_stat	Bandwidth	Observations	Control_mean	R_squared
Panel A: Applicants without working age family members								
Female share	Linear	-0.0140	(0.020)	-0.693	500	3,647	0.879	0.00400
Female share	Quadratic	0.00600	(0.029)	0.192	500	3,647	0.879	0.00500
Age (years)	Linear	-0.680	(0.457)	-1.488	500	3,647	69.01	0.0160
Age (years)	Quadratic	-1.114*	(0.629)	-1.771	500	3,647	69.01	0.0170
Days hospitalization 0.5 years before applying	Linear	-0.513**	(0.216)	-2.379	500	3,647	0.592	0.00200
Days hospitalization 0.5 years before applying	Quadratic	-0.459	(0.283)	-1.622	500	3,647	0.592	0.00300
Took Influenza vaccine 6 months before applying	Linear	-0.0110	(0.028)	-0.387	500	3,647	0.349	0.00200
Took Influenza vaccine 6 months before applying	Quadratic	-0.0200	(0.044)	-0.445	500	3,647	0.349	0.00200
Took Pneumonia vaccine 6 months before applying	Linear	0.0250	(0.016)	1.513	500	3,647	0.0440	0.00200
Took Pneumonia vaccine 6 months before applying	Quadratic	0.0280	(0.019)	1.465	500	3,647	0.0440	0.00300
Family size	Linear	-0.0160	(0.020)	-0.840	500	3,647	1.931	0.00400
Family size	Quadratic	-0.054*	(0.029)	-1.850	500	3,647	1.931	0.00500
Poverty score	Linear	-48.82	(207.017)	-0.236	500	3,647	10000	0.0260
Poverty score	Quadratic	-399.2	(330.852)	-1.206	500	3,647	10000	0.0270
Live with person below 16	Linear	-0.00400	(0.004)	-1.036	500	3,647	0.00400	0.00100
Live with person below 16	Quadratic	-0.00800	(0.007)	-1.057	500	3,647	0.00400	0.00100
Municipal_Income_pc	Linear	5.761	(5.048)	1.141	500	3,640	147.5	0.00200
Municipal_Income_pc	Quadratic	3.738	(8.297)	0.450	500	3,640	147.5	0.00200
App. from metropolitan area	Linear	-0.0370	(0.027)	-1.369	500	3,647	0.379	0.00200
App. from metropolitan area	Quadratic	-0.0400	(0.035)	-1.136	500	3,647	0.379	0.00200
Panel B: Applicants with at least one working age family member								
Female share	Linear	-0.0170	(0.021)	-0.780	500	4,852	0.896	0.00100
Female share	Quadratic	-0.0370	(0.031)	-1.189	500	4,852	0.896	0.00100
Age (years)	Linear	-0.116	(0.314)	-0.369	500	4,852	66.44	0.00700
Age (years)	Quadratic	0.0810	(0.428)	0.188	500	4,852	66.44	0.00800
Days hospitalization 0.5 years before applying	Linear	0.185	(0.236)	0.781	500	4,852	0.414	0
Days hospitalization 0.5 years before applying	Quadratic	-0.123	(0.300)	-0.410	500	4,852	0.414	0.00100
Took Influenza vaccine 6 months before applying	Linear	-0.0360	(0.027)	-1.342	500	4,852	0.342	0.00100
Took Influenza vaccine 6 months before applying	Quadratic	-0.0400	(0.034)	-1.158	500	4,852	0.342	0.00200
Took Pneumonia vaccine 6 months before applying	Linear	0.0100	(0.014)	0.681	500	4,852	0.0590	0
Took Pneumonia vaccine 6 months before applying	Quadratic	0.00200	(0.023)	0.0660	500	4,852	0.0590	0.00100
Family size	Linear	0.00800	(0.060)	0.136	500	4,852	3.241	0.00100
Family size	Quadratic	0.00100	(0.083)	0.0160	500	4,852	3.241	0.00100
Poverty score	Linear	167.3	(255.827)	0.654	500	4,852	9870	0.00500
Poverty score	Quadratic	-121.6	(373.054)	-0.326	500	4,852	9870	0.00600
Live with person below 16	Linear	0.00700	(0.006)	1.045	500	4,852	0.0140	0.00100
Live with person below 16	Quadratic	0.0120	(0.011)	1.060	500	4,852	0.0140	0.00100
Municipal_Income_pc	Linear	-9.301	(5.746)	-1.619	500	4,843	147.5	0.00100
Municipal_Income_pc	Quadratic	-5.688	(8.668)	-0.656	500	4,843	147.5	0.00200
App. from metropolitan area	Linear	-0.0240	(0.022)	-1.112	500	4,852	0.377	0.00100
App. from metropolitan area	Quadratic	0.00400	(0.025)	0.140	500	4,852	0.377	0.00100

Notes: The table shows balance tests for predetermined characteristics at the moment of the first application. Number of days of hospitalization, vaccines and childbirths are within 6 months before applying. The "Regression" column indicates the degree of the polynomial used. The "RD coef", "Se" and "t stat" columns report the point-estimate, standard error and t-statistic of the RD coefficient. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean of non-recipients in the bandwidth. In all regressions, we use standard errors clustered by health district and triangular kernels. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table B6: Applicants' Health Outcomes in 4 years from application using non-parametric estimations by family structure

Variables	Regression	conventional_coeff	conventional_SE	Bias_corrected_coeff	Bias_corrected_SE	Bandwidth	Control_mean	Observations
Panel A: Applicants without working age family members								
Mortality rate	non-parametric	0.045**	0.0190	0.063**	0.0250	500	0.0640	23,206
No. days of hospitalization	non-parametric	2.250***	0.721	2.762***	0.931	500	3.947	23,206
Had a medical episode	non-parametric	0.093***	0.0340	0.136**	0.0530	500	0.309	23,206
Panel B: Applicants with at least 1 working age family members								
Mortality rate	non-parametric	0.00100	0.0130	0.00900	0.0210	500	0.0640	26,346
No. days of hospitalization	non-parametric	-0.635	0.928	-0.906	1.490	500	3.947	26,346
Had a medical episode	non-parametric	0	0.0350	-0.00600	0.0490	500	0.309	26,346

Notes: The table shows the results of non-parametric estimations on health outcomes within 4 years from the applicant's application. The "Conventional coeff' and "conventional SE" columns report the point-estimate and standard error of the nonparametric estimation. The "Bias corrected coeff' and "Bias corrected SE" columns report the point-estimate and standard error using after correcting for the bias of the non-parametric estimation. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table B7: Applicants' Health Outcomes in 4 years from application using controls by family structure

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: Applicants without working age family members									
Mortality rate	Linear	-0.047***	0.018	-0.041**	(0.016)	500.000	3,622	0.071	0.160
Mortality rate	Quadratic	-0.071**	0.029	-0.061**	(0.025)	500.000	3,622	0.071	0.161
No. days of hospitalization	Linear	-1.607***	0.565	-1.386***	(0.493)	500.000	3,622	4.464	0.113
No. days of hospitalization	Quadratic	-1.840***	0.707	-1.592**	(0.620)	500.000	3,622	4.464	0.114
Had a medical episode	Linear	-0.097**	0.043	-0.083**	(0.037)	500.000	3,622	0.339	0.091
Had a medical episode	Quadratic	-0.131*	0.072	-0.113*	(0.063)	500.000	3,622	0.339	0.092
Panel B: "Applicants with at least 1 working age family members"									
Mortality rate	Linear	-0.005	0.012	-0.004	(0.010)	500.000	4,827	0.056	0.084
Mortality rate	Quadratic	-0.021	0.021	-0.018	(0.017)	500.000	4,827	0.056	0.084
No. days of hospitalization	Linear	0.834	1.352	0.620	(1.106)	500.000	4,827	3.820	0.028
No. days of hospitalization	Quadratic	1.295	2.348	1.060	(1.878)	500.000	4,827	3.820	0.029
Had a medical episode	Linear	-0.001	0.047	-0.001	(0.039)	500.000	4,827	0.318	0.042
Had a medical episode	Quadratic	0.012	0.070	0.010	(0.057)	500.000	4,827	0.318	0.042

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. In each estimation we used as controls: health service fixed effects, time fixed effects, age fixed effects, days of hospitalization before appliying, rehospitalizations before applying, number of vaccines before appliying, gender, poverty score, family size, number of applicants per family, sex, number of elderly family members, number of working age family members, number of children in the family, municipal income level. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

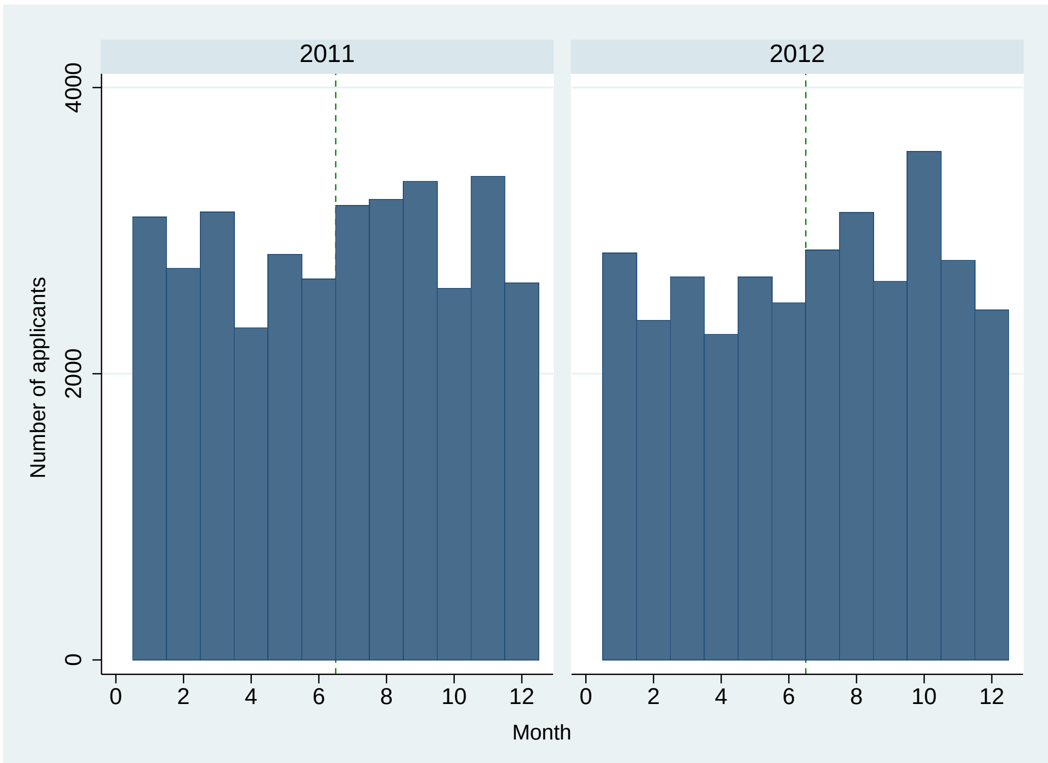
Table B8: Health outcomes in 4 years from application: applicants in families of 2 people by family structure.

Variables	Regression	Coef_2sls	Se_2sls	Coef_RF	Se_RF	Bandwidth	Observations	Control_mean	R_squared
Panel A: All applicants. Family size=2									
Mortality rate	Linear	-0.051***	0.0180	-0.044***	(0.016)	500	4,289	0.0710	0.00300
Mortality rate	Quadratic	-0.067**	0.0280	-0.059**	(0.025)	500	4,289	0.0710	0.00300
No. days of hospitalization	Linear	-2.315**	1.061	-2.042**	(0.928)	500	4,289	4.941	0.00200
No. days of hospitalization	Quadratic	-2.558	1.846	-2.233	(1.623)	500	4,289	4.941	0.00200
Had a medical episode	Linear	-0.120***	0.0300	-0.104***	(0.027)	500	4,289	0.351	0.00600
Had a medical episode	Quadratic	-0.146***	0.0500	-0.127***	(0.045)	500	4,289	0.351	0.00700
Panel B: Applicants living with a working-age family member. Family size=2									
Mortality rate	Linear	-0.0190	0.0280	-0.0160	(0.024)	500	1,198	0.0550	0.00200
Mortality rate	Quadratic	-0.0240	0.0320	-0.0230	(0.029)	500	1,198	0.0550	0.00500
No. days of hospitalization	Linear	-1.937	3.330	-1.816	(2.919)	500	1,198	5.654	0.00400
No. days of hospitalization	Quadratic	-1.658	5.741	-1.323	(5.035)	500	1,198	5.654	0.00700
Had a medical episode	Linear	-0.167**	0.0850	-0.147*	(0.073)	500	1,198	0.368	0.0120
Had a medical episode	Quadratic	-0.162	0.102	-0.142	(0.088)	500	1,198	0.368	0.0120
Panel C: Applicants living with an elderly family member. Family size=2									
Mortality rate	Linear	-0.060**	0.0240	-0.052**	(0.022)	500	3,091	0.0760	0.00400
Mortality rate	Quadratic	-0.080**	0.0370	-0.069**	(0.033)	500	3,091	0.0760	0.00400
No. days of hospitalization	Linear	-2.534***	0.787	-2.216***	(0.690)	500	3,091	4.735	0.00200
No. days of hospitalization	Quadratic	-3.056***	1.021	-2.633***	(0.900)	500	3,091	4.735	0.00400
Had a medical episode	Linear	-0.108***	0.0400	-0.094**	(0.035)	500	3,091	0.346	0.00500
Had a medical episode	Quadratic	-0.145**	0.0690	-0.125**	(0.062)	500	3,091	0.346	0.00700

Notes: The table shows the results of 2 stage least squares (2SLS) and reduced form (RF) regressions on health outcomes within 4 years from the applicant's application. The "Regression" column indicates the degree of the polynomial used in the regression. The "Coef. 2SLS" and "Se 2SLS" columns report the point-estimate and standard error of the Pension coefficient in the second stage regression (Equation 1). The "Coef. RF" and "Se RF" columns report the point-estimate and standard error of the coefficient for being below the cutoff in a reduced form regression. "Bandwidth" indicate the range of score points around the threshold within which regressions are performed. "Control mean" is the variable mean within the group of non-treated observations in the bandwidth. In all regressions, data covers the 4 years following the application of the applicant. In all regressions, we control for month-of-application and health district fixed effects. In all regressions, we clustered the standard errors at province level. * significant at 10%, ** significant at 5%, *** significant at 1%.

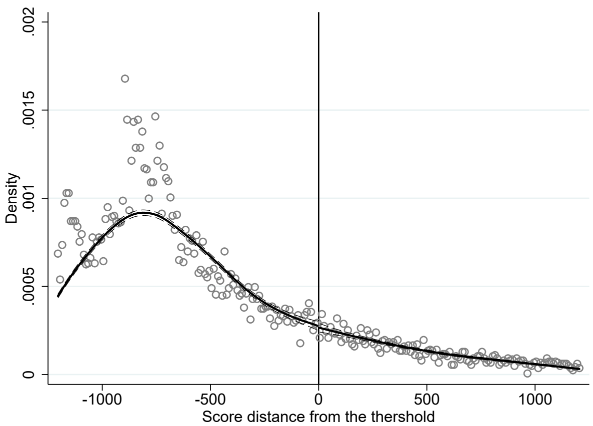
Appendix C Figures

Figure C1: Number of applicants for the basic pension by month

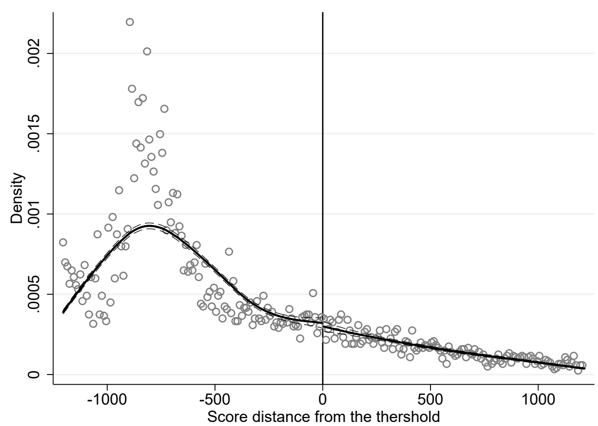


Notes: The eligibility threshold changes only in July 2011 (dashed line in left panel). A dashed line has been added to July 2012 for comparison.

Figure C2: McCrary's tests by family structure



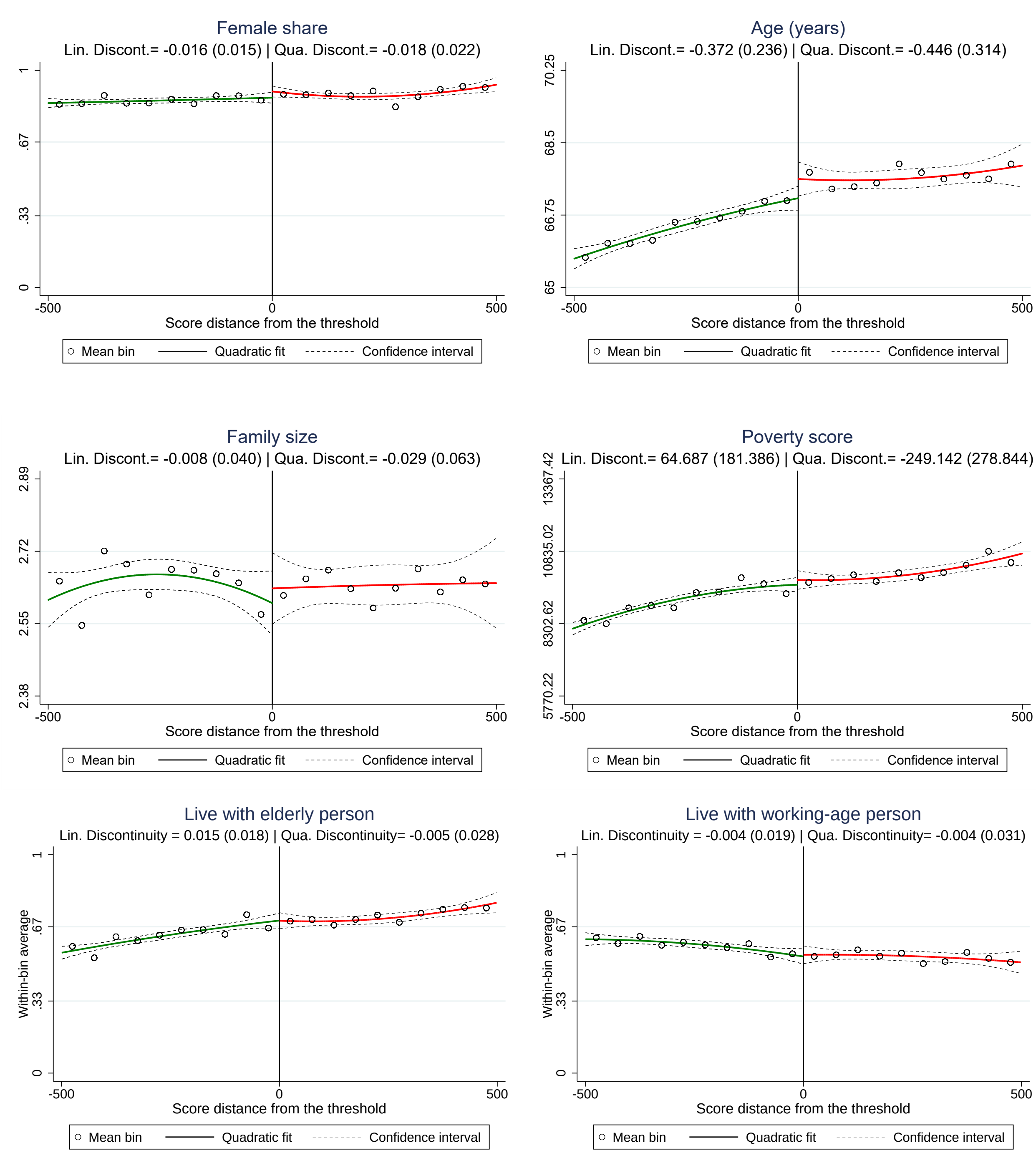
(A) Applicants living with working age fmaily members



(B) Applicants living without working age fmaily members

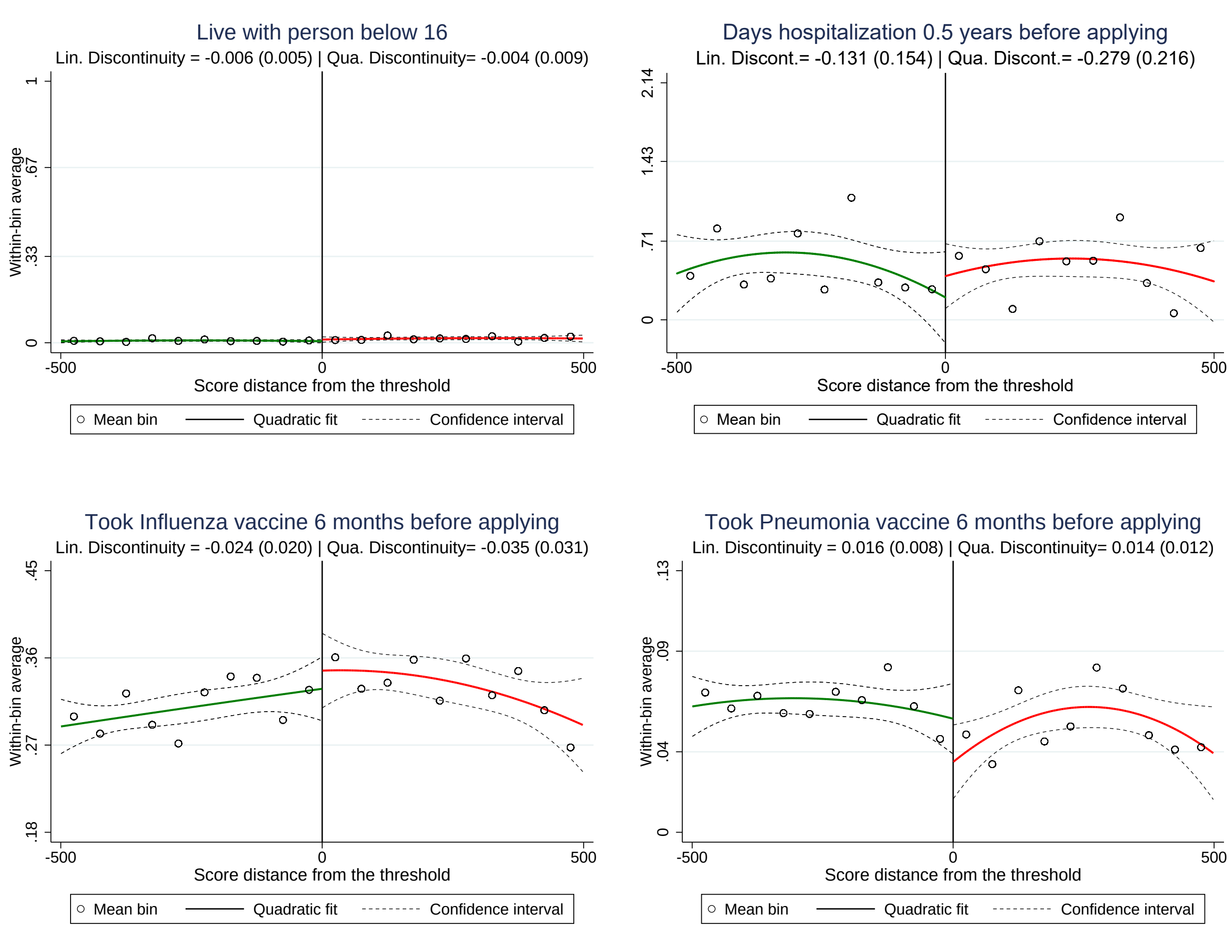
Notes: These figures show the density of individuals in 10 score-point bins. The solid line plots fitted values from a local linear regressions of frequency on the pension score, separately estimated on both sides of the cutoff. The thin lines represent the 95% confidence intervals that are set at 95 percent confidence level.

Figure C3: Covariate RD plots, applicants



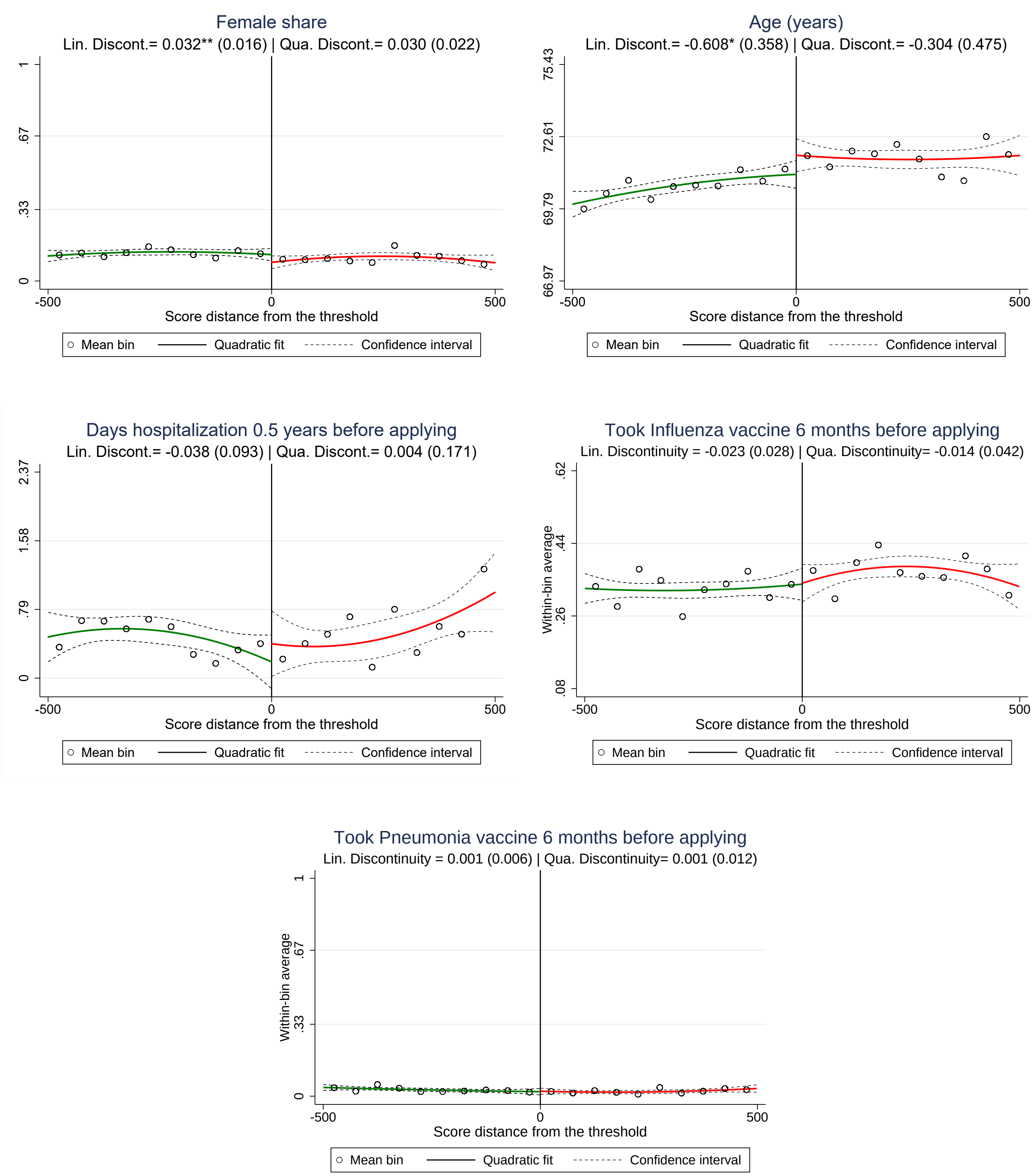
Notes: Each graph shows the average value of the corresponding covariate conditional on the score distance from the cutoff . The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and associated confidence interval, respectively, using a quadratic polynomial regression based on Equation 2.

Figure C4: Covariate RD plots, applicants



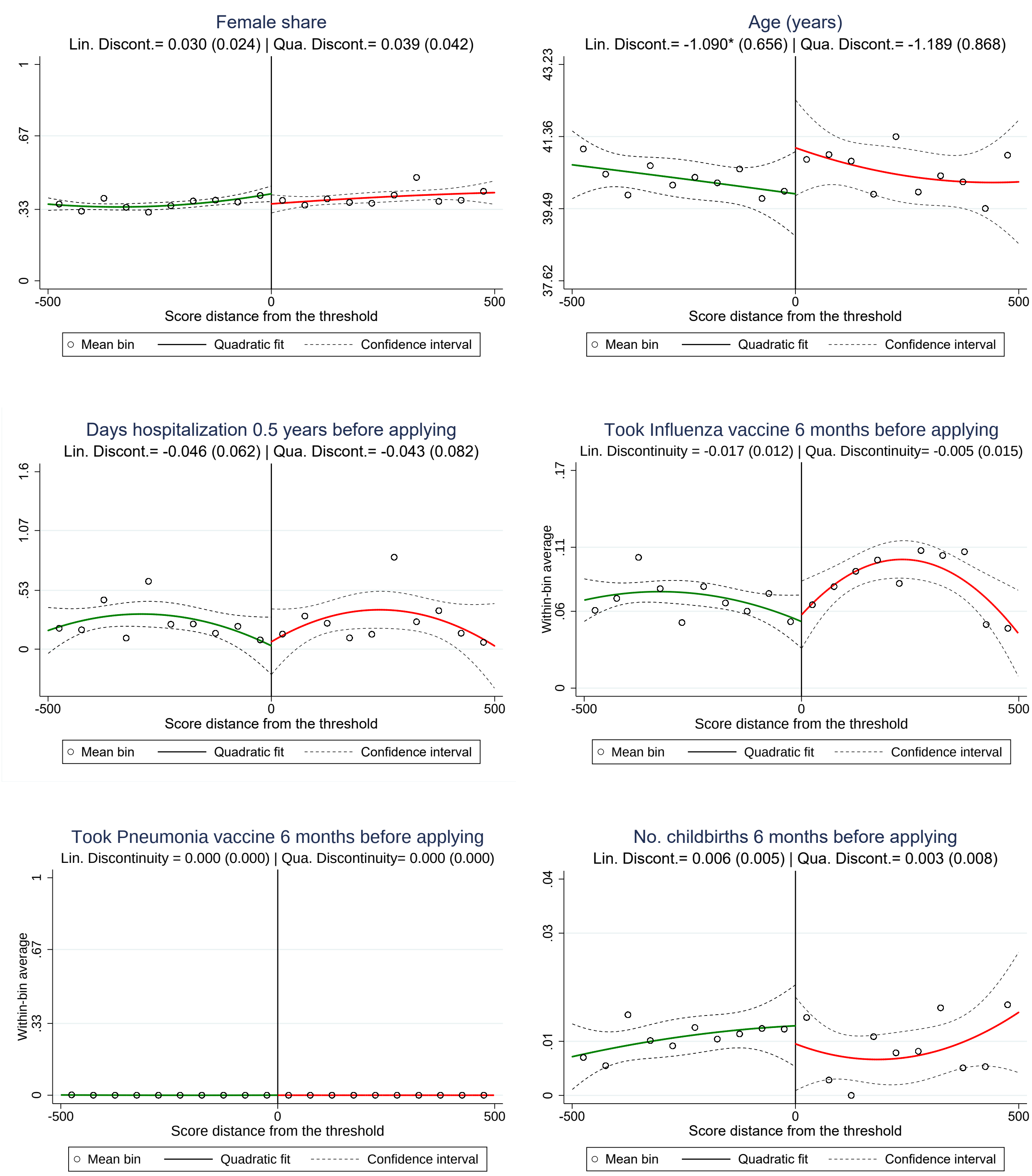
Notes: Each graph shows the average value of the corresponding covariate conditional on the score distance from the cutoff . The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and associated confidence interval, respectively, using a quadratic polynomial regression based on Equation 2.

Figure C5: Covariate RD plots, elderly family members



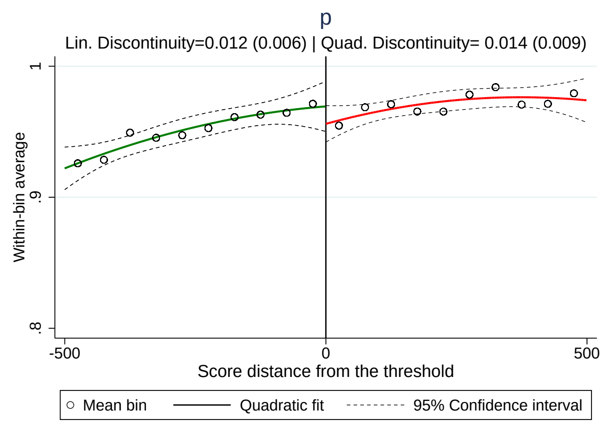
Notes: Each graph shows the average value of the corresponding covariate conditional on the score distance from the cutoff . The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and associated confidence interval, respectively, using a quadratic polynomial regression based on Equation 2.

Figure C6: Covariate RD plots, working-age family members



Notes: Each graph shows the average value of the corresponding covariate conditional on the score distance from the cutoff. The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and confidence interval, respectively, using a quadratic polynomial regression based on Equation 2.

Figure C7: Other covariates RD plots, all observations by family

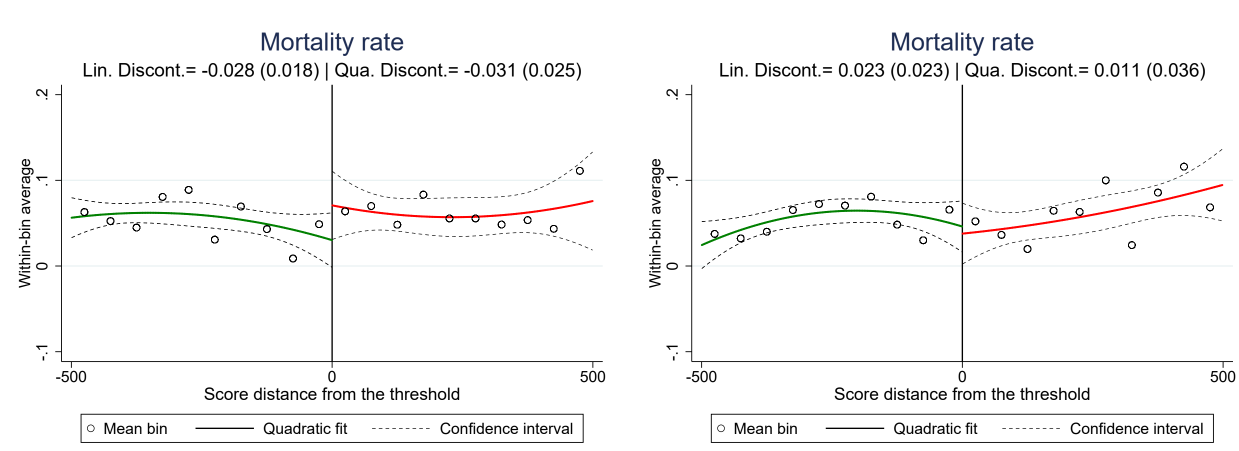


Notes: Each graph shows the average value of the corresponding covariate conditional on the score distance from the cutoff . The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and associated confidence interval, respectively, using a quadratic polynomial regression based on Equation 2.

Figure C8: Effect of the Pension Score on Mortality of Applicants with Working-Age members, by poverty score of family members

(A) Applicants below the median of the poverty score

(B) Applicants above the median of the poverty score

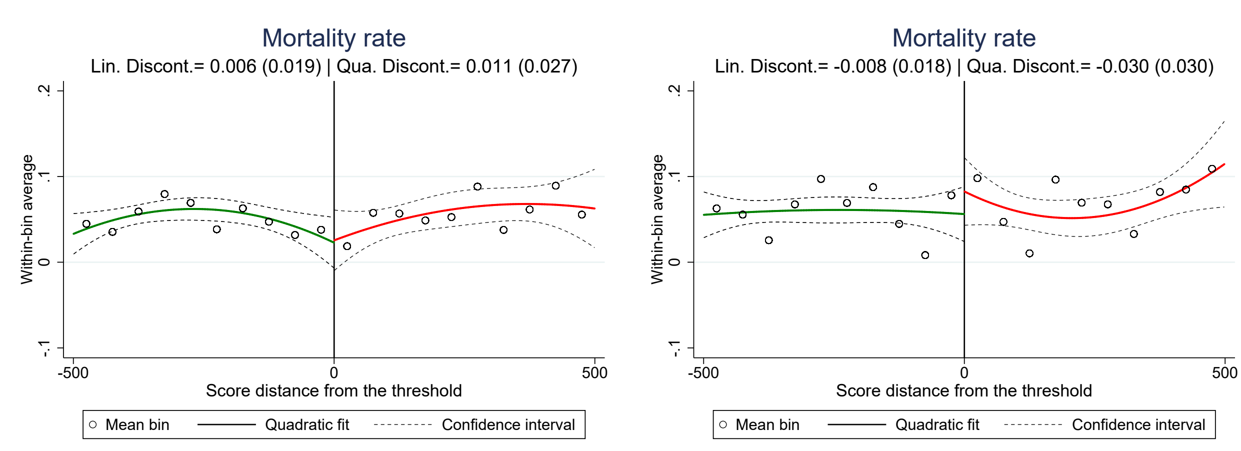


Notes: Each graph shows the average value of the corresponding Variable conditional on the score distance from the cutoff. The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and confidence interval, respectively, using a quadratic polynomial in the Reduced Form regression.

Figure C9: Effect of the Pension Score on Mortality of Applicants with Working-Age members, by gender of family members

(A) Applicants with only male working-age members

(B) Applicants with only female working-age members



Notes: Each graph shows the average value of the corresponding Variable conditional on the score distance from the cutoff. The circles are averages across 50-point bins on either side of the threshold, whereas the solid and dashed lines represent the predicted values and confidence interval, respectively, using a quadratic polynomial in the Reduced Form regression.