More to Live for: Health Investment Responses to Expected Retirement Wealth in Chile

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Abstract

An important but poorly understood way that economic development may influence health is through the private incentives that it creates for individuals to invest in their own health. In this paper, we study how individuals' forward-looking health investments respond to changes in expected future (but not current) wealth. Focusing on Chile's public pension overhaul in 1981, we link administrative microdata to a detailed household panel survey, exploiting discrete breaks in the reform's impact across cohorts using a fuzzy regression kink design (RKD). Consistent with theoretical predictions, we find that greater expected pension wealth increases the use of important preventive medical services (and to a lesser extent, promotes more costly healthy lifestyle behavior change) – leading to measurable increases in chronic disease diagnosis (a requisite for appropriate disease management), reductions in disease prevalence, and measurably lower mortality (particularly due to chronic diseases). In general, these results provide new evidence that economic development can have a meaningful incentive effect on health.

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1 Introduction

A large body of research links long-term economic growth to improvements in population health (Pritchett and Summers 1996). However, the precise ways that economic growth improves health are complex.[1] Considerable past research has focused on the contemporaneous role of income and consumption (nutrition and use of medical care, for example) in health production and on how child nutrition fosters economic productivity in adulthood (Rodgers 1975; Bliss and Stern 1978; Basta et al. 1979; Immink and Viteri 1981; Strauss 1986; Deolalikar 1988; Fogel 1994b; Dasgupta 1997; Thomas and Strauss 1997; Strauss and Thomas 1998; Hoddinott et al. 2013; Vogl 2014). More poorly understood, however, is the possibility that economic growth strengthens forward-looking incentives for individuals to invest in their own health.

Consistent with canonical models of human capital accumulation by forward-looking individuals ((Becker 1964, Becker 1967, Grossman 1972b, Grossman 1972a), expectations of greater future wealth may create incentives for longevity because, all else equal, individuals have "more to live for."[2] Put differently, the utility derived from an extra year of life is greater because additional material resources allow higher consumption.[3,4] Although we are unaware of studies that have empirically examined how health investments respond to changes in future economic circumstances, such behavioral responses

[1]There is ongoing debate about the primary causes of mortality decline; economic gains may not be most important but undoubtedly matter (Preston 1975; McKeown 1976; Fogel 1994a; Cutler and Miller 2005; Cutler et al. 2006).

[2]A growing literature in behavioral economics also provides alternative models of forward-looking individual decision-making (Laibson 1997; O'Donoghue and Rabin 1999; Angeletos et al. 2001; Harris and Laibson 2001; Pistaferri 2001). In general, changing one's health investments in response to a shock to future wealth does not require fully rational behavior.

[3]This assumes that the cross derivative of consumption and health are positive and that imperfect capital and intertemporal markets do not allow households to borrow against their pension wealth, which holds for all years prior to the COVID-19 pandemic.

[4]Attanasio and Hoynes (2000) observe that accounting for the wealth-health relationship is required for appropriately estimating wealth-age profiles.

may be meaningful.[5]

This paper provides new empirical evidence on forward-looking incentives for health investments by studying how current health behaviors respond to changes in expected future (but not current) wealth. To study this issue empirically, we exploit a major public pension reform introduced by the Chilean government in 1981, converting its Defined Benefit (DB) system into a Defined Contribution (DC) system.[6] Because of the way that participants in the DB system were compensated for their previous contributions, the reform creates a kink on the cohort pension wealth profile. We therefore use a fuzzy regression kink design (RKD) to estimate how individuals' private investments in their health respond to changes in expected (future) pension wealth (Card et al. 2012; Card et al. 2015).

Future consumption can affect current health investments through complementarity or substitution between consumption and health. To make these ideas clear, we develop a simple model that incorporates this mechanism by allowing the marginal utility of consumption to depend on health (see Section A.1 in the Appendix). If consumption and health are complements (and hence the marginal utility of consumption increases with health), greater future consumption increases the incentive to invest in health. Existing empirical evidence on complementarity or substitution is somewhat thin, and mixed: Lillard and Weiss (1997) and Low and Pistaferri (2015) find evidence of substitution; Viscusi and Evans (1990), Finkelstein et al. (2013), and Blundell et al. (2020) find evidence of complementarity; and Evans and Viscusi (1991) and De Nardi et al. (2010) find no significant evidence of either. However, the degree of substitution required to

[5]Studying self-protective behavior in response to HIV/AIDS in Sub-Saharan Africa, Oster (2012) shows evidence that the degree of self-protection is related to material well-being.

[6]The Chilean Pension reform has been studied by Diamond (1994), Edwards (1998), Diamond (2002), Arenas de Mesa et al. (2008), Stephen and Kay (2008), Attanasio et al. (2011), Quintanilla (2011), and Attanasio et al. (2014), among others.

completely offset the "more to live for" effect would need to be quite sizeable.

To estimate how health behaviors respond to changes in future wealth, we first link two rich data sources at the individual level, joining four waves of Chile's nationally-representative Social Protection Surveys (or Encuesta de Protección Social (EPS)) with monthly administrative records from Chile's public pension system (from the Historia Previsional de Afiliados (HPA) database). This linked EPS-HPA data enables us to calculate expected pension wealth (EPW) at retirement for every individual in our nationally representative sample. It also allows us to observe their private health behavior (physical activity, alcohol consumption, and smoking), use of screening tests (specifically for diabetes, cholesterol, and hypertension), and chronic disease diagnoses (for cardiovascular disease, diabetes, hypertension, and kidney failure). We focus on Chilean men given substantially lower labor force participation rates (and greater variability in ages of labor force entry) among women.[7]

Doing so, we find that greater expected pension wealth increases use of key chronic disease screening tests (for high cholesterol, hypertension, and diabetes) that contribute to healthy aging and longevity. These preventive screenings are critical for early detection and subsequent management of chronic diseases, and they can reduce hospitalizations (Guirguis-Blake et al. 2021; Kaczorowski et al. 2011) as well as risk of major morbidity and premature mortality (Cheung et al. 2004; ADVANCE Collaborative Group 2008; Holman et al. 2008; The Action to Control Cardiovascular Risk in Diabetes Study Group 2008; Law et al. 2009). We also note that these health investments are relatively less costly (both in time and in utility loss) than others because they require relatively little behavior change (only a single medical visit, for example) and because health

[7]As we show in Section A.2, we do not observe a discernible kink in women's expected pension wealth, presumably because they have historically participated less in the formal labor market in Chile (Contreras et al. 2005).

conditions identified through them can often be managed with simple pharmaceutical interventions. To a lesser extent, we also find increases in physical activity and exercise, a more costly lifestyle change in health behavior.

Importantly, these health investments then translate directly into higher diagnosis rates of major chronic diseases sensitive to them – specifically, hypertension, diabetes and heart disease (which increase by 0.43%, 0.43%, and 0.7%, respectively). Using data from the Chilean National Health Survey (ENS), a nationally-representative epidemiological surveillance survey, we show evidence that these increases in diagnosis reflect greater detection of chronic diseases rather than increases in disease prevalence. Specifically, exploiting the same birth cohort kink, we find suggestive evidence that, if anything, the reform *reduced* chronic disease prevalence rates.

Finally, an important question is if these health investments actually led to measurable declines in mortality. To test for this, we use Chile's administrative death records to estimate discrete-time survival models (Jenkins 1995). We find that the reform measurably increased longevity, reducing age-specific mortality rates overall, and in particular, among the key chronic conditions for which we find greater health investments.

In addition to providing new evidence on how economic development can improve health through an incentive effect, our paper is also related to several other broad areas of research. First, it contributes to research on the effects of pension reforms on economic outcomes such as labor market participation and retirement decisions (Mastrobuoni 2009; Behaghel and Blau 2012; Attanasio et al. 2011; Blanchet et al. 2019), consumption, and savings (Attanasio and Rohwedder 2003; Attanasio and Brugiavini 2003). We also complement previous empirical evidence on changes in health-related outcomes produced by pension system reforms. For example, Bando et al. (2022) (using data from Peru) and Galiani et al. (2016) (using data from Mexico) show that beneficia-

ries of new contributory pensions increase their leisure, and enjoy gains in psychological well-being and mental health.

Second, our paper contributes to a substantial empirical literature demonstrating important forward-looking economic behavior (studying a horizon of a decade or more) (Modigliani et al., 1954; Friedman, 1957). Ashenfelter (1978) prominently observes an anticipatory earnings response to job training programs, an idea reinforced by others, including Heckman and Smith (1999). Research in public finance documents 'fiscal foresight,' or behavioral adjustments to the announcement of fiscal policy changes before they occur (Hall 1971; Auerbach 1989; Yang 2005; Lemos 2006; House and Shapiro 2006). More generally, anticipatory forward-looking behavior has been shown in a wide range of other areas, including the supply response of physicians to tort reforms (Malani and Reif 2015), health care use in response to dynamic incentives embedded in non-linear health insurance contracts (Aron-Dine et al., 2015), pharmaceutical consumption responses to anticipation of the creation of Medicare Part D (Alpert 2016), the development of privately-held forest land in anticipation of the Endangered Species Act (Lueck and Michael 2003), and human capital investments in children in response to reductions in future mortality risk (Jayachandran and Lleras-Muney 2009).

Finally, our paper contributes to the literature on what share of overall resources should be devoted to health, and how the optimal share varies with income per capita. (Chernew and Newhouse 2011). Hall and Jones (2007) suggest that if the marginal utility of consumption declines sufficiently, it may be optimal for individuals with increasing income to allocate resources largely towards longevity (rather than increasing consumption within a single period). Relatedly, Costa and Kahn (2004) and Kniesner et al. (2010) estimate income elasticities for the value of a statistical life to be greater than one, and several studies find that advances in medical technology – even very ex-

pensive ones – are generally worth their expense (Cutler and McClellan, 2001; Cutler, 2007; Cutler et al., 2007).[8] Our findings that individual health investments increase with expected future wealth is consistent with, and extends, this literature.

The rest of this paper is organized as follows. Section 2 provides an overview of the Chilean pension system and its 1981 reform. Section 3 describes our data and Section 4 presents our econometric frameworks. In Section 5, we report our primary results for health investments, disease diagnoses, disease prevalence, and mortality. Section 6 shows evidence on the validity of our identifying assumptions and the robustness of our results. Finally, Section 7 concludes.

2 The Chilean Pension System Reform

2.1 Pension Reform Overview

In May 1981, Chile converted its Defined Benefit (DB) public pension program for formal sector workers into a Defined Contribution (DC) program (Congreso Nacional de Chile 1980). This was a landmark reform, and it was widely publicized and heavily advertised across the country. In the DC system, participating workers are required to contribute 10% of their monthly income to an individual account, which is privately managed by regulated Pension Fund Administrators (PFAs).[9,10]

Individual accounts would earn a market-based rate of return depending on the investment choices made by PFAs. Women are eligible to retire at age 60, and men at age 65. Retirement at these ages is not mandatory – pensioners can continue working, and

[8]This does not of course mean that all health care spending is efficient (see Weisbrod 1991, Garber et al. 2007 and Newhouse 2004 for example)

[9]In the DC system employers do not make pension contributions.

[10]The contribution rate has remained unchanged since the introduction of the DC system.

additional contributions past retirement age are not required.

During this transition, all new formal sector workers (joining the workforce for the first time, typically at age 18) were mandated to enroll in the DC system, while existing formal sector workers had the option of either remaining in the DB program until retirement or switching to the DC system.[11] Given that the minimum legal age for employment in Chile is 18, all individuals born in May 1963 or later (who turned 18 at or after the time of the reform) were mandated to enroll in the DC system. Alternatively, those born before May 1963 (who legally could have entered the labor force before the reform) had the option to remain in the DB system. In other words, individuals born in May 1963 or later were "fully exposed" to the DC pension system, while those born before May 1963 were only "partially exposed" (because they either opted into the DC system for a fraction of their adult working years, as most Chileans did, or chose to remain in the DB system altogether).

Beneficiaries in the DB system who switched to the DC system also received a compensatory payment, known as a recognition bond, to transfer past contributions to their individual DC system accounts. The amount of these recognition bonds depended on how long workers had already contributed to the DB system. Workers making all contributions necessary to be fully vested in the DB system received a recognition bond calculated to be the equivalent of a lifetime annuity providing 80% of their average earnings.[12] The size of the bond is otherwise scaled to match the share of contributions made towards full vesting. Recognition bonds yield a 4% annual return (paid by the Chilean government once the recognition bond has been adjusted for inflation) from the time a beneficiary moves to the DC system to the time of retirement.

[11]Until 2017, participation was optional for the self-employed.

[12]This value corresponds to the average of the last 12 salaries received between June 1979 and November 1975.

Gross wages were increased by law to prevent the higher employee contribution resulting in less disposable income. As documented in Arellano (1985): *"The increase in net wages was the main incentive for moving to the new system. In March 1981, before the new system came into effect, social security contributions, which were previously the responsibility of both the employer and the employee, were almost entirely transferred to the employee. To prevent this from resulting in a loss of income for employees, gross wages were simultaneously increased to compensate for the higher contributions. Thus, initially, this change did not result in lower wages or higher costs for the employer."*[13]

Public knowledge of the reform was widespread, and one year after it was implemented, about 70% of contributors to Chile's DB system had chosen to move to the DC system (Arellano, 1985). Both the Chilean government and PFAs made substantial efforts to publicize the reform and to promote the DC system, enlisting the help of prominent public figures and using marketing slogans such as "a secure future."[14] During the year prior to reform implementation, news headlines aimed to publicize to Chileans that the new system would safeguard pensions from inflation, a major concern in Latin American countries at the time. For example, a newspaper (La última Noticias, 11/7/1980) front page proclaimed, "The Minister assures: [The DC system is the] End of the drama of the retirees!" and "Pensions will have an automatic adjustment [100% Consumer Price Index (CPI)]" (see Appendix Figure A.1). Other newspaper articles emphasized the reform's positive impact on pension income, promising that "Minimum pension amounts were guaranteed" and that "Contributing 10% of their remuneration...will allow workers to obtain a pension close to their last remuneration" (see Appendix Figure A.2). This publicity continued over time as well; in 2000, the

[13]This is the translation from the original text written in Spanish.

[14]For an example, see `https://www.youtube.com/watch?v=OdSUlclz19E`

COO of the PFA Association advertised that affiliates retiring by 2020 would enjoy a 100% replacement rate if DC return rates continued to exceed 6% (see Appendix Figure A.3).

2.2 Simulation Evidence Illustrating the Kink in Chile's Cohort Pension Wealth Profile

To illustrate the differential impact of Chile's pension reform on birth cohorts fully versus partially exposed, we conduct a simple simulation exercise. Overall, this exercise shows that it is the recognition bond paid to those moving from the DB to the DC system that creates the kink in Chile's cohort pension wealth profile, differentiating cohorts "fully exposed" vs. "partially exposed" to the reform – a kink which we exploit for identification in our empirical analysis.

Specifically, we use the linked Encuesta de Protección Social and the Historia Previsional de Afiliados (EPS-HPA) data described later in Section 3 to compute expected pension wealth (EPW) at the time of retirement for each birth cohort using the following procedure and assumptions. First, we compute contribution amounts using a third-order polynomial in age and cohort to capture changes in contributions across time.[15] Second, we assume that the rate of return to pension savings is 4% per year (the rate of return of the recognition bond).[16] More precisely:

$$EPW_{cg} = \sum_{s=1}^{S} cont_am_{cg} \times (1+r)^{n_{gs}}, \quad (1)$$

[15]We tested several specifications and selected the one with the highest goodness of fit, as indicated by the Bayesian and Akaike information criteria (Schwarz 1978; Akaike 1974). To obtain the estimates used to predict contributions, we include contributions greater or equal to zero. Thus, we obtain a predicted contribution that reflects the probability of not contributing in a given month.

[16]Note that we do not include the recognition bond in this calculation.

where c indexes monthly cohorts; g indicates gender (female or male); s indexes working months (from s = 1, the month individuals in cohort g turns 18 years old, through month s = S, the month that the individuals in cohort c of gender g reach minimum legal retirement age); $cont_am_{cg}$ is the cohort- and gender-specific pension contribution; r is the monthly rate of return corresponding to an annual rate of return equal to 4%; and n_{gs} is the number of months between month s and the month of minimum legal retirement age for gender g.

The resulting EPW profile shown by the continuous line in Figure 1 Panel A is increasing across successive cohorts because average contributions rise over time due to earnings growth. Also, affiliates who turned 18 years of age (the legal working age in Chile) before the introduction of the DC system made fewer contributions to their individual accounts and, consequently, their account balance at retirement is smaller. These considerations result in a smooth and increasing EPW profile in which there is no evident kink. The vertical red line highlights the birth cohort that turned 18 years of age in May 1981, the month-year of implementation of the pension system reform. This line separates cohorts "fully exposed" to the DC system (those who turned 18 years old as or after the DC system was implemented) from cohorts "partially exposed" to the DC system (those who could have already participated in the DB system and therefore could only have contributed in the DC system for a shorter period of time).

In what follows, we maintain all of the assumptions above, but we also introduce the recognition bond (the compensatory payment designed to allow workers who made contributions to the DB system to transfer their savings to the DC system). Specifically, the amount of the cohort- and gender-specific recognition bond is:

$$rbond_{cg} = (income_g \times 0.8 \times 12) \times \frac{density_c/12}{35} \times weight_g \times rbpr_g, \qquad (2)$$

where $income_g$ is the average monthly income (by gender) of individuals born before May 1963 (using income observed in the HPA between May 1981 and Dec 1982); $density_c$ is the potential cohort-specific working life until the change in the pension system (in months); $weight_g$ is equal to 10.35 for males, and 11.36 for females;[17] and $rbpr_g$ is the gender-specific probability of being entitled to receive the recognition bond, computed using the administrative records of issued recognition bonds (DB affiliates were only entitled to receive the recognition bond if they made at least twelve contributions to the pension system between May-1976 and April-1981). The amount of the recognition bond is set to zero for cohorts born in May-1963 or later.

We then add these recognition bond values for each cohort to the cohort-specific EPW, compounding the interest rates earned from the time that an individual moved to the DC system (May 1981) until retirement:

$$EPW_{cg} = \sum_{s=1}^{S} cont_am_{cg} \times (1+r)^{n_{gs}} + rbond_{cg} \times (1+rr)^{nr_{cg}}, \quad (3)$$

where rr is the real monthly rate of return to the recognition bond[18] and nr_{cg} is the number of months between May 1981 and the month-year that each cohort reaches minimum legal retirement age.

The dashed line in Figure 1 Panel B shows EPW values including the recognition bond. With the recognition bond, there is now a visible kink (change of slope) in the cohort pension wealth profile at the cohort born in May 1963.

Overall, this simulated example shows that the rules of the pension reform mechanically produce a kink in the EPW-cohort profile that is independent of individuals'

[17] As established by Law DL 3,500.

[18] The annual rate of return to the recognition bond was set by law at 4%, implying a monthly rate of return of 0.327% ($(1+0.00327)^{12} \approx 1.04$).

decisions. Also, the kink is more visibly evident for males than for females, reflecting both lower formal labor force participation rates and later entry in the labor force among women (both reducing the probability of receiving the bond) (Contreras et al. 2005). We therefore focus our analysis on Chilean men.

3 Data

We use a variety of data sources for our analyses, and we present our Expected Pension Wealth (EPW) calculations in detail in Section A.2. To study household savings, financial behavior, and health investments, we use (1) Chilean administrative data on compulsory pension contributions (Historia Previsional de Afiliados, or HPA), (2) nationally-representative data from Chile's Social Protection Surveys (Encuesta de Protección Social, or EPS), and (3) nationally-representative data from the Chilean Household Finance Survey (Encuesta Financiera de Hogares, or EFH). To study disease prevalence rates and mortality, we use (4) the Chilean National Health Survey (Encuesta Nacional de Salud, or ENS) and (5) death records from the Chilean government's vital registration system. We describe each data source in more detail below (and present descriptive statistics in Tables A.1 and A.3).[19]

3.1 Household Savings, Finances, and Health Investments

First, our analysis uses two rich sources of microdata linked at the individual level. One is Chile's Social Protection Survey (Encuesta de Protección Social, or EPS), with

[19]Summary statistics from our sample are generally comparable with those from the CASEN survey (Encuesta de Caracterización Socioeconómica Nacional), the most widely-used Chilean population survey.

waves conducted in 2004, 2006, 2009, and 2015.[20] The EPS is a nationally representative survey designed to measure socio-economic status and retirement behavior, broadly defined. Importantly, the EPS also contains detailed individual- and household-level information about health care service use (specific health service use, including diabetes and hypertension screening), disease diagnoses (including cardiovascular and metabolic syndrome diseases), and private health behaviors (physical activity, alcohol consumption, and smoking). The EPS also contains information about labor market participation and the characteristics of respondents' current job.

The other dataset is the Chilean government pension system administrative records (Historia Previsional de Afiliados, or HPA), which we link to the EPS at the individual level. The HPA data contains information about DC affiliates (both currently working and retired affiliates), and it includes both employees of firms and the self-employed as well as those unemployed and no longer in the workforce. This HPA administrative data system spans all years of pension system participation for each affiliate (our HPA data extends through December 2017), and it includes earnings in each month of participation, additional pension contributions, pension fund type over time, and accumulated pension savings including recognition bonds from the DB system.

Using linked EPS-HPA data, we apply several sample restrictions. First, we only include individuals observed below the minimum retirement age (65 for men). Second, we exclude individuals below age 25 when surveyed to avoid predicting labor market entry among those still in formal education (or who could still be in school or college). Finally, we only include men born beginning in 1943 or later because they were only entitled to claim pension benefits in January 2008 or later (the HPA do not include

[20]There was a 2002 wave of the EPS as well, but detailed health information was not collected in the 2002 wave, so we do not include it in our analyses.

accumulated pension saving data for individuals who claimed pension benefits before January 2008). Our final sample is an unbalanced panel containing 18,836 observations (7,194 men) born between 1943 and 1990. Questions about disease screening were introduced in the 2009 EPS wave, so to study these outcomes, our sample is comprised of 2009 and 2015 waves (which we term the "two-wave sample"). For other outcomes, we use all four waves (which we term the "four-wave sample"). Because individuals at the kink were born in 1963, they are between 41 and 52 years old in the "four-wave sample" and between 46 and 52 years old in the "two-wave sample."

Separately, in supporting analyses, we use the 2017 Chilean Household Finance Survey (Encuesta Financiera de Hogares, or EFH) to measure non-pension savings. Covering a total of 4,549 urban households, the EFH is representative of the national urban population and collects comprehensive information on assets, debt, income, insurance contracts, and financial behavior.

3.2 Disease Prevalence and Mortality

To study differences in disease prevalence across the pension reform cohort kink, also we use the 2016-2017 Chilean National Health Survey (ENS), which contains nationally-representative epidemiological data on blood levels of cholesterol, glucose, and other biomarkers (collected through nurse visits to households). This cross-sectional household data includes 6,233 individuals 15 years of age or greater selected from both urban and rural areas of all 15 geographic regions of Chile.

Finally, to study differences in mortality by age and cause across the pension reform cohort kink, we use Chile's administrative death records between 2003 and 2018. Compiled by the Department of Information and Health Statistics within the Chilean

Ministry of Health, this vital registry data includes individual-level demographic information (including sex, age, and municipality of residency for all deceased individuals) along with the primary cause of death. We combine these records with data from the 2002 Chilean population census to conduct survival analyses by age across various causes of death.

4 Empirical Framework

4.1 Fuzzy Regression Kink Estimation

Our identification strategy takes advantage of the exogenous kink in the EPW cohort profile differentiating men born before and after May 1963 (due to the structure of the recognition bond embedded in Chile's pension system reform) (Card et al. (2012) and Card et al. (2015)). Those born in May 1963 or later were fully-exposed to the reform (i.e., enrolled to the DC system for their entire working life), while those born earlier were only partially-exposed. This kink is visible both in our simulated example (Figure 1 Panel B) and also in our data (Figure 2). We use a fuzzy RKD because the endogenous variable (EPW) is not uniquely determined by the age of the individual, but also by the current pension account balance (which is a function of previous contributions and the rate of return) and by estimated future pension contributions between the present and Chile's legal age of retirement.

Specifically, Following Card et al. (2015) and defining c_0 as the birth cohort at the kink (those born in May 1963), the effect of EPW on health-related outcomes H is

given by:

$$\tau = \frac{\lim\limits_{c_0 \to 0^+} \frac{d\mathbb{E}[H|cohort = c]}{dc}\Big|_{c=c_0} - \lim\limits_{c_0 \to 0^-} \frac{d\mathbb{E}[H|cohort = c]}{dc}\Big|_{c=c_0}}{\lim\limits_{c_0 \to 0^+} \frac{d\mathbb{E}[EPW|cohort = c]}{dc}\Big|_{c=c_0} - \lim\limits_{c_0 \to 0^-} \frac{d\mathbb{E}[EPW|cohort = c]}{dc}\Big|_{c=c_0}} \tag{4}$$

In practice, the estimate of ${\beta_1}^h$ in the following reduced form equation for health outcome H can be used to estimate the numerator in Equation (4):

$$\mathbb{E}[H_{it}|cohort_i, \omega_t] = \alpha_0^h + \alpha_1^h(cohort_i - c_0) + \beta_1^h(cohort_i - c_0) \times D_i + \omega_t^h, \tag{5}$$

where i indexes individuals, t indexes EPS survey waves, $cohort_i$ is the month-year birth cohort, $D_i = \mathbb{1}[cohort_i > c_0]$ is an indicator variable, and ω_t are year fixed effects.

Similarly, the estimate of ${\beta_1}^{EPW}$ in the following reduced form equation for the EPW can be used to estimate the denominator in Equation (4):

$$\mathbb{E}[EPW_i|cohort_i, \omega_t] = \alpha_0^{EPW} + \alpha_1^{EPW}(cohort_i - c_0) + \beta_1^{EPW}(cohort - c_0) \times D_i + \omega_t^{EPW}. \tag{6}$$

Card et al. (2012) also show that τ can be directly estimated by regressing H_{it} on linear (or quadratic) terms in $(cohort_i - c_0)$ and $(cohort_i - c_0) \times D_i$, but leaving out the "main effect", D_i, replacing the interaction term $(cohort_i - c_0) \times D_i$ with EPW_i, and using $(cohort_i - c_0) \times D_i$ as an instrumental variable in a two-stage least- squares (2SLS) procedure. We therefore use 2SLS to estimate:

$$\mathbb{E}[H_{it}|cohort_i, \omega_t] = \alpha_0 + \alpha_1(cohort_i - c_0) + \tau \times EPW_i + \omega_t, \tag{7}$$

where the endogenous variable EPW_i is instrumented with $(cohort_i - c_0) \times D_i$.[21]

To select the appropriate degree of the polynomial for the running variable ($cohort$), we compute the Bayesian Information Criteria (BIC) for up to a second-order polynomial as suggested by Gelman and Imbens (2019). Although the goodness-of-fit statistics are very similar across most models, the first-order polynomial has slightly higher values in most cases. Therefore, we present the results with the first-order polynomial in the main paper but also show results with both first- and second-order polynomials in the Appendix. We also present 95% confidence sets, which are robust to the inclusion of weak instruments, based on the minimum distance version of the Anderson-Rubin test statistics (Finlay 2009).

Finally, when using several outcome variables to test the same hypothesis, we report Romano-Wolf p-values that are step-down adjusted and robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b). We also combine related outcomes into a single index, following Anderson (2008). We cluster our standard errors at the individual level.[22]

[21]To assess the sensitivity of our results, we also generate estimates using non-parametric procedures and different bandwidths around the kink following Calonico et al. (2014) and Calonico et al. (2016), but these estimates are imprecise, presumably because of the small number of observations in our sample.

[22]Estimates clustered at the running variable level (available upon request) yield similar results. According to Lee and Card (2008), when employing RD designs in the context of a discrete running variable, it is recommended to cluster at the running variable level. In our dataset, the month-year cohort serves as the running variable, with fewer than 100 values on each side of the cutoff, indicating a discrete support. However, Kolesár and Rothe (2018) demonstrated that such clustering may introduce higher bias compared to using a standard sandwich-type estimator and proposed a non-parametric alternative for regression discontinuity designs. Considering these insights and the absence of a practical adaptation of the Kolesár and Rothe (2018)'s approach to the FRK design, we have opted to report the standard errors clustered at the individual level as our main results.

4.2 Reduced Form Models of Disease Prevalence and Mortality

Because we cannot link the HPA dataset directly to the Chilean National Health Survey or Chile's vital registration system, we do not use the framework described in Section 4.1 to study the relationship between EPW and disease prevalence or mortality. For the prevalence of major chronic diseases for which we also observe health investments, we therefore estimate Equation (5) using these chronic diseases as outcomes instead.[23]

Alternatively, for mortality risk (and mortality risk by cause), we estimate discrete-time survival models using the following estimation framework (following Jenkins (1995)):

$$\mathbb{P}r[death_{it} = 1|cohort_i, age_{it}] = \tag{8}$$
$$G(\gamma_1 age_{it} + \gamma_2 age_{it}^2 + \gamma_3(cohort_i - c_0) + \gamma_4(cohort_i - c_0) \times D_i),$$

where $t = 2003, 2004, ..., 2018$ and G is the logistic cumulative distribution function. We use the resulting parameter estimates to compute the marginal effect of the kink as $\frac{\delta \mathbb{P}r[death|cohort, age]}{\delta(cohort - c_0) \times D}$, evaluated at ages 38 to 60 and $(cohort - c_0) = 0$. We compute the corresponding standard errors using the Delta Method.

Finally, we estimate changes in the probability of death within one year by age and cause at the EPW kink using a multinomial logit competing risk model. We focus specifically on causes of death that are sensitive to the health investments that we study

[23]For completeness, we also estimate reduced form models for the outcomes which are part of the EPS-HPA linked dataset (screening of chronic diseases, medical visits, influenza vaccination, unhealthy lifestyle behaviors, and diagnosed conditions).

(the screenings and diagnoses discussed in Section 5.2). Specifically, we estimate:

$$\mathbb{P}r[death_{it} = m|cohort_i, age_{it}] = \tag{9}$$
$$\frac{exp(\gamma_{1m}age_{it} + \gamma_{2m}age_{it}^2 + \gamma_{3m}(cohort_i - c_0) + \gamma_{4m}(cohort_i - c_0) \times D_i)}{1 + \sum_{m=1}^{M} exp(\gamma_{1m}age_{it} + \gamma_{2m}age_{it}^2 + \gamma_{3m}(cohort_i - c_0) + \gamma_{4m}(cohort_i - c_0) \times D_i)},$$

where $m = 0$ identifies censored individuals and $m = 1, ..., 8$ are mutually exclusive categories for cause of death (hypertension, diabetes, ischaemic heart disease, pulmonary heart disease, other heart diseases, kidney disease, prostate disease, and other causes). As before, we compute marginal effects of the kink for each cause of death m.

5 Results

5.1 The Effect of Chile's Pension Reform on Expected Pension Wealth (and Private Savings and Consumption)

Using our linked EPS-HPA sample, Figure 2 first shows calculations of Expected Pension Wealth (EPW) at age 65 for every individual in the sample (using local polynomial smoothing (Fan and Gijbels, 2018)). There is a clear kink at the cohort threshold differentiating those fully-exposed (i.e., those reaching age 18 after the reform, and hence exposed to it for their entire working life) and those partially-exposed (i.e., those exposed only a fraction of their working life according to their age at the time of the reform), matching our rule-based simulation in Figure 1 Panel B.

Next, comparing fully- vs. partially-exposed individuals parametrically, Table 1 reports estimates of the effect of Chile's public pension reform on expected pension wealth (EPW) from Equation (6). Column (1) shows that the kink (or slope change at

the threshold) in the "four-wave" sample is USD $1,037.6 per month from the kink, a change of 0.8% relative to the sample mean. Similarly, Column (2) shows that the kink in the two-wave sample is USD $1,134.4 per month from the kink, a relative change of 0.7%.[24] These estimates are both significantly different from zero at the $p<0.01$ level, with corresponding F-statistics of 557 and 686, respectively. These results clearly suggest that younger cohorts who were fully-exposed to the reform accumulated pension wealth more rapidly than older cohorts who were only partially-exposed to it.

Another way to assess the magnitude of the kink in Table 1 is to compare the projected monthly pension at retirement for individuals belonging to the final year of partially-exposed birth cohorts under two scenarios: (1) using our actual EPW calculations, including the recognition bond, and (2) using a counterfactual scenario in which these individuals' EPW would increase in the same way that did for those fully exposed to the reform for a year. In the counterfactual scenario, EPW is adjusted by adding the value of the kink (USD $1,037.6), multiplied by twelve. Using the Chilean Superintendency of Pensions' simulator along with our EPW calculations and kink estimates, we project that the actual monthly pension benefit at retirement is $394.11, while the counterfactual amount is $466.76.[25] The projected difference in monthly pension between the

[24]In the "four-wave" sample, average EPW is $135,139, and the kink estimate is a 0.7678% change ($1,037.6 / $135,139 = 0.007678) per month from the kink. In the "two-wave" sample, average EPW is $160,320, and the kink estimate is a 0.7076% change ($1,134.4 / $160,320 = 0.00707584) per month from the kink.

[25]We express all monetary values in Unidad de Fomento (UF), an inflation-indexed unit published by the Central Bank of Chile. Because our monetary variables are presented in 2018 U.S. dollars, we use the exchange rate and UF values for that year. In 2018, the exchange rate was 640.29 Chilean pesos per U.S. dollar, and the UF was valued at 27,565.79 Chilean pesos. Our computations were performed on March 1, 2025, when the UF had increased to 38,663.05 Chilean pesos. Because the pension simulator provides projections for a minimum of two years into the future, we set the age to 63 to estimate pension benefits at the legal retirement age of 65. For males born between May 1962 and April 1963, the average balance of the mandatory contributions account at age 65 is $67,091.24 (UF 1,558.38), while the average recognition bond amount is $444.56 (UF 10.33). In the counterfactual scenario, we add the estimated twelve-month kink effect to the account balance, which corresponds to an additional $12,451.20 (UF 289.22). Our projections assume no voluntary pension savings, the Chilean government's default investment strategy,

two scenarios ($72.65) is about 21.7% of the average monthly household expenditure reported in the EPS survey for the May 1962 to April 1963 birth cohorts ($335.23).[26]

An important related question is if the increase in EPW due to the pension reform is offset by compensating reductions in private savings (and accompanying increases in consumption) (Attanasio and Rohwedder, 2003; Attanasio and Brugiavini, 2003). To test if such an effect is present at the cohort kink, we use both our linked sample and Chile's 2017 National Household Finance Survey (separately) to test for a kink in voluntary pension savings, the probability of saving in financial assets, and the probability of having other non-financial savings using Equation (5).[27] Columns (1-3) of Table 2 show that these estimates are close to zero and statistically insignificant in all cases except one. We find that the probability of having voluntary pension savings (Column (1)) decreases by 0.07 p.p. ($p<0.01$), a decline of 0.5%.[28] It is unlikely that such a small change in this probability meaningfully offsets the estimated increase in the EPW.

Finally, if the public pension reform increased future–but not current–wealth, and if individuals cannot borrow against future wealth, there should be no general change in household consumption at the cohort kink. To test this, we re-estimate Equation (5) for monthly household consumption. Column (4) of Table 2 shows that the resulting estimate is negative and insignificant, indicating no evidence of an increase in current consumption.

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and no dependents (children or spouse). The Superintendency of Pensions' simulator used for these calculations is available at: `https://www.spensiones.cl/apps/simuladorPensiones/`.

[26](466.76-394.11)/335.23=0.217

[27]For these exercises, we study birth cohorts at the annual- rather than month-level because month of birth is not provided by Chile's National Household Finance Survey.

[28]The probability of having voluntary pension savings is 13.72%. Then, the estimated relative effect is computed as (-.0007/0.1372)x100=-0.005

5.2 Expected Pension Wealth and Forward-Looking Health Investments

After establishing a sufficiently strong first-stage relationship, we next estimate how personal health investments respond to an increase in EPW. Formalizing the intuition of our predictions, Appendix A.1 shows that the sign of the effect of an increase in EPW on health investments is positive unless consumption and health are substitutes and the degree of substitution is sufficiently large to offset the additional utility from a longer life.[29]

We start by considering the use of screenings for common chronic diseases, which are a key way to promote longevity at older ages. In contrast to health investments that require changing one's daily lifestyle (such as exercising, eating more healthfully, quitting smoking, or consuming less alcohol), these health investments are generally less costly (both in time and in direct utility loss) because they typically involve a single screening, are inexpensive, and are generally covered by insurance in the Chilean health system (see Appendix A.4). Health conditions identified through screenings are then often managed with pharmaceutical interventions, which also require less behavior change than lifestyle modification (i.e., are also relatively less costly).

Table 3 shows estimates of τ from Equation (7) for key health screenings related to major chronic diseases. Columns (1-3) report estimates for hypertension, diabetes, and cholesterol screenings, which are necessary for identifying (and managing) the risk of stroke, heart attack, and metabolic syndrome. Columns (4-6) then show estimates

[29]Empirical evidence on the substitution vs. complementarity between health and consumption is limited, and mixed: Lillard and Weiss (1997) and Low and Pistaferri (2015) find evidence of substitution; Viscusi and Evans (1990), Finkelstein et al. (2013), and Blundell et al. (2020) find evidence of complementarity; and Evans and Viscusi (1991) and De Nardi et al. (2010) find no significant evidence of either. Complementarity between consumption and health will reinforce the incentive to increase health investments.

for prostate cancer screening, doctor office visits, and influenza vaccination. We also construct an aggregate health investment index, following Anderson (2008). In general, these results show that use of screening for chronic diseases increases significantly with greater EPW. Specifically, a USD $1,000 increase in EPW (equivalent to approximately a 1% increase in the EPW) significantly increases the probability of screening for hypertension, diabetes, cholesterol, and prostate cancer by 0.06 percentage points (pp.), 0.04 pp., 0.04 pp., and 0.06 pp., respectively, representing increases of about 0.200%, 0.137%, 0.123%, and 0.396% relative to the mean of each outcome.[30] Additionally, the probability of visiting a doctor office in the preceding two years increases by 0.1 pp (0.226%), and the probability of receiving an influenza vaccination in the preceding two years increases by 0.12 pp (0.554%).[31]

We also consider unhealthy lifestyle behaviors, which are generally more costly for an individual to change. Table 4 shows estimates for smoking, drinking, and exercise/physical activity. We find that a USD $1,000 increase in EPW reduces the probability of smoking by 0.05 p.p. (0.13%) and the number of cigarettes smoked per month by 0.1433 units (0.2%).[32] We also find increases the probability of exercise at least once a week by 0.06 pp (0.086%), but no significant change in alcohol consumption.[33] In general, these results show that more costly individual health investments also increased in response to greater EPW, but to a lesser extent.

The above IV estimates are consistent with Figure 3, and Appendix Figures A.7, A.8, which show reduced form graphs of these outcomes across the cohort kink. Appendix Tables A.4 and A.5 also report corresponding reduced-form estimates for in-

[30](0.0006/0.299)x100=0.200, (0.0004/0.2918)x100=0.137, (0.0004/0.3251)x100=0.123, and (0.0006/0.1514)x100=0.396, respectively

[31](0.001/0.4428)x100=0.226 and (0.0012/0.2168)x100=0.554, respectively

[32](-0.0005/0.3825)x100=-0.131 and (-0.1433/71.2213)x100=-0.201, respectively.

[33](-0.0006/0.6962)x100=-0.086.

dexes and individual health outcomes (obtained using Equation (5)).

5.3 Expected Pension Wealth and Health Outcomes

The increases in long-term health investments that we find (preventive screening as well as other healthy lifestyle behaviors) are capable of increasing longevity at older ages through better detection of underlying chronic diseases - a prerequisite for subsequent therapeutic management. We therefore also test directly for changes in chronic disease diagnoses. Table 5 reports estimates for disease diagnoses from Equation (7) for chronic diseases corresponding to the health investments that we study (hypertension, diabetes, heart disease, and kidney failure as well as the summary index).[34] For a USD $ 1,000 increase in EPW, diagnosis (or detection) rates rise significantly for hypertension by 0.05 pp (a relative increase of 0.43%), for diabetes by 0.02 pp (an increase of 0.43%), and for heart disease by 0.02 pp (an increase of 0.7%).[35]

If increases in preventive screening lead to higher detection rates of chronic diseases, and their subclinical precursors, they could presumably also lead to lower prevalence rates of chronic diseases. Estimating changes in chronic disease prevalence at the cohort kink is also important to rule out the possibility of an increases in chronic disease prevalence, which could provide an alternative explanation for the increases in diagnosis rates shown in Table 5. To test for a kink in underlying disease prevalence, we use data from Chile's National Health Survey. Because we cannot compute EPW in this dataset, we use reduced form models to estimate the parameter β_1^h in Equation (5) using biomarker measures of disease prevalence as the dependent variable. Despite smaller sample sizes, Appendix Tables A.9 and A.10 show suggestive evidence that in

[34] Appendix Figure A.9 and Table A.6 shows congruent reduced-form results.

[35] (0.0005/0.1171)x100=0.43, (0.0002/0.0467)x100=0.43, and (0.0002/0.029)x100=0.7, respectively.

some cases, the slope of chronic disease prevalence declines at c_0, suggesting reductions in chronic diseases (and no evidence of an increase).

Finally, we investigate if the changes in health investments that we find ultimately lead to reductions in mortality (and hence increases in longevity). Specifically, we test for a cohort kink in all-cause and cause-specific mortality related to chronic diseases (ischaemic heart disease, pulmonary heart disease, hypertension, diabetes, kidney failure, and prostate cancer) using Chile's vital statistics and population census data. Focusing first on total mortality, Figure 4 shows the age profile of the marginal effect of full (vs. partial) exposure to the pension reform using the discrete-time survival model described in Section 4.2 (Jenkins, 1995). Full (relative to partial) exposure to the reform reduces mortality risk, and increasingly so at older ages (more than three times more at age 60 than 38), although estimates at older ages also become less precise.[36] The average marginal effect of full (vs. partial) exposure on the probability of death across all ages is -.00031 (p-value=0.042). Given that the unconditional probability of death is 0.048, the decrease corresponds to a 0.65% decrease in mortality risk at the kink.[37]

Figure 5 then reports analogous results for cause-specific mortality. In general, it shows that cause-specific mortality sensitive to the individual health investments that we study in this paper follows a pattern similar to all-cause mortality, declining among fully- (vs. partially-) exposed cohorts, and increasingly so at older ages.[38] The disease for which the marginal effect is largest is ischemic heart disease, with an estimate of -.000049 (p-value=0.074), a 11.4% reduction of in the probability of dying at the kink.[39].

[36]Appendix Table A.11 reports analogous logit model estimates.

[37](0.00031/0.048)x100=0.65

[38]Corresponding multinomial logit estimates are reported in Appendix Table A.12.

[39]The unconditional probability of dying due to ischemic heart disease is equal to 0.00043. Then, the relative effect is obtained as (-.000049/0.00043)x100=0.114

6 Identifying Assumptions and Robustness

6.1 Assessment of Identifying Assumptions

Our empirical framework assumes no manipulation of the running variable (in our case, month of birth). Our birth date data are those contained in the Chilean government's administrative records, which are generally very accurate and reliable [SUPPORTING CITATION]. Nonetheless, we also investigate the possibility of manipulation using an empirical test for a break or kink in sample density at the pension reform cohort threshold, and we assess balance at the threshold by testing for the presence of a kink in household characteristics which could not plausibly respond to the pension reform (because they reflect choices made earlier in time).

First, to test for a slope change in density of individuals across the May 1963 cohort threshold, we regress the frequency of observations in each birth month on a birth cohort polynomial (allowing the polynomial order to range up to 8 and using Akaike's information criteria to select the polynomial order with the best goodness-of-fit (Card et al. 2012)).[40] Figure A.5 shows the number of observations in each month of birth along with the resulting fitted distribution. The bottom of the figure reports the test statistic of a discontinuity test performed on the fraction of observations at the kink cohort and corresponding standard errors. The resulting p-value is 0.66, suggesting little evidence of a slope change.

Second, we use individual socio-demographic characteristics determined before the reform to test for balance in observable characteristics across the kink. To do so, we estimate Equation (5) by OLS, using dichotomous indicators for place of birth (born in the metropolitan region of Santiago), educational attainment (completion of secondary

[40] For this exercise, we use bins of 3 birth months.

school), and risk aversion as dependent variables.[41] Table 6 shows that the resulting estimates of β_1^h from Equation (5) for these individual attributes are both small and precise. Figure A.6 also shows these results graphically, depicting smooth profiles of these variables across the May 1963 cohort threshold.

Finally, following the permutation test approach of Card et al. (2017), we also estimate reduced form equations at placebo cutoffs to test if observed slope changes clearly occur precisely at the specified kink point (rather than reflecting non-linearities apart from the kink). Specifically, we randomly draw 200 placebo (false) cutoffs between May 1948 and September 1951, and also between November 1975 and November 1980. Appendix Figures A.10, A.11, and A.12 show histograms of the distributions of these placebo estimates and their corresponding t-statistics for all health outcomes.[42] Importantly, these placebo estimates and t-statistics are distant from those obtained using the true kink point.

6.2 Robustness

To explore the sensitivity of our results to alternative functional forms of the running variable, we re-estimate models using second order polynomials of the running variable following Gelman and Imbens (2019) and report Bayesian Information Criteria (BIC) values.[43] Appendix Tables A.13, A.14, and A.15 show evidence of a kink in the EPW slope of at the May 1963 cohort, no evidence of a kink in the slope of household con-

[41]The measure of risk aversion is based on questions from Module J of the EPS 2004, 2006, and 2009 waves. The exact wording of these questions can be found in the available questionnaires at `https://previsionsocial.gob.cl/datos-estadisticos/descargar-bases-de-datos-eps/`.

[42]For this analysis, we use two groups: individuals born between January 1943 and September 1956, who were partially exposed to the DC system, and individuals born between January 1970 and December 1990, all of whom were fully exposed to the DC system.

[43]In the Appendix Section A.3 we present the empirical models used to compute estimates controlling for a second-order polynomial in the cohort.

sumption or savings, and no evidence of a kink in the slope of socio-demographic outcomes determined prior to the reform (respectively). Appendix Tables A.16 and A.17; A.18, and A.19 then present estimates of the effect of EPW on health investments, unhealthy related behaviors, and diagnoses of chronic conditions. In general, these results are qualitatively similar to those using a first order polynomial (but with somewhat less precision). BIC values for specifications with first-order polynomials are slightly lower than those for specifications with second-order polynomials, implying that the former are preferable.

Additionally, Figures A.13, A.14, and A.15 also show re-estimating results using alternative bandwidths (although these alternative bandwidths reduce sample sizes by up to 80% of the main sample size).[44] The resulting point estimates are generally consistent with those from the full sample, although some outcomes exhibit lower precision.

7 Conclusion

In this paper, we provide new empirical evidence that among working-age adults, individuals' current health investments respond to changes in expected future retirement wealth. Specifically, we find that a 1% increase in expected pension wealth leads to greater use of key preventive screening services (between 0.1% and 0.4%, depending on the specific screening), services that are central in the diagnosis and subsequent management of prevalent chronic diseases (cardiovascular disease, hypertension, and diabetes) which influence longevity. Studying the relationship with subsequent longevity directly, we also find that these additional health investments lead to higher rates of chronic disease diagnosis (reflecting higher rates of disease detection, not disease prevalence) – and

[44]In all cases, the bandwidths are non-symmetric and chosen to reflect the asymmetry of the main sample by removing an equal number of observations from each side of the threshold.

ultimately reduce age-specific mortality due to the same chronic conditions. Because our results should be interpreted as Local Average Treatment Effects, mostly driven by those born around the kink cohort whom we observe at ages 40-50, these findings imply forward-looking health investments over a horizon of 15-25 years (relative to a retirement age of 65).

Our results can be rationalized by a framework in which forward-looking individuals anticipate greater resources later in life, giving them stronger incentives for longevity, and therefore choose to investment more in their health. If health and consumption are complements (and hence the marginal utility of consumption increases with health), these effects will be amplified, and if health and consumption are sufficiently strong substitutes, these effects could be fully offset (reducing health investments). The fact that we do not find reductions in health investments suggests that if there is any degree of substitution, it is not very large.

More generally, our paper provides new evidence that an important way in which economic circumstances can influence health is through the incentives they create for health investments. Consistent with canonical models of human capital accumulation by forward-looking individuals (Becker 1964, Becker 1967, Grossman 1972b, Grossman 1972a), these findings contribute to a broader understanding of the benefits of economic development through private individual investments in health (Pritchett and Summers 1996; Deaton 2003; Deaton 2024). In particular, they imply that the full return to growth and development may be undervalued, all else equal, if individuals' forward-looking health behavior is not taken into account.

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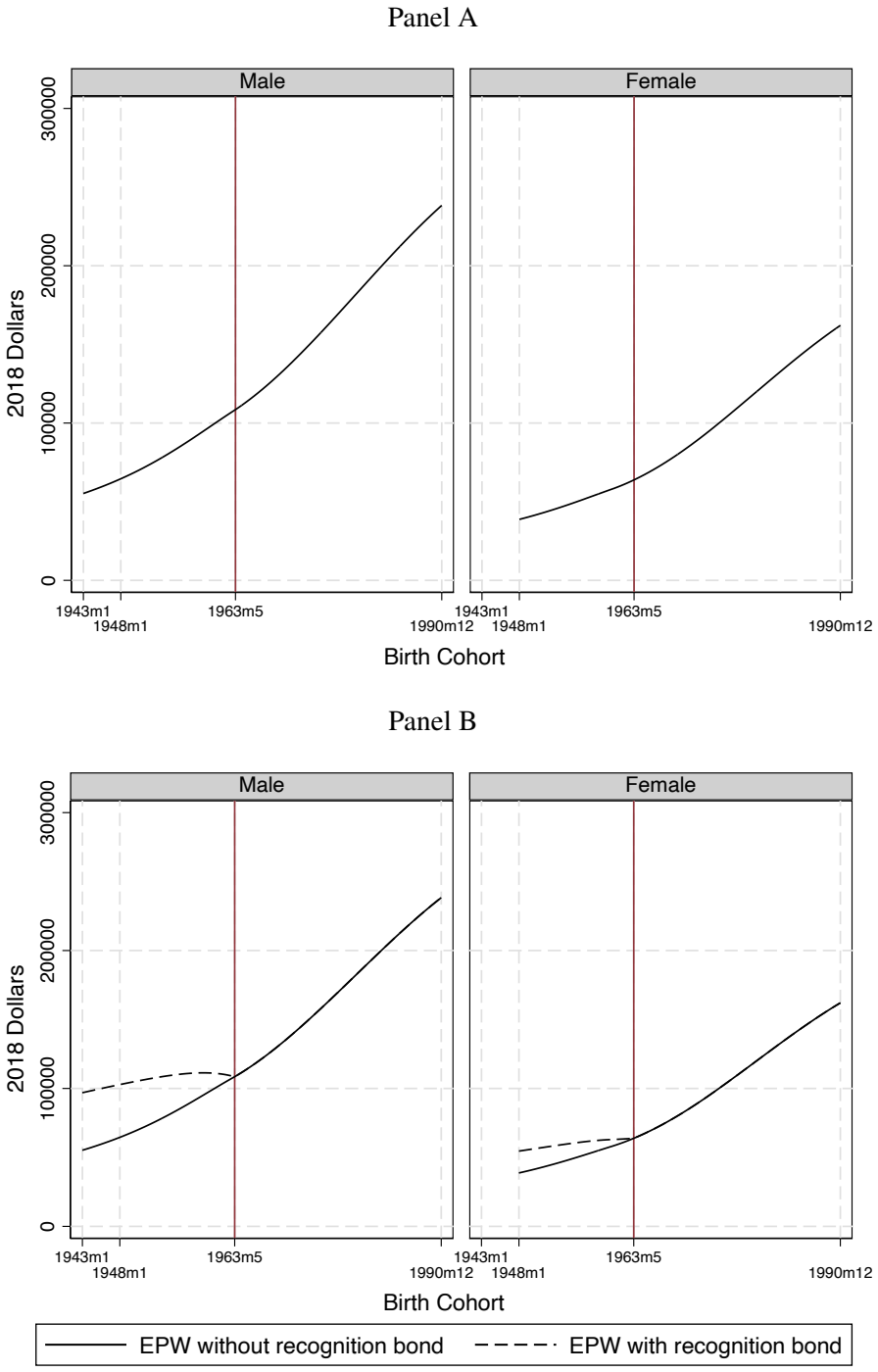
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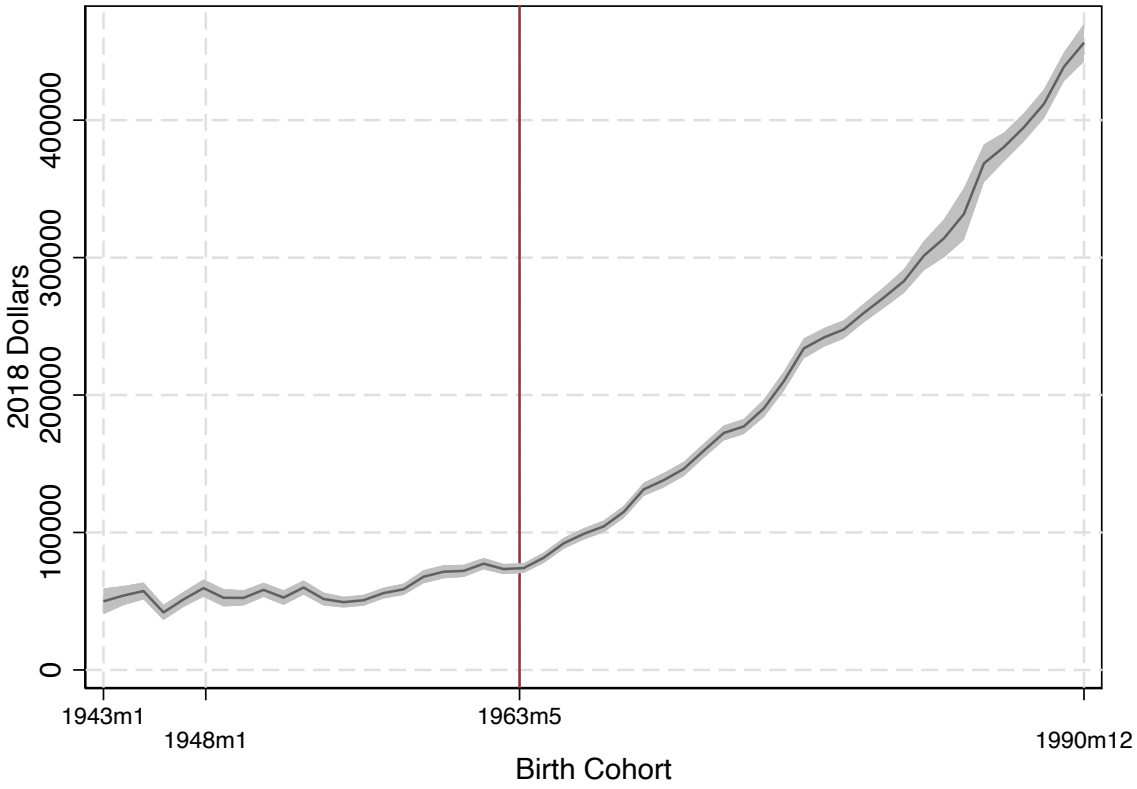
Figures

Figure 1: Simulated Expected Pension Wealth and Recognition Bond by Month of Birth.



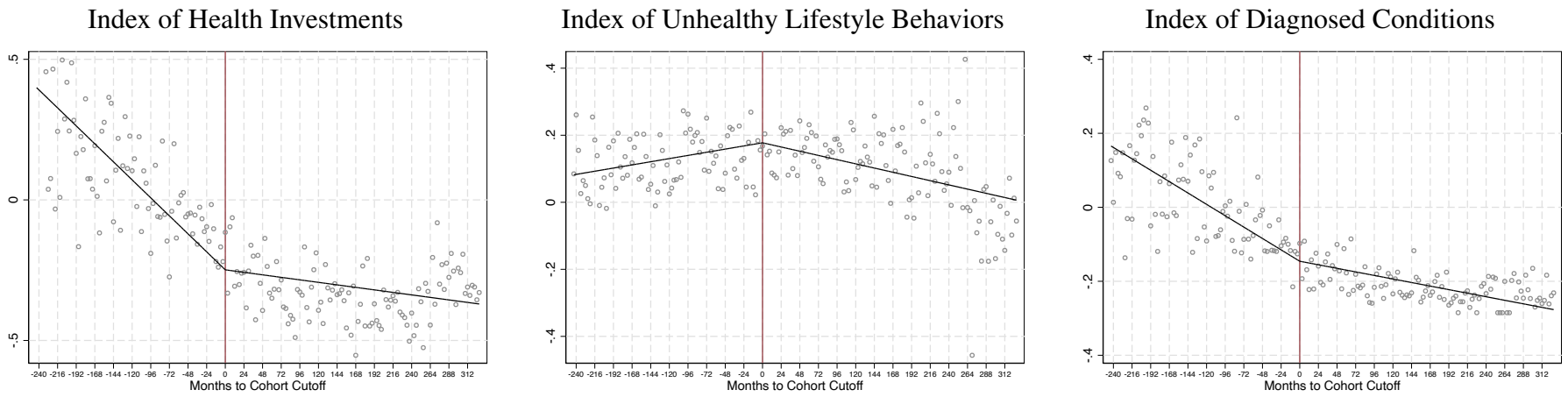
NOTE: Simulated Expected Pension Wealth (EPW) calculated from Equation (1), using contributions by cohort and age, and a rate of return to pension savings of 4%, both with and without the recognition bond (calculated using Equation (2)). The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. EPW values are CPI adjusted to December 2018 dollars.

Figure 2: Expected Pension Wealth among Chilean Men.



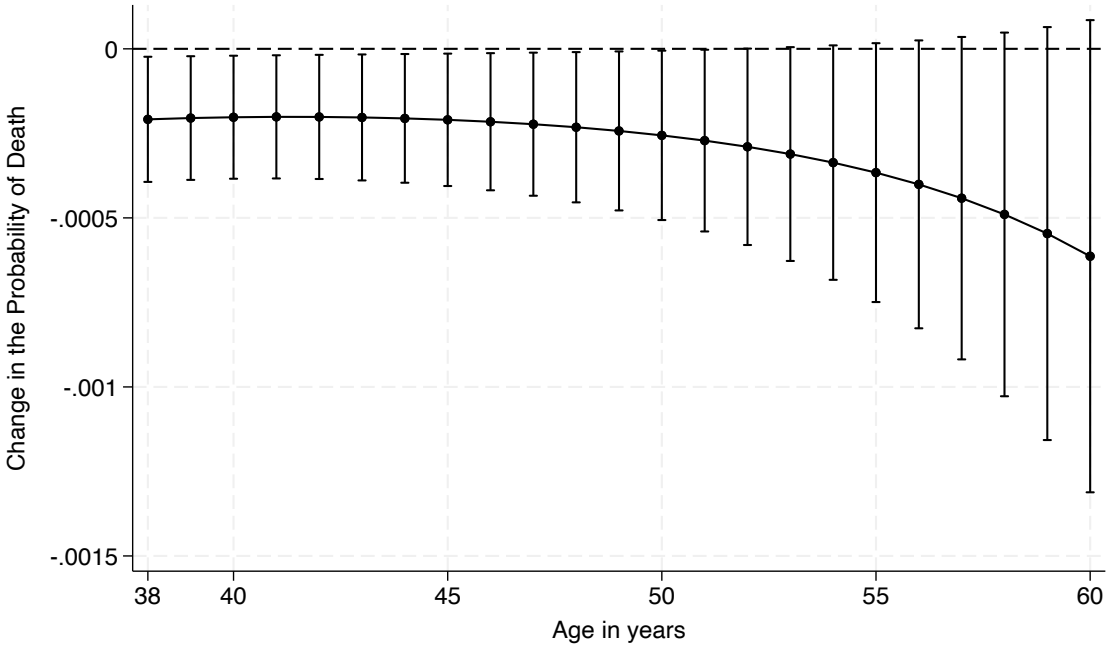
NOTE: Expected Pension Wealth (EPW) and 95% confidence interval (shaded) among Chilean men, with local polynomial smoothing (Fan and Gijbels 2018). For men reaching legal retirement age before December 2017, we observe actual EPW at the time of retirement. For those retiring after December 2017 (born before December 1952), we predict pension contributions from January 2018 until the month that an individual reaches the minimum legal retirement age (as well as the return to fund-specific investments) using Equation (18). The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. EPW values are CPI adjusted to December 2018 dollars.

Figure 3: Average Index of Health Investments, Unhealthy Lifestyle Behaviors, and Diagnosed Conditions, across Birth Cohort.



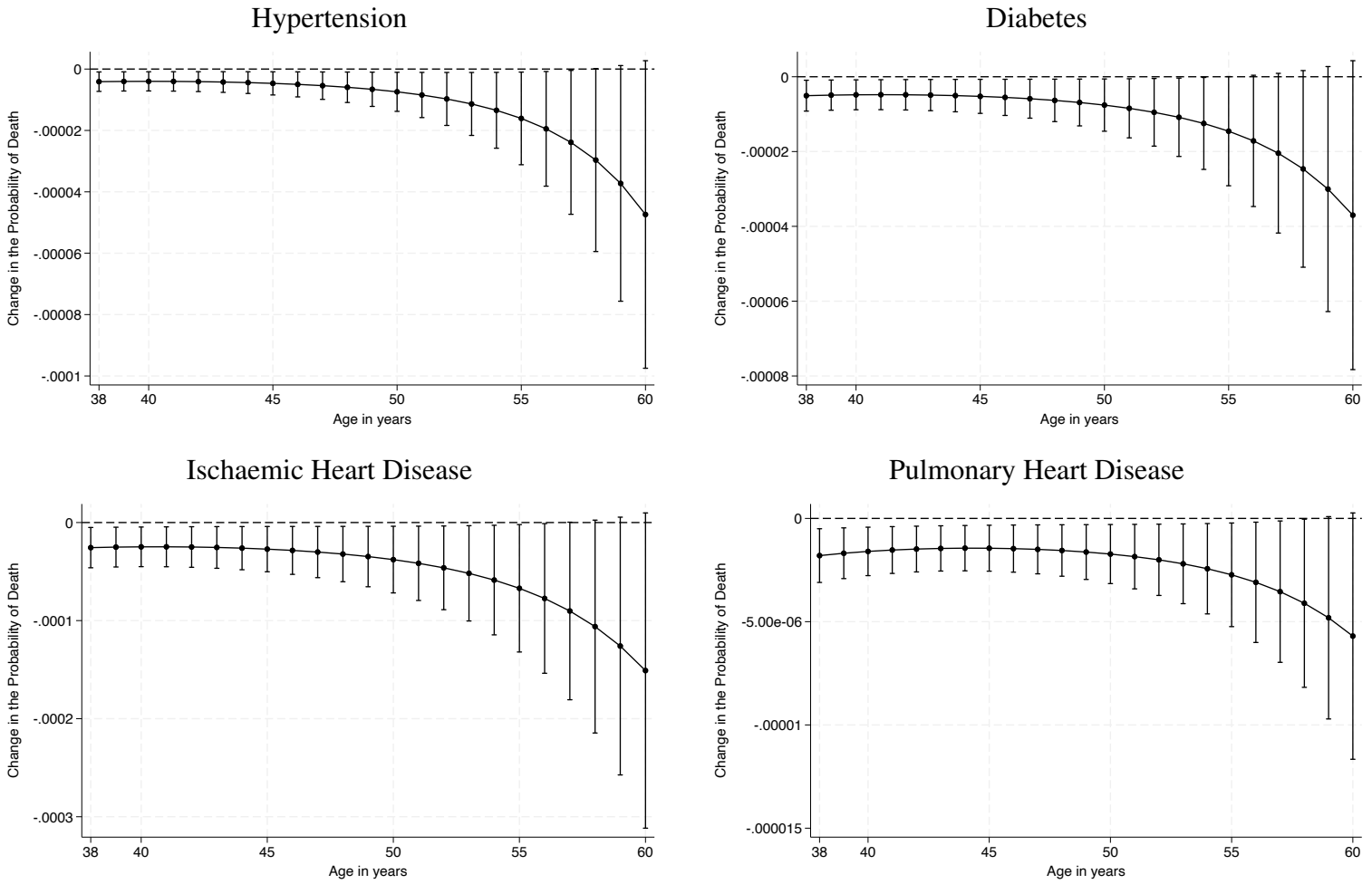
NOTE: Dots corresponds to scatter plots of the average of each Index across birth cohorts. Black lines are predicted values of each Index for each birth cohort, obtained using OLS and Equation (5). The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform.

Figure 4: Marginal Effect of the Expected Pension Wealth Kink on the Probability of Death by Age.



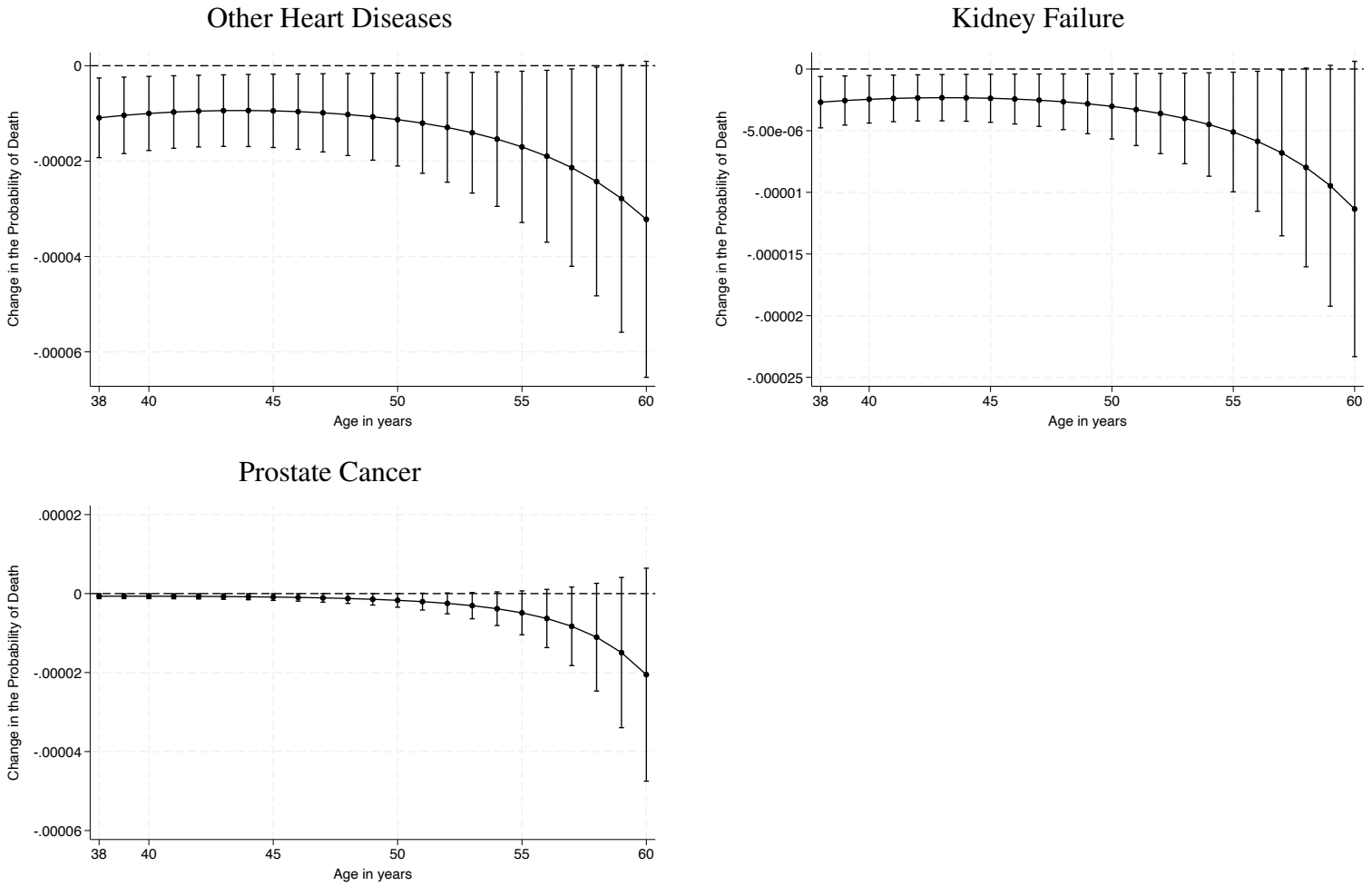
NOTE: Marginal effect of the Expected Pension Wealth (EPW) kink of the probability of death, by age, computed using logit estimates from the discrete survival model shown in Equation (8). 90% confidence intervals are constructed using the Delta Method.

Figure 5: Marginal Effect of the Expected Pension Wealth Kink on the Probability of Death, by Cause of Death and Age.



NOTE: Marginal effect of the Expected Pension Wealth (EPW) kink of the probability of death, by age, computed using logit estimates from the discrete survival model shown in Equation (9). 90% confidence intervals are constructed using the Delta Method.

Figure 5: (*cont.*) Marginal Effect of the Expected Pension Wealth Kink on the Probability of Death, by Cause of Death and Age.



NOTE: Marginal effect of the Expected Pension Wealth (EPW) kink of the probability of death, by age, computed using logit estimates from the discrete survival model shown in Equation (9). 90% confidence intervals are constructed using the Delta Method.

Tables

Table 1: Chile's Pension Reform and the Birth Cohort Kink in Expected Pension Wealth.

	Four-Waves Sample	Two-Waves Sample
	(1)	(2)
Cohorts Relative to Kink $(cohort - c_0)$	16.9	-29.4
	(15.4)	(18.2)
Slope Change at Kink $((cohort - c_0) \times D)$	1037.6***	1134.4***
	(23.6)	(26.2)
Observations	18836	8685
Mean	135193	160320

NOTE: OLS estimates of α_1^{EPW} (cohort relative to the kink) and β_1^{EPW} (slope change at the kink), conditional on a first-order birth cohort polynomial and linear time trends, shown from Equation (6). The "four-waves" sample includes observations from EPS waves conducted in 2004, 2006, 2009 and 2015. The "two-waves" sample includes observations from EPS waves conducted in 2009 and 2015 (see Section 3 for a description of the difference between both samples). EPW is CPI adjusted to December 2018 dollars. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Chile's Pension Reform and Voluntary Pension Savings, Other Financial and Non-Financial Savings, and Household Consumption.

	Has Voluntary Pension Savings	Household Has Financial Assets	Household Has Non-Financial Savings	Monthly Household Expenditure
	(1)	(2)	(3)	(4)
Cohorts Relative to Kink $(cohort - c_0)$	0.0002**	0.0011	0.0055***	19.7861
	(0.00009)	(0.0022)	(0.0016)	(19.8723)
Slope Change at Kink $((cohort - c_0) \times D)$	-.0007***	0.0024	-.0046	-42.7917
	(0.0001)	(0.0037)	(0.003)	(42.8708)
Observations	8737	2279	2279	18560
Mean	0.1372	0.4208	0.1768	1326

NOTE: OLS estimates of α_1^{EPW} (cohort relative to the kink) and β_1^{EPW} (slope change at the kink), conditional on a first-order birth cohort polynomial and linear time trends, shown from Equation (5). Outcomes in Columns (1), (2), and (3) are binary variables, and are estimated using linear models. Household expenditure (Column (4)) is CPI adjusted to December 2018 dollars. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Fuzzy Regression Kink Estimates of the Effect of Expected Pension Wealth on Health Investments

	Screenings				Visited	Influenza	Index
	Hypertension	Diabetes	Cholesterol	Prostate	Doctor's Office	Vaccination	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EPW	0.0006***	0.0004***	0.0004***	0.0006***	0.001***	0.0012***	0.0016***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Romano-Wolf p-value	0.001	0.002	0.001	0.001	0.001	0.001	
95% Robust confidence set	[.0003,.0008]	[.0001,.0006]	[.0002,.0007]	[.0004,.0008]	[.0007,.0013]	[.001,.0014]	[.0013,.002]
AR test p-value	3.00e-06	0.0023	0.0004	1.83e-07	1.13e-10	3.68e-25	1.40e-18
F-stat	1861.6470	1862.3720	1868.5290	1853.9960	892.4926	1869.1120	1828.9320
Observations	8679	8683	8690	8572	14871	8685	8504
Mean	0.299	0.2918	0.3251	0.1514	0.4428	0.2168	

NOTE: 2SLS estimates of the effect of Expected Pension Wealth (EPW) on health investments. "EPW" is the estimate of τ in Equation (7). EPW is measured in thousands of dollars and is CPI adjusted to December 2018 dollars. Outcomes in columns (1) through (6) are binary variables and are estimated using linear models. The Index is computed following Anderson (2008) and is standardized. All regressions include a first-order cohort polynomial centered at the kink $(cohort - c_0)$ and linear time trends. Standard errors are clustered at the individual level and reported in parenthesis.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Romano-Wolf p-values are step-down adjusted p-values robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b), implemented using the Stata command rwolf2 by Clarke et al. (2020). 95% confidence set and the AR test p-value are robust to the inclusion of weak instruments, are based on the minimum distance version of the Anderson-Rubin test statistics, and are implemented using the Stata command rivtest by Finlay (2009). F-statistic shown for the instrument in the first stage.

Table 4: Fuzzy Regression Kink Estimates of the Effect of Expected Pension Wealth on Unhealthy Lifestyle Behaviors.

	Smokes Tobacco	Number of Cigarettes per month	Drinks Alcohol	Frequency of Alcohol Consumption per Week	Physically Inactive	Index
	(1)	(2)	(3)	(4)	(5)	(6)
EPW	-.0005***	-.1433***	0.00007	0.0006	-.0006***	-.0007***
	(0.0001)	(0.0405)	(0.0001)	(0.0005)	(0.0001)	(0.0001)
Romano-Wolf p-value	0.001	0.001	0.5834	0.3187	0.001	
95% Robust confidence set	[-.0008,-.0003]	[-.2219,-.0678]	[-.0002,.0003]	[-.0003,.0016]	[-.0008,-.0004]	[-.001,-.0005]
AR test p-value	0.00006	0.0003	0.5627	0.1768	7.73e-10	6.26e-07
F-stat	1929.4740	1926.1980	1935.8670	1943.0630	1934.8360	1905.8550
Observations	18781	18746	18780	18547	18681	18182
Mean	0.3825	71.2213	0.5879	1.3480	0.6962	

NOTE: 2SLS estimates of the effect of Expected Pension Wealth (EPW) on health investments. "EPW" is the estimate of τ in Equation (7). EPW is measured in thousands of dollars and is CPI adjusted to December 2018 dollars. Outcomes in columns (1), (3), and (5) are binary variables and are estimated using linear models. The Index is computed following Anderson (2008) and is standardized. All regressions include a first-order cohort polynomial centered at the kink $(cohort - c_0)$ and linear temporal trends. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Romano-Wolf p-values are step-down adjusted p-values robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b), implemented using the Stata command rwolf2 by Clarke et al. (2020). 95% confidence set and the AR test p-value are robust to the inclusion of weak instruments, are based on the minimum distance version of the Anderson-Rubin test statistics, and are implemented using the Stata command rivtest by Finlay (2009). F-statistic shown for the instrument in the first stage.

Table 5: Fuzzy Regression Kink Estimates of the Effect of Expected Pension Wealth on Diagnosed Conditions.

	Hypertension	Diabetes	Heart Disease	Kidney Failure	Index
	(1)	(2)	(3)	(4)	(5)
EPW	0.0005***	0.0002***	0.0002***	-.00003	0.0006***
	(0.00009)	(0.00006)	(0.00004)	(0.00003)	(0.0001)
Romano-Wolf p-value	0.001	0.005	0.001	0.2248	
95% Robust confidence set	[.0003,.0007]	[.0001,.0003]	[.0002,.0003]	[-.0001,0]	[.0004,.0008]
AR test p-value	4.93e-09	0.0018	2.17e-08	0.2306	1.68e-07
F-stat	1934.6070	1930.8610	1944.3370	1931.8560	1903.8680
Observations	18798	18793	18801	18782	18541
Mean	0.1171	0.0467	0.029	0.0178	

NOTE: 2SLS estimates of the effect of Expected Pension Wealth (EPW) on health investments. "EPW" is the estimate of τ in Equation (7). EPW is measured in thousands of dollars and is CPI adjusted to December 2018 dollars. Outcomes in columns (1) through (4) are binary variables and are estimated using linear models. The Index is computed following Anderson (2008) and is standardized. All regressions include a first-order cohort polynomial centered at the kink $(cohort - c_0)$ and linear temporal trends. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Romano-Wolf p-values are step-down adjusted p-values robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b), implemented using the Stata command rwolf2 by Clarke et al. (2020). 95% confidence set and the AR test p-value are robust to the inclusion of weak instruments, are based on the minimum distance version of the Anderson-Rubin test statistics, and are implemented using the Stata command rivtest by Finlay (2009). F-statistic shown for the instrument in the first stage.

Table 6: Test for a Birth Cohort Kink in Predetermined Individual Characteristics.

	Born in Chile's Metropolitan Area	High School Completed	Highest Level of Risk Aversion
	(1)	(2)	(3)
Cohorts Relative to Kink $(cohort - c_0)$	0.0003***	0.0008***	-.0003***
	(0.0001)	(0.0001)	(0.00007)
Slope Change at Kink $((cohort - c_0) \times D)$	-.00008	3.86e-08	-.00004
	(0.0001)	(0.0001)	(0.0001)
Observations	18758	18836	14216
Mean	0.309	0.5714	0.6335

NOTE: OLS estimates of α_1^h (cohort relative to the kink) and β_1^h (slope change at the kink), conditional on a first-order birth cohort polynomial and linear time trends, shown from Equation (5). The sample includes observations from the EPS waves conducted in 2004, 2006, 2009 and 2015. All outcomes are binary variables and are estimated using linear models. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Appendix

A.1 Conceptual Framework

We outline a simple two-period model to understand the role that the complementarity/substitution between health and consumption plays when deriving predictions on how expected pension wealth affects health investments. We assume that in period 1, an individual is endowed with $\bar{T}$ time units, that he/she splits between working time, W, leisure time, L, and time dedicated to invest in health, I. The first period utility function, $F(C_1, L)$, depends on period 1 consumption, C_1, and leisure, L. In the second period, the individual maximizes $S(C_2, H)$, which depends on period 2 consumption C_2 and health, H, which has been produced using the period 1 health investment, I. The level of health, H, also enters in the probability of survival between period 1 and 2, $p(H)$. The individual chooses C_1, C_2, L, I, and hence, H, in order to solve the following maximization problem:

$$\underset{C_1,C_2,I,L}{\text{Max}} \quad \big\| F(C_1, L) + \beta p(H) S(C_2, H) \big\| \tag{10a}$$

$$\text{subject to} \quad C_1 = w(\bar{T} - L - I), \tag{10b}$$

$$H = f(I), \tag{10c}$$

$$m = C_2, \tag{10d}$$

where β refers to the discount factor, w is the wage rate and m is the pension wealth. We model the pension wealth as exogenous because the pension contributions are compulsory and voluntary contributions are very small in the setting that we study.

After substituting (10b), (10c), and (10d) on (10a), the first order conditions are:

$$U_L : -wF_{C_1} + F_L = 0, \tag{11a}$$

$$U_I : -wF_{C_1} + \beta p' f' S(m, f(I)) + \beta p(f(I)) S_H = 0. \tag{11b}$$

The second derivatives of the utility function are:

$$U_{LL} = w^2 F_{C_1 C_1} - 2wF_{C_1 L} + F_{LL}, \tag{12a}$$

$$U_{II} = w^2 F_{C_1 C_1} + \beta p'' f' S + \beta p' f'' S + \beta p' S_H (f')^2 + \beta p' f' S_H + \beta p S_{HH} f', \tag{12b}$$

$$U_{Im} = \beta p' f' S_{C2} + \beta p S_{HC_2}, \tag{12c}$$

$$U_{IL} = w^2 F_{C1C1} - wF_{C1L}, \tag{12d}$$

$$U_{Lm} = 0. \tag{12e}$$

Rewriting the first order conditions, (11a) and (11b) as:

$$U_L(L(m), I(m), m) = 0, \tag{13a}$$

$$U_I(L(m), I(m), m) = 0, \tag{13b}$$

and differentiating both equations with respect to m, we obtain:

$$U_{LL}\frac{dL}{dm} + U_{LI}\frac{dI}{dm} = -U_{Lm} \tag{14a}$$

$$U_{IL}\frac{dL}{dm} + U_{II}\frac{dI}{dm} = -U_{Im} \tag{14b}$$

Applying Cramer's Rule, the comparative statics are:

$$\frac{dI}{dm} = \frac{-U_{LL}U_{Im} + U_{IL}U_{Lm}}{U_{LL}U_{II} - U_{IL}^2} \tag{15a}$$

$$\frac{dL}{dm} = \frac{-U_{II}U_{Lm} + U_{IL}U_{Im}}{U_{LL}U_{II} - U_{IL}^2} \tag{15b}$$

Substituting 12a, 12c, 12d, 12e into 15a, we find how health investments in the first period, I change with the pension wealth, m:

$$\frac{dI}{dm} = \frac{-U_{LL}(\beta p' f' S_{C_2} + \beta p S_{HC_2})}{U_{LL}U_{II} - U_{IL}^2}, \tag{16a}$$

where the denominator and $-U_{LL}$ are positive due to the second order conditions. The term $\beta p' f' S_{C_2}$ is also positive and can be interpreted as how much utility increases due to the increase in longevity associated to the increase in higher health investment. However, the sign of $\beta p S_{HC_2}$ is ambiguous and given by the sign of S_{HC_2}. If health and consumption are complements, $S_{HC_2} > 0$, then all the terms are positive and it is clear that $\frac{dI}{dm} > 0$. Intuitively, the individual invests more in health because this increases the marginal utility of consumption, and consumption in period 2 increases due to the increase in pension wealth. However, if health and consumption are substitutes, $S_{HC_2} < 0$, the effect will be the contrary. Note that if $\beta p S_{HC_2}$ is negative but sufficiently close to zero, it might not offset the positive longevity effect of $\beta p' f' S_{C_2}$ and $\frac{dI}{dm}$ still be positive. Otherwise, if $\beta p S_{HC_2}$ was negative and sufficiently large in absolute value, then $\frac{dI}{dm}$ would be negative.

A.2 Calculation of Individual-Level Expected Pension Wealth

For individuals reaching legal retirement age before December 2017, we observe actual EPW at the time of retirement. For those retiring after December 2017, we use their actual account balance as of December 2017, and predict the stream of pension contributions from January 2018 until the month that an individual reaches minimum legal retirement age, as well as the return to fund-specific investments. Specifically, we compute EPW for these individuals i as:

$$\begin{aligned} EPW_i &= acc_bal_{i,Dec-2017} \times f1_i(rm, n_i, n1_i, n2_i) + \sum_{s=1}^{S} \widehat{cont_am}_{i,s} \times f2_i(rm, n_i, n1_i, n2_i) \\ &\quad + \mathbb{1}[i \epsilon DB] \times rbond_i \times (1+rr)^{nr_i}, \end{aligned} \tag{17}$$

where $acc_bal_{i,Dec-2017}$ is the observed value of the individual's pension savings accumulated by December 2017; $f1_i$ and $f2_i$ are functions used to compound the returns on the value of past and future pension contributions, respectively, up to the month of minimum legal retirement age (this functions are further explained below); rm is a set that includes the r_j, for $j = A, B, C, D, E$, the real monthly average pension fund type j's rate of return computed using the observed rates from October 2002 until December 2018; n_i is the number of months from January 2018 until the month-year the individual has the legal right to claim pension benefits; $n1_i$ is the number of months from January 2018 until the month at which the individual turns either 56 (males) or 51 (females), and $n2_i$ is the number of months from January 2018 until the month at which the individual turns 36; $\widehat{cont_am}_{is}$ is the predicted individual's real pension contribution in month s; s indexes working months (from s = 1 in January 2018 through s = S in the month that the individual reaches minimum legal retirement age); $rbond_i$ is the observed value of the

recognition bond (0, except for individuals that participated in the DB system); rr is the real monthly rate of return to the recognition bond;[45] and nr_i is the number of months between when an individual exits the DB system and reaches minimum legal retirement age.

To predict monthly pension contributions made between January 2018 and minimum legal retirement age (or calculate $\widehat{cont_am}_{is}$), we stratify by level of education and estimate:[46]

$$\begin{aligned} cont_am_{is} &= \alpha + \sum_{j=1}^{3} \beta_j age_{is}^j + \sum_{j=1}^{3} \gamma_j cohort_i^j + \delta(age_{is} \times cohort_i) \\ &\quad + \zeta female_i + \lambda' X_i^{meduc} + \pi' X_i^{region} + u_{is}, \end{aligned} \tag{18}$$

where age_{is} is the age in months of individual i at month s; $cohort$ is the individual i birth cohort in months; $female$ is a dummy variable that takes value 1 if the individual is female; $X^{meduc} = (elem, hs, ungrad)$ is a vector of dummy variables for an individual's mother's educational attainment ($elem$ takes value 1 if the mother completed elementary education, hs takes value 1 if the mother completed high school, and $ungrad$ takes value 1 if the mother completed undergraduate studies; the omitted category is $elem_inc$ that takes value 1 if the mother did not complete elementary education); and X^{region} is a vector of dummy variables for an individual's region of birth.

Before we provide the details for the functions $f1_i$ and $f2_i$ used to compute the EPW, we explain two features of the pension fund's rate of return, namely the multi-fund scheme and the default fund assignment. The precise pension savings investments

[45] The annual rate of return to the recognition bond was set by law at 4%. The corresponding monthly rate of return is equal to 0.327%.

[46] We tested several alternative specifications to predict monthly contributions and selected the one with the highest goodness of fit using Bayesian and Akaike information criteria (Schwarz 1978; Akaike 1974)

made by PFAs are standardized, regulated, and monitored by the Superintendencia de Pensiones. Since 2002, this regulatory agency created a multi-fund DC scheme that allow beneficiaries to choose asset allocations across five different investment categories, varying in their degree of risk and expected return. Each PFA is required to offer all five types of fund types (A-E): fund type A is the highest risk/highest expected return, and fund type E is the lowest risk/lowest expected return. Figure A.16 summarizes historical returns by fund type from 2002 to 2018.

In general, Figure A.16 shows higher average returns and greater volatility in the riskier funds, and the drop in returns during the 2008 subprime crisis. In the computation of the EPW we use the average monthly returns excluding the 2008 subprime crisis period (between November 2007 and October 2008) that are equal to 0.87%, 0.69%, 0.71%, 0.44%, and 0.40%, for fund types A to E, respectively.[47]

Chilean government regulates beneficiary choices of fund type in several ways. One restricts the amount of risk taken by those close to retirement. Within ten years of the legal retirement age, beneficiaries are unable to choose the riskiest fund category (fund A). Also, pensioners cannot choose the two riskier (fund A and B). Another is the use of default fund assignments based on age and sex. If the beneficiary does not actively choose a fund allocation, the following default assignments are made: fund B for males and females ages 35 and younger; fund C for females 36-50 and males 36-55; and fund D for females above 50 and males above 55. In our computation of the EPW we follow the default fund assignment.

The default fund assignment generates 5 different equations for the computation of the EPW:[48]

[47]The reported average monthly returns are arithmetic means.

[48]We use the formulae established by the Superintendencia de Pensiones to inform PFA's affiliates about their projected pensions, as described in Superintendencia de Pensiones (2009), modified to incor-

- case 1: individuals aged 55 years old or more if she is a woman, and 60 years old or more if he is a man, in December 2017:

$$EPW_i = acc_bal_{i,Dec-2017}(1+r_D)^{n_i} + \Big[\sum_{s=1}^{n_i} \widehat{cont_am}_{is}(1+r_D)^s + \mathbb{1}[i \epsilon DB] rbond_i (1+rr)^{nr_i}. \quad (19)$$

- case 2: individuals aged between 51 and 54 years old if she is a woman, and between 56 and 59 if he is a man, in December 2017:

$$EPW_i = acc_bal_{i,Dec-2017} X_{CD}(1+r_D)^{60} + \sum_{s=1}^{n} \widehat{cont_am}_{is}(1+r_D)^s + \mathbb{1}[i \epsilon DB] rbond_i (1+rr)^{nr_i}, \quad (20)$$

where:

if individual i is 51 years old and woman or 56 years old and man: $X_{CD} = \prod_{k=1}^{4} \big[\big[0.8-(k-1)0.2\big](1+r_C) + \big[1-(0.8-(k-1)0.2)\big](1+r_D)\big]$

if individual i is 52 years old and woman or 57 years old and man: $X_{CD} = \prod_{k=1}^{4} \big[\big[0.6-(k-1)0.2\big](1+r_C) + \big[1-(0.6-(k-1)0.2)\big](1+r_D)\big]$

if individual i is 53 years old and woman or 58 years old and man: $X_{CD} = \prod_{k=1}^{4} \big[\big[0.4-(k-1)0.2\big](1+r_C) + \big[1-(0.4-(k-1)0.2)\big](1+r_D)\big]$

if individual i is 54 years old and woman or 59 years old and man: $X_{CD} = 0.2(1+r_C) + 0.8(1+r_D)$

- case 3: individuals aged between 40 and 50 years old if she is a woman, and

porate our predicted contributions.

between 40 and 55 years old if he is a man, in December 2017:

$$\begin{aligned} EPW_i &= acc_bal_{i,Dec-2017}(1+r_C)^{n1_i}X_{CD}(1+r_D)^{60} \\ &+\big[\sum_{s=1}^{n1_i}\widehat{cont_am}_{is}(1+r_C)^s\big](1+r_D)^{108}+\sum_{s=1}^{108}\widehat{cont_am}_{is}(1+r_D)^s \\ &+\mathbb{1}[i\epsilon DB]rbond_i(1+rr)^{nr_i}, \end{aligned} \tag{21}$$

where:

$X_{CD}=\prod_{k=1}^{4}\big[\big[0.8-(k-1)0.2\big](1+r_C)+\big[1-(0.8-(k-1)0.2)\big](1+r_D)\big]$, and

- case 4: individuals aged between 36 and 39 years old in December 2017:

$$\begin{aligned} EPW_i &= acc_bal_{i,Dec-2017}X_{BC}(1+r_C)^{n3_i}X_{CD}(1+r_D)^{60} \\ &+\big[\sum_{s=1}^{n3_i+48}\widehat{cont_am}_{is}(1+r_C)^s\big](1+r_D)^{108}+\sum_{s=1}^{108}\widehat{cont_am}_{is}(1+r_D)^s \\ &+\mathbb{1}[i\epsilon DB]rbond_i(1+rr)^{nr_i}, \end{aligned} \tag{22}$$

where:

$X_{CD}=\prod_{k=1}^{4}\big[\big[0.8-(k-1)0.2\big](1+r_C)+\big[1-(0.8-(k-1)0.2)\big](1+r_D)\big]$, and

if individual i is 36 years old: $X_{BC}=\prod_{k=1}^{4}\big[\big[0.8-(k-1)0.2\big](1+r_B)+\big[1-(0.8-(k-1)0.2)\big](1+r_C)\big]$

if individual i is 37 years old: $X_{BC}=\prod_{k=1}^{4}\big[\big[0.6-(k-1)0.2\big](1+r_B)+\big[1-(0.6-(k-1)0.2)\big](1+r_C)\big]$

if individual i is 38 years old: $X_{BC}=\prod_{k=1}^{4}\big[\big[0.4-(k-1)0.2\big](1+r_B)+\big[1-(0.4-(k-1)0.2)\big](1+r_C)\big]$

if individual i is 39 years old: $X_{BC}=0.2(1+r_B)+0.8(1+r_C)$

- case 5: individuals aged 35 years old or less in December 2017:

$$
\begin{aligned}
EPW_i &= acc_bal_{i,Dec-2017}(1+r_B)^{n2_i}X_{BC}(1+r_C)^{n3_i}X_{CD}(1+r_D)^{60} \\
&\quad +\Big[\sum_{s=1}^{n2_i}\widehat{cont_am}_{is}(1+r_B)^{s}\Big](1+r_C)^{n3_i+48}(1+r_D)^{108},
\end{aligned} \tag{23}
$$

where:

$X_{BC} = \prod_{k=1}^{4}\big[\big[0.8-(k-1)0.2\big](1+r_B)+\big[1-(0.8-(k-1)0.2)\big](1+r_C)\big]$

$X_{CD} = \prod_{k=1}^{4}\big[\big[0.8-(k-1)0.2\big](1+r_C)+\big[1-(0.8-(k-1)0.2)\big](1+r_D)\big]$

Definitions applying to all cases (case 1 to 5):

$acc_bal_{i,Dec-2017}$ is the real value of the individual's pension savings accumulated by December 2017; r_j, for $j = A, B, C, D, E$, is the real monthly average pension fund type j's rate of return computed using the observed rates from October 2002 until December 2018; n_i is the number of months from January 2018 until the month-year the individual i has the legal right to claim pension benefits; $n1_i$ is the number of months from January 2018 until the month-year the turns 56 if he is a man or 51 if she is a woman; $n2_i$ is the number of months from January 2018 until the month-year the individual i turns 36; $n3_i$ is equal to 192 if individual i is a men and 132 if individual i is a woman. s indexes working months (from s = 1 in January 2018); $\widehat{cont_am}_{is}$ is the individual's predicted real pension contribution in month s; $rbond_i$ is the value of a recognition bond (0, except for individuals that participated in the DB system); rr is the real monthly rate of return to the recognition bond;[49] nr_i is the number of months between when an individual exits the DB system and reaches minimum legal retirement age.

[49]The annual rate of return to the recognition bond was set by law at 4%. The corresponding monthly rate of return is equal to 0.327%.

A.3 Details on the sensitivity analysis

In what follows we present the equations used to estimate regression models with a second-order polynomial in the cohort centered at the kink, similar to equations 5, 6, and 7 in Section 4.1.

The health outcome function is:

$$\begin{aligned}\mathbb{E}[H_{it}|cohort_i, \omega_t] &= \alpha_0^h + \alpha_1^h(cohort_i - c_0) + \alpha_2^h(cohort_i - c_0)^2 \\ &\quad +\beta_1^h(cohort_i - c_0) \times D + \beta_2^h(cohort_i - c_0)^2 \times D + \omega_t,\end{aligned} \tag{24}$$

where i indexes individuals, t indexes EPS survey waves, $cohort_i$ is the year-month birth cohort, $D_i = \mathbb{1}[cohort_i > c_0]$ is an indicator variable, and ω_t are year fixed effects.

Similarly, the EPW function is:

$$\begin{aligned}\mathbb{E}[EPW_i|cohort_i, \omega_t] &= \alpha_0^{EPW} + \alpha_1^{EPW}(cohort_i - c_0) + \alpha_2^{EPW}(cohort_i - c_0)^2 \\ &\quad +\beta_1^{EPW}(cohort_i - c_0) \times D + \beta_2^{EPW}(cohort_i - c_0)^2 \times D + \omega_t.\end{aligned} \tag{25}$$

To estimate the structural estimator of τ in the fuzzy RKD using the two stage least squares (2SLS) procedure we use:

$$\mathbb{E}[H_{it}|cohort_i, \omega_t] = \alpha_0 + \alpha_1(cohort_i - c_0) + \alpha_2(cohort_i - c_0)^2 + \beta_2(cohort_i - c_0)^2 * D + \tau * EPW + \omega_t, \tag{26}$$

where the endogenous variable EPW_i is instrumented with $(cohort_i - c_0) \times D_i$.

A.4 Direct financial costs of preventive health screening in Chile

Appendix Table A.7 shows small direct financial costs of preventive health screening for a large share of the individuals in our sample. Cost-sharing rates at Chilean healthcare providers vary depending on the type of health insurance and the healthcare provider. For beneficiaries of public health insurance, which make up roughly 70% of the individuals in the working sample, copayment rates at public healthcare providers range from zero to 20%, depending on the specific insurance program (see the Appendix Table A.8 for details). Individuals with public health insurance can choose to seek care at private providers and are required to pay a copayment rate of 40%.[50] For them, copayment amounts are US $0.96 (for blood glucose tests), $1.04 (for cholesterol tests), $1.52 (for high-density lipoprotein tests), $6.68 (for a visit to a generalist doctor's office), and $11.76 (for a visit to an urologist's office).[51] These direct out-of-pocket screening costs are very low relative to a mean monthly income of US $1,080 (for males in 2017), and taken together with the finding that consumption expenditures do not change at the threshold (Table 2), imply that contemporaneous financial considerations are unlikely to explain the increases in preventive screening that we observe.

[50]Public health insurance at zero premium covers individuals who have no income. This group, which makes up about 17.24% of the working sample, is not permitted to opt for private healthcare providers.

[51]The public health insurance account for about 80% of the Chilean population; roughly 17% is in private health insurance providers, and 3% is in other private programs or formally uninsured (https://www.superdesalud.gob.cl/app/uploads/2022/03/articles-20754_recurso_1.pdf)

Appendix Figures

Figure A.1: Newspaper Column in Year 1980: "The minister assures: [The DC system is the] End of the drama of the retirees!"


Esto Es lo que se Sabe
Del Remedio Anticáncer
• Hay en Chile algunas cajas disponibles del Lisado de corazón
las últimas noticias
DIARIO POPULAR E INDEPENDIENTE
Año LXXVIII — N.o 25.178 — Viernes 7 de Noviembre de 1980
$ 10.- IVA incluido
HOY: San Ernesto — MAÑANA: Santa Ninfa
EDICION DE HOY: 203.133 EJEMPLARES
Normas de la Nueva Previsión
PENSIONES TENDRAN
REAJUSTE AUTOMATICO
100% del Alza del Costo De la Vida una Vez al Año
AHORRO VOLUNTARIO ADMINISTRADO POR ORGANOS PRIVADOS
ASEGURA EL MINISTRO
¡Fin del Drama De Jubilados!
El que la Sigue la Consigue.

NOTE: Published in Las Últimas Noticias, 11/7/1980. *Source*: Engel et al. (2017).

Figure A.2: Newspaper Column in Year 1980: "...Every dependent worker must contribute 10% of their remuneration to increase their individual fund. This figure, according to reasonable assumptions, will allow workers to obtain a pension close to their last remuneration."



Ministro Piñera dio a conocer nuevo sistema previsional

Asegurado Reajuste Automático Para Jubilados, Una Vez al Año

Expresando la convicción del Gobierno que con el programa de modernizaciones, en cuyo contexto se inserta la reforma a la previsión, se transformará a Chile en un país desarrollado y en una nación de hombres libres, el Ministro del Trabajo, José Piñera dio a conocer anoche, por red nacional de radio y televisión, el contenido fundamental de la Reforma Previsional.

NO AFECTA BENEFICIOS

Luego de hacer un recuento de los vicios del sistema previsional imperante hasta la fecha, generador de injusticias y de una desigual distribución en las jubilaciones y pensiones, que condujo a que 7 de cada 10 jubilados recibieran pensiones inferiores a tres mil pesos, el Secretario de Estado entró a detallar los principales aspectos de la Reforma Previsional, cuyos lineamientos básicos son los siguientes:

A partir del primero de marzo de 1981, las cotizaciones previsionales serán de cargo del trabajador, pero al mismo tiempo todas las remuneraciones brutas imponibles serán reajustadas con el sólo efecto de mantener constante la renta líquida de cada trabajador.

El Ministro Piñera destacó también que la reforma Previsional consiste fundamentalmente en crear un nuevo sistema de pensiones, que no afecta a los otros beneficios de la previsión social, y que está basado en una serie de libertades, entre ellas la de optar entre el viejo y el nuevo sistema; libertad de elegir la institución de capitalizacion; de realizar ahorros voluntarios para mejorar la pensión o adelantarla; de escoger como jubilación una renta vitalicia o un retiro programado, y otras.

Con respecto al sector pasivo, el Ministro Piñera expresó "que este Gobierno no tiene responsabilidad alguna en el drama de tantos pensionados". Agregó el Secretario de Estado en su intervención, "que no desentendiéndose de ellos, por primera vez en la historia, se ha consagrado en la ley el reajuste automático de pensiones en un 100% del alza del costo de la vida, por lo menos una vez al año".

"Nunca más el jubilado tendrá que sufrir la angustia de esperar que eventuales leyes le devuelvan el poder adquisitivo de sus pensiones erosionadas por la inflación", señaló el Ministro del Trabajo.

ASEGURA PENSION MINIMA

Entre las importantes disposiciones del conjunto de leyes que se promulgan, según señaló el Ministro Piñera está el hecho de que "todo trabajador dependiente deberá aportar mensualmente un 10% de su remuneración para incrementar su fondo individual".

"Esta cifra, de acuerdo a supuestos razonables, permitirá a un trabajador obtener una pensión cercana a sus últimas remuneraciones".

Se asegurará una pensión mínima a quienes hayan trabajado una parte signficativa de su vida, siempre que cuenten con los requisitos de edad actualmente vigentes, 60 años para la mujer y 65 años para el hombre. En caso de que sus ahorros acumulados sean insuficientes, estos serán complementados por la vía del subsidio estatal.

La puesta en marcha del nuevo sistema, continuó el Ministro del Trabajo, permitirá a los trabajadores que a partir del 1° de mayo próximo, se trasladen libremente a el, obteniendo un aumento de remuneraciones líquidas.

"La opción a cambiarse al nuevo sistema podrá ser ejercida en cualquier momento a contar del 1° de mayo de 1981 hasta el 1° de mayo de 1986".

También dentro del conjunto de nuevas leyes, se aprovechó de cambiar el financiamiento de la asignación familiar y del subsidio de cesantía, transformándolo en prestaciones redistributivas financiadas con impuestos generales de la nación.

No existirán, en consecuencia, cotización con ese destino, sin perjuicio de que ambos beneficios seguirán siendo percibidos por los trabajadores dependientes, afiliados a los actuales sistemas previsionales o al nuevo que se crea. Parte del costo de esta medida se financiará con un impuesto transitorio del 3% del empleador, que disminuirá en un uno por ciento anual, hasta desaparecer en 1984.

Ministro José Piñera: "el nuevo sistema de pensiones no afecta a los otros beneficios de la previsión social".

Dudas e Interrogantes Trabajadores ante la

● Comisión de Resguardo de los Derechos Pre sus juicios sobre el sistema y lamentó que no tado "la opinión de los trabajadores"

Para expresar su preocupación sobre la Reforma Previsional, y su rechazo a la privatización del sistema, a pocas horas de ser dadas a conocer por el Gobierno las nuevas normas que regirán en esta materia, varios sectores gremiales aglutinados en la llamada "Comisión de Resguardo de los Derechos Previsionales", hicieron pública una declaración al respecto.

En un documento entregado a la prensa por Federico Mujica y Ramiro de La Vega, dirigentes de empleados particulares y periodistas, respectivamente, se expresa que **"en vispera de que se ponga en vigencia la Reforma Previsional en la cual la opinión de los trabajadores no fue considerada, las organizaciones gremiales abajo firmantes, creen oportuno entregar al Supremo Gobierno esta declaración oficial con sus puntos de vista y consideraciones".**

Luego de enumerar una serie de medidas legales que han significado importantes pérdidas de derechos adquiridos por los trabajadores, quebrando **"dramáticamente el equilibrio entre capital y trabajo, con desmedro para los segundos"**, la decla-

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40 Años de Chile en La Antártica

Las personalidades que dieron vida al de- territorio nacional en el continente antártico realizada en la Acade-

Figure A.3: Newspaper in year 2000: "by 2020 Chilean pensioners would enjoy a 100% replacement rate".



TRABAJADORES QUE COTIZARON EN AFP DESDE SU INICIO:

Chilenos Se Pensionarían con El 100% de Su Sueldo el 2020

● Esta predicción de expertos previsionales se basa en una rentabilidad anual promedio de los fondos del 6% y 7%.

Para el año 2020, la Asociación de AFP asegura que los actuales afiliados al sistema jubilarán con una renta equivalente o superior al 100% de su remuneración promedio durante sus años trabajados.

Esto, si se mantiene de aquí en adelante una rentabilidad de los Fondos de Pensiones semejante a la de países desarrollados que fluctúa entre el 6% y 7%, que es la pronosticada por expertos del sistema para Chile.

"Las personas que jubilen en 20 años más podrían recibir incluso como pensión más del 100% de su sueldo promedio si se alcanzan buenos resultados de los fondos", pronosticó el gerente de operaciones de la Asociación de AFP, Fernando Avila.

Este grupo de futuros jubilados son aquellos trabajadores que cotizaron en las AFP desde que ellas entraron en vigencia, en 1981.

Avila afirma que los afiliados que estén más cerca de la edad de jubilar, por ejemplo, en 10 años más, tendrán una pensión mayor a la que recibirían en la actualidad si fueran jubilados, pero lo más probable es que no alcance a igualar su remuneración promedio.

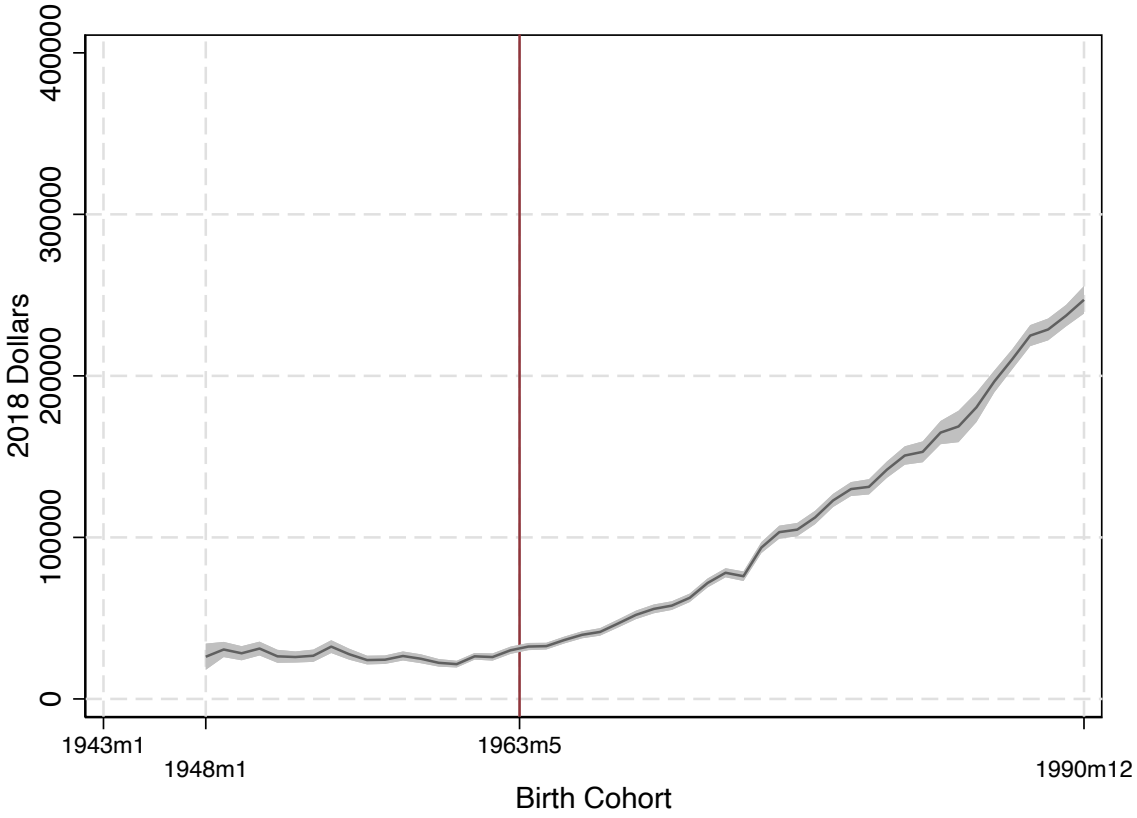
Sin embargo, el representante de la Asociación de AFP reconoce que no existen estudios que permitan cuantificar el porcentaje de pensión que recibirán.

Cabe destacar que la rentabilidad anual promedio de los Fondos de Pensiones en Chile ha sido de 11,1% desde que comenzaron a funcionar, aunque se espera que esta cifra se estabilice alrededor

(Continúa en la página B 7)

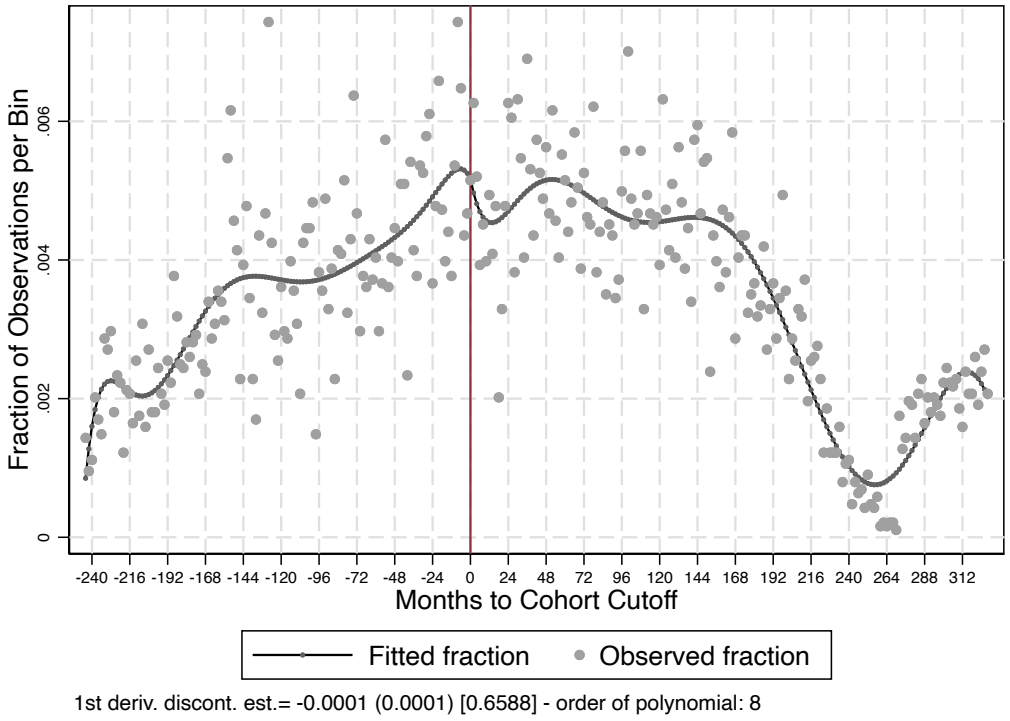
NOTE: Published in El Mercurio, 2/4/2000. *Source*: Engel et al. (2017).

Figure A.4: Expected Pension Wealth among Chilean Women.



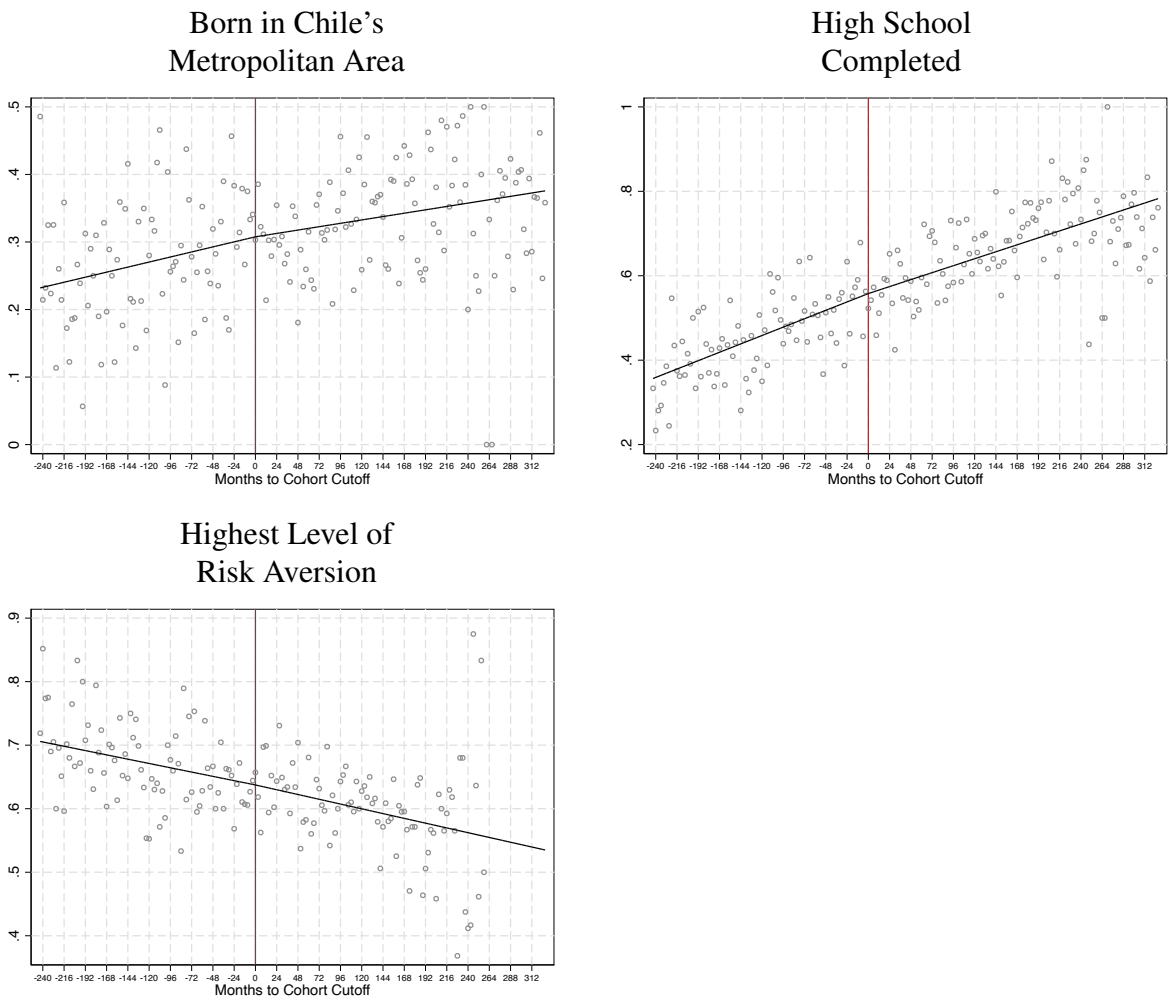
NOTE: Expected Pension Wealth (EPW) and 95% confidence interval (shaded) among Chilean women, with local polynomial smoothing (Fan and Gijbels 2018). For women reaching legal retirement age before December 2017, we observe actual EPW at the time of retirement. For those retiring after December 2017 (born before December 1952), we predict pension contributions from January 2018 until the month that an individual reaches the minimum legal retirement age (as well as the return to fund-specific investments) using Equation (18). The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. EPW values are CPI adjusted to December 2018 dollars.

Figure A.5: Density of Observations by Birth Cohort.



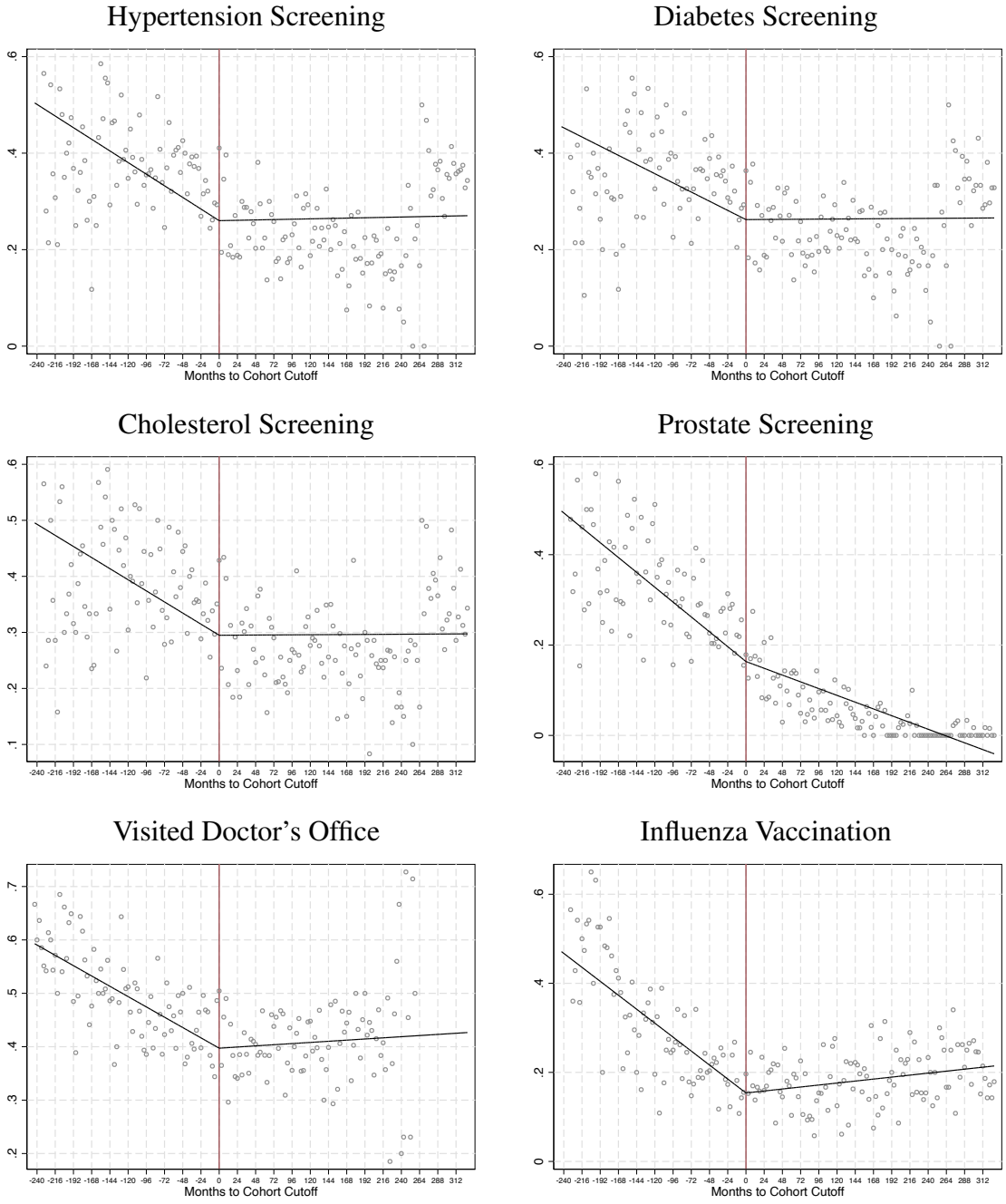
NOTE: Distribution of observations for men, across monthly birth cohorts, using a two months bin. The sample includes observations from the EPS waves conducted in 2004, 2006, 2009 and 2015, that is the "four-waves" sample. The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. Grey dots depict the observed fraction of observations. Black dots are the estimated fraction of observations obtained with OLS estimators and a cohort polynomial of degree up to 8 chosen using the Akaike's information criteria. 1st deriv. discont. est is the result of a discontinuity test performed on the fraction of observations at the kink cohort, with the reported standard error in parenthesis and p-value in brackets.

Figure A.6: Balance of Observable Predetermined Characteristics across Birth Cohorts.



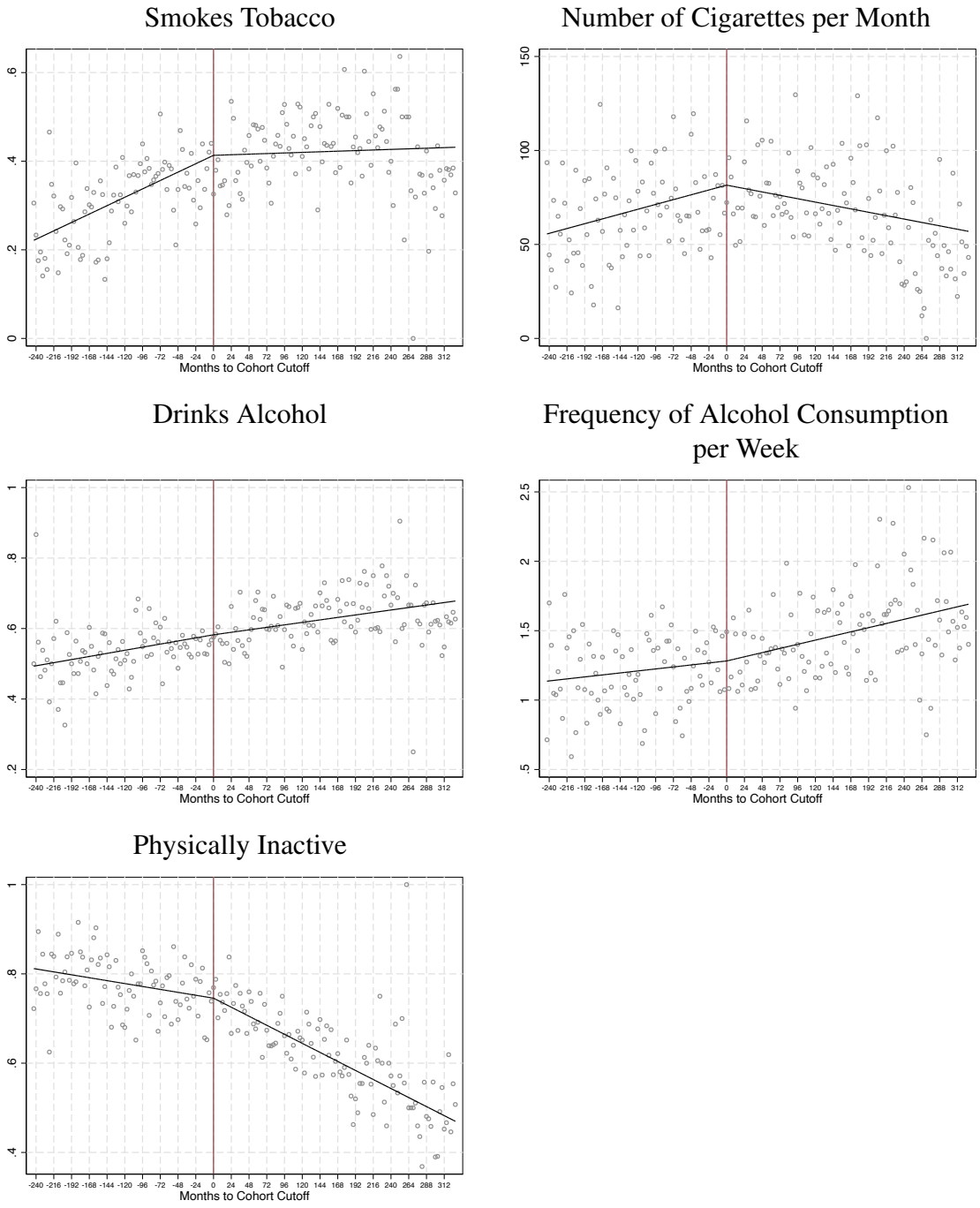
NOTE: Dots corresponds to scatter plots of each predetermined characteristic across birth cohorts. Black lines are predicted values of the predetermined characteristics for each birth cohort, obtained using OLS and Equation (5). The sample includes observations from the EPS waves conducted in 2004, 2006, 2009 and 2015, that is the "four-waves" sample. The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. All outcomes are binary variables.

Figure A.7: Average Value of Health Investments across Birth Cohorts.



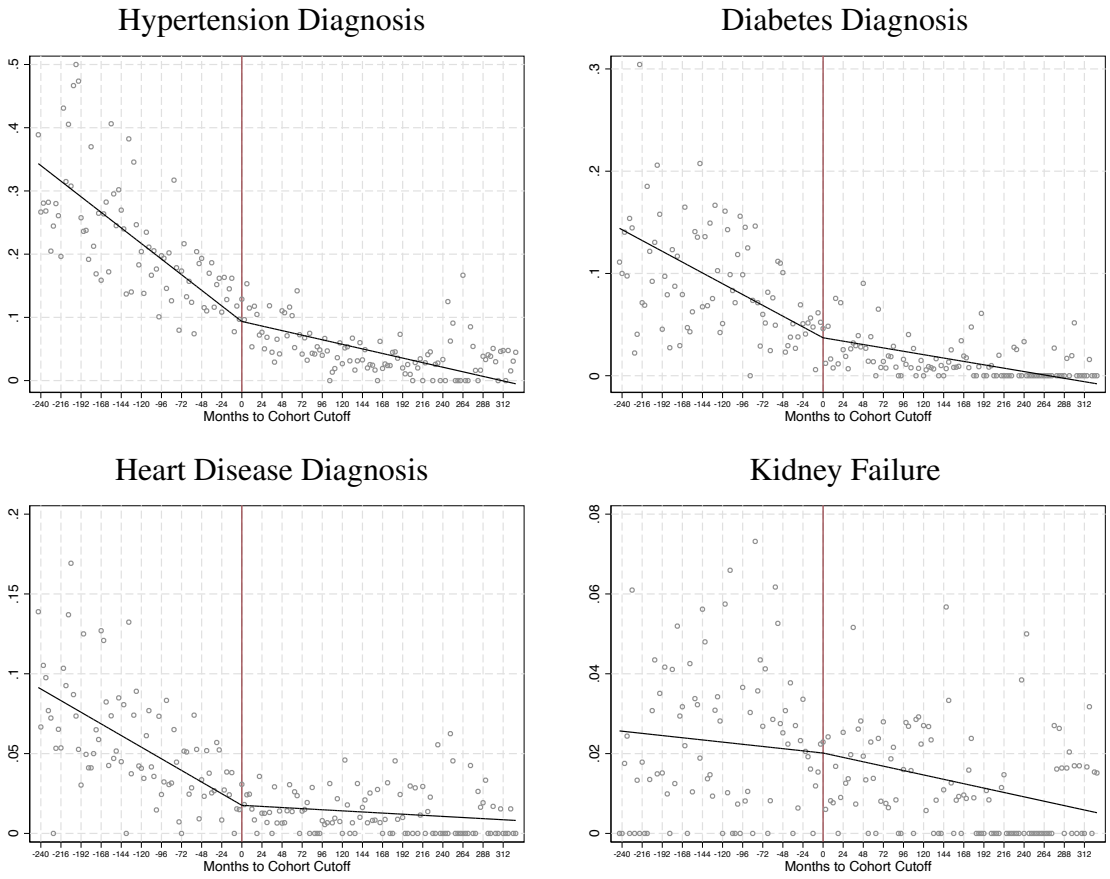
NOTE: Dots corresponds to scatter plots of each outcome across birth cohorts. Black lines are predicted values of each outcome for each birth cohort, obtained using OLS and Equation (5). The sample includes observations from the EPS waves conducted in 2009 and 2015, that is the "two-waves" sample. The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. All outcomes are binary variables.

Figure A.8: Average Value of Unhealthy Lifestyle Behaviors across Birth Cohorts.



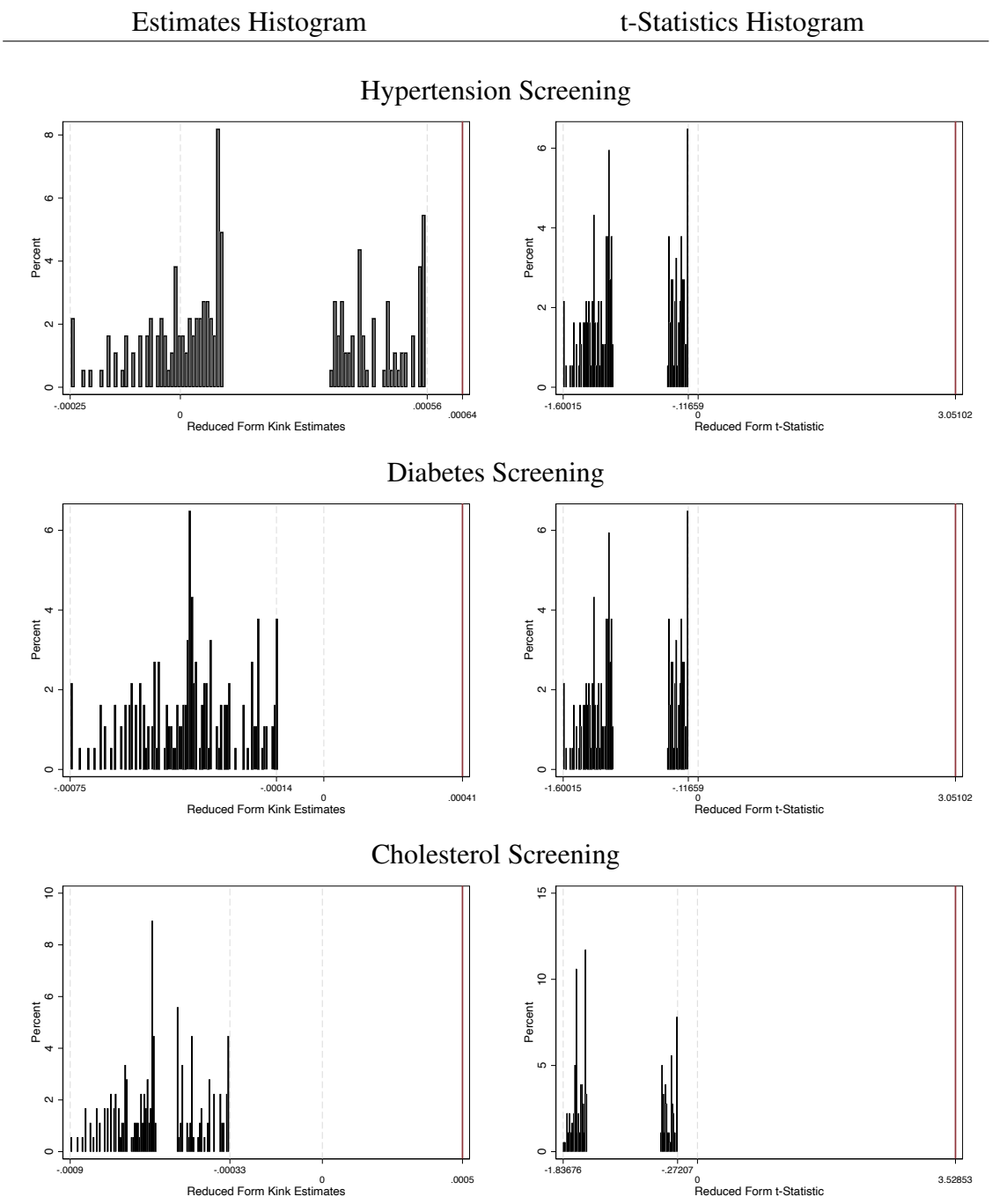
NOTE: Dots corresponds to scatter plots of each outcome across birth cohorts. Black lines are predicted values of each outcome for each birth cohort, obtained using OLS and Equation (5). The sample includes observations from the EPS waves conducted in 2004, 2006, 2009 and 2015, that is the "four-waves" sample. The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. All outcomes are binary variables.

Figure A.9: Average Value of Diagnosed Conditions across Birth Cohorts.



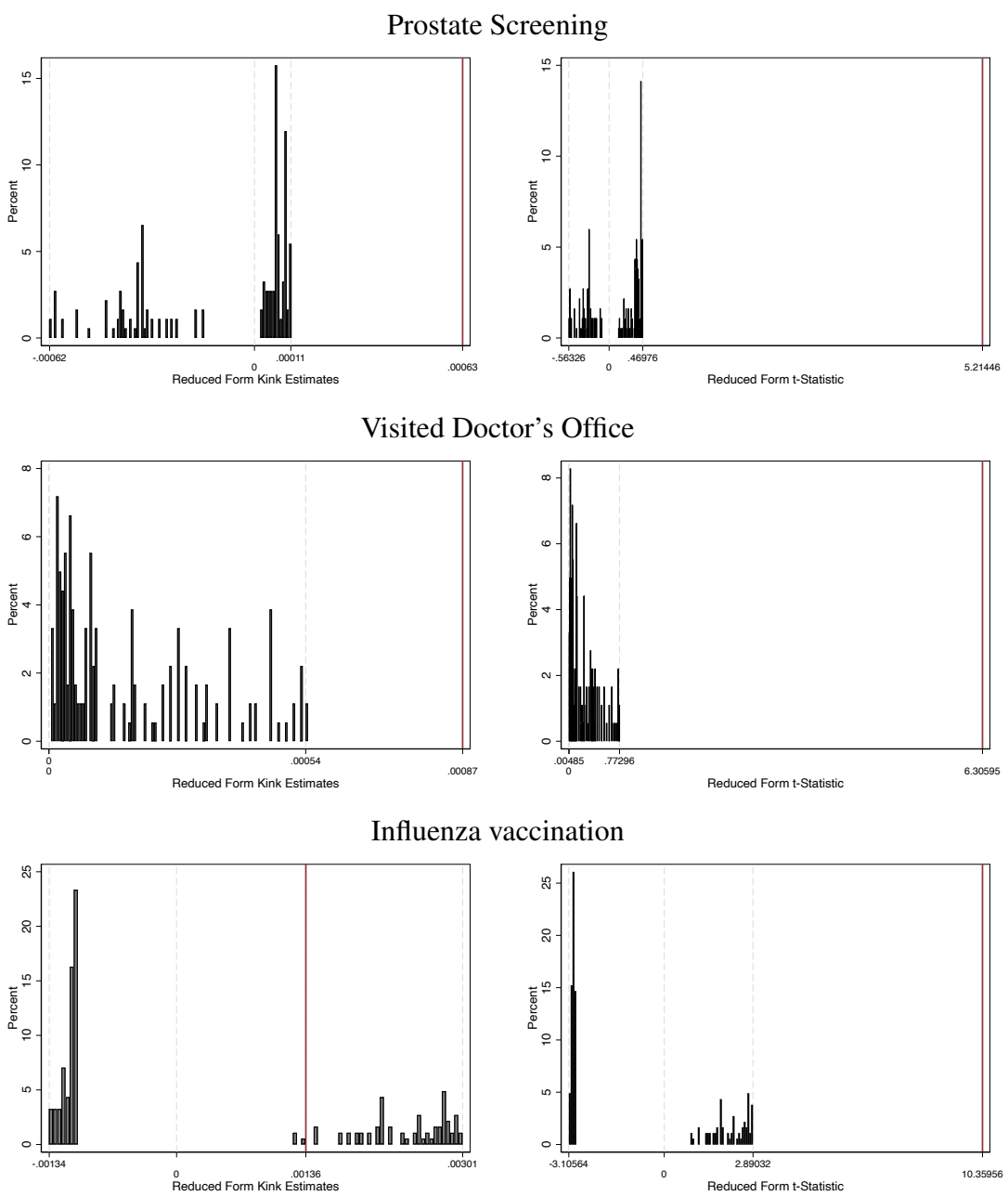
NOTE: Dots corresponds to scatter plots of each outcome across birth cohorts. Black lines are predicted values of each outcome for each birth cohort, obtained using OLS and Equation (5). The sample includes observations from the EPS waves conducted in 2004, 2006, 2009 and 2015, that is the "four-waves" sample. The vertical red line is set at the cohort that turns 18 years old at the month-year of the pension system reform. All outcomes are binary variables.

Figure A.10: Permutation Test on Reduced Form Estimates of Health Investments using Randomly Drawn Placebo Cutoffs.



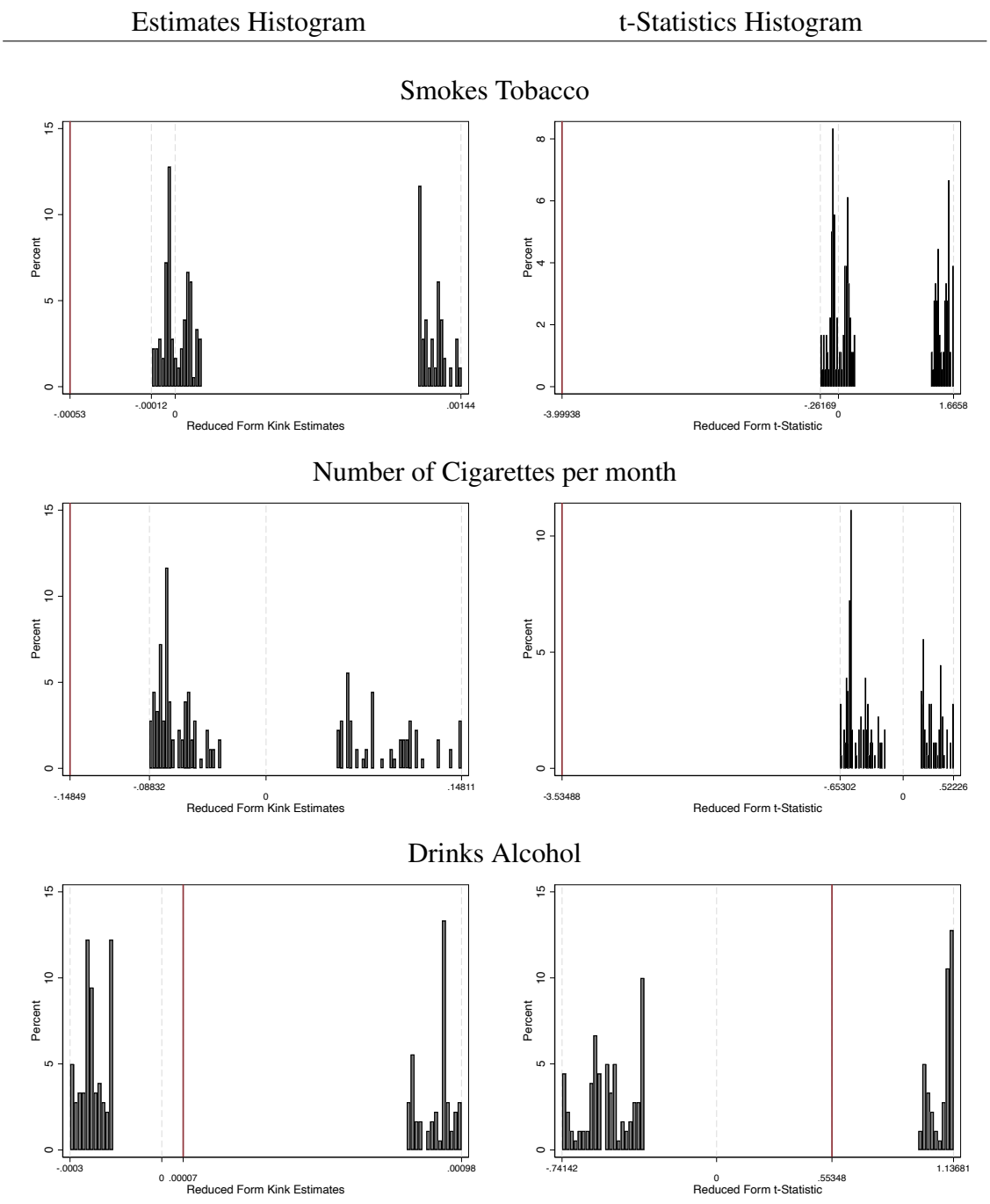
NOTE: *This Figure continues on the next page*.

Figure A.10: *(cont.)* Permutation Test on Reduced Form Estimates of Health Investments using Randomly Drawn Placebo Cutoffs.



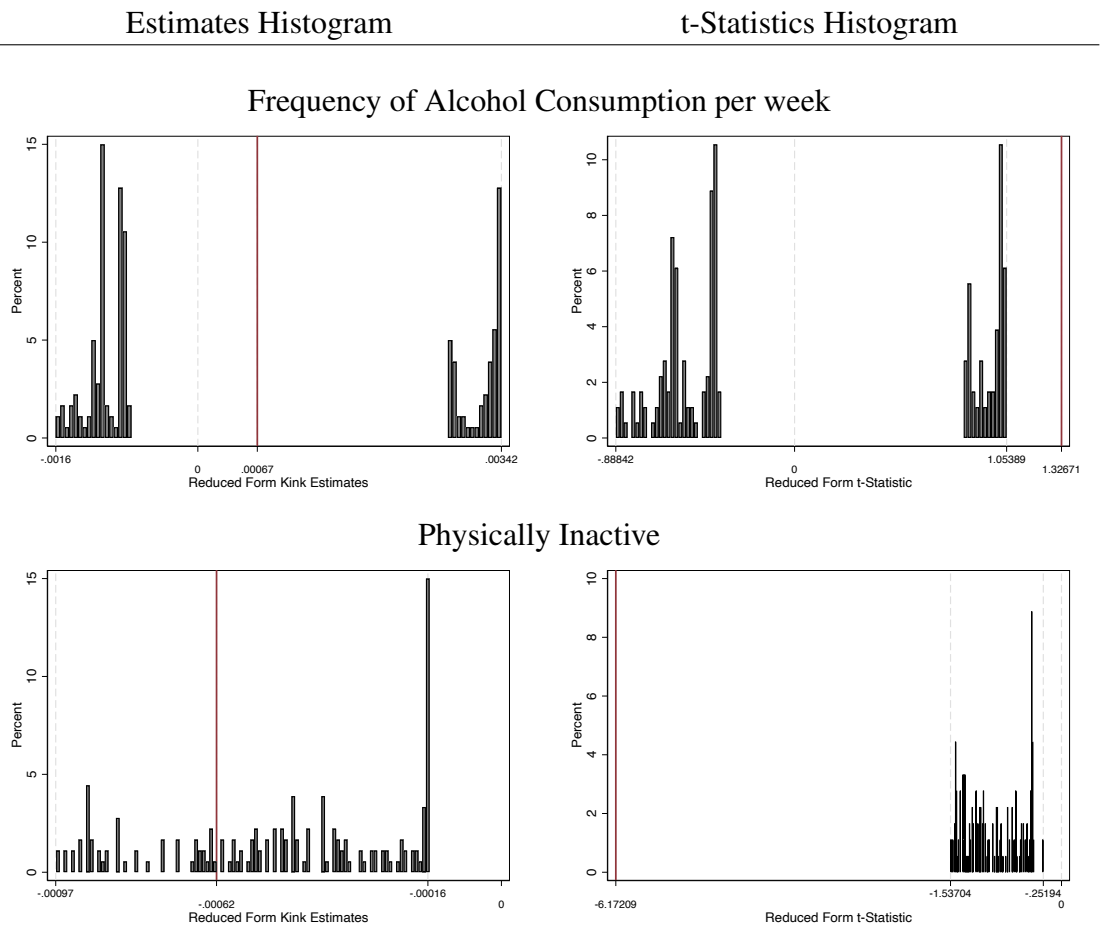
NOTE: Reduced Form Estimates and t-Statistics histograms obtained using randomly drawn placebo cutoffs, as described in Section 6.2. Reduced Forms are estimated by OLS using the Equation (5), and the estimates displayed correspond to the parameter β_1. Vertical red lines are kink estimates and t-statistics at the true cut-off.

Figure A.11: Permutation Test on Reduced Form Estimates of Unhealthy Lifestyle Behaviors using Randomly Drawn Placebo Cutoffs.



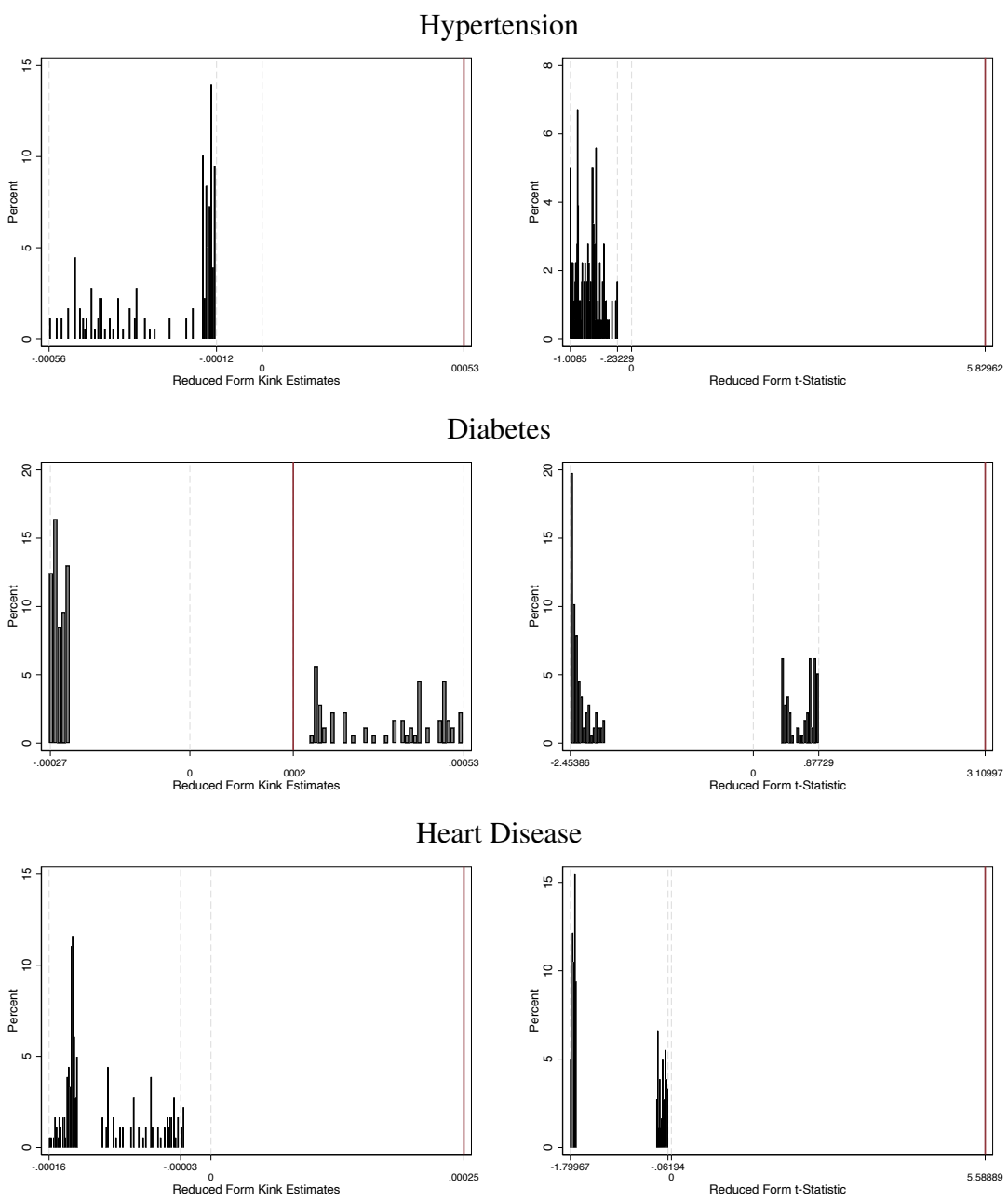
NOTE: *This Figure continues on the next page*.

Figure A.11: *(cont.)* Permutation Test on Reduced Form Estimates of Unhealthy Lifestyle Behaviors using Randomly Drawn Placebo Cutoffs.



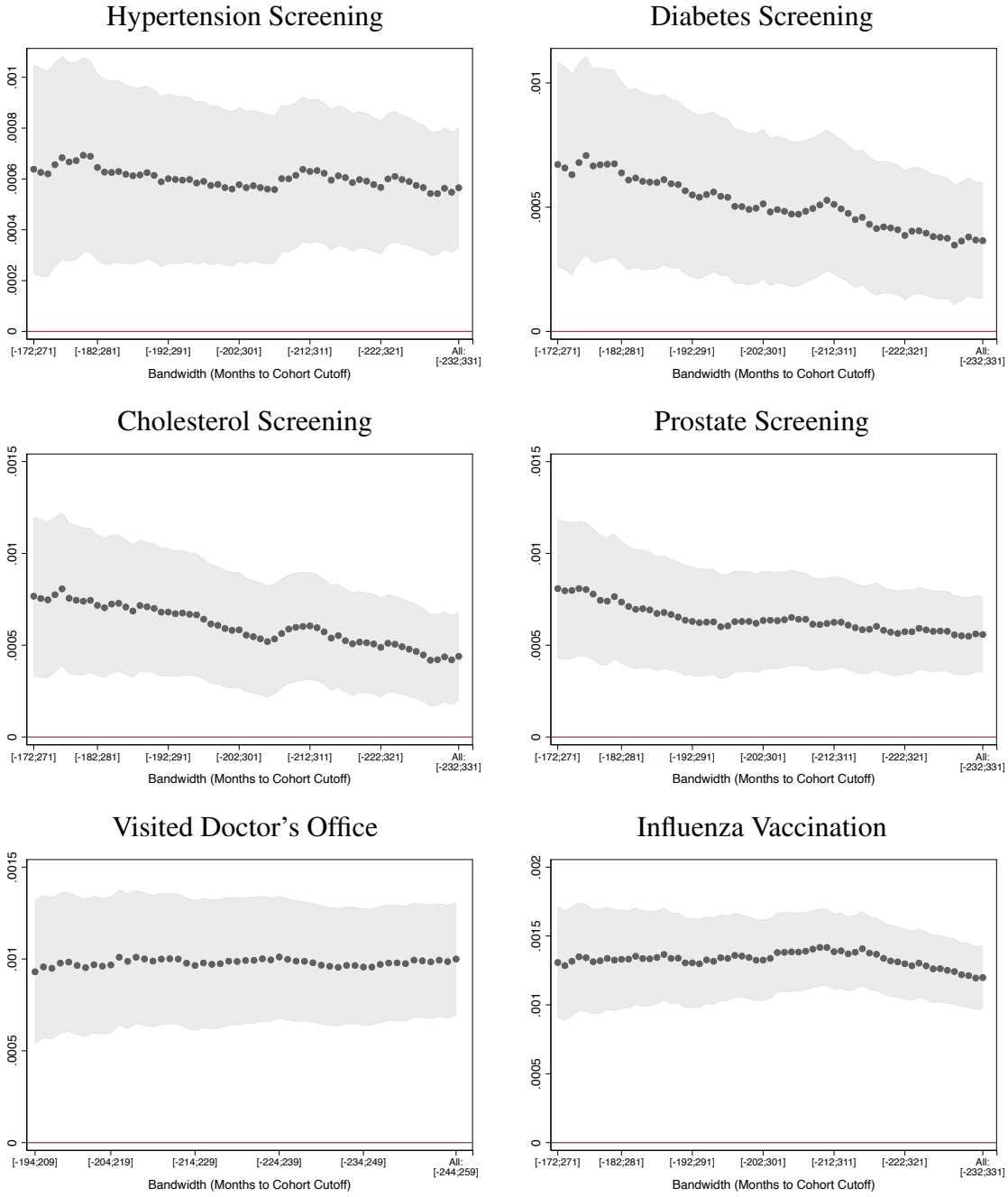
NOTE: Reduced Form Estimates and t-Statistics histograms obtained using randomly drawn placebo cutoffs, as described in Section 6.2. Reduced Forms are estimated by OLS using the Equation (5), and the estimates displayed correspond to the parameter β_1. Vertical red lines are kink estimates and t-statistics at the true cut-off.

Figure A.12: Permutation Test on Reduced Form Estimates of Diagnosed Conditions using Randomly Drawn Placebo Cutoffs.



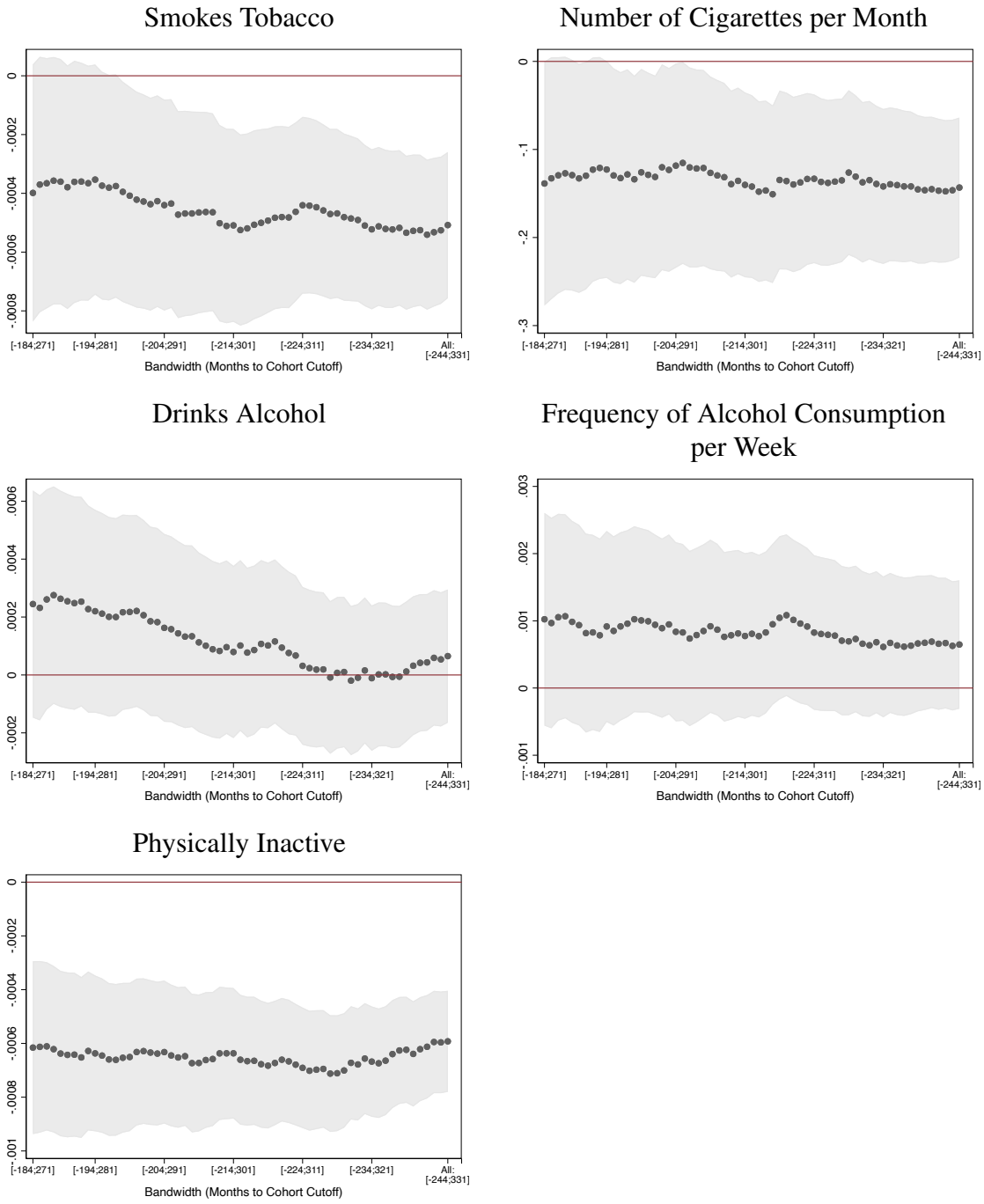
NOTE: Reduced Form Estimates and t-Statistics histograms obtained using randomly drawn placebo cutoffs, as described in Section 6.2. Reduced Forms are estimated by OLS using the Equation (5), and the estimates displayed correspond to the parameter β_1. Vertical red lines are kink estimates and t-statistics at the true cut-off. Results for Kidney Failure are not statistically significant and are available upon request.

Figure A.13: FRKD Estimates for the Sensitivity to Bandwidth Choice on Health Investments.



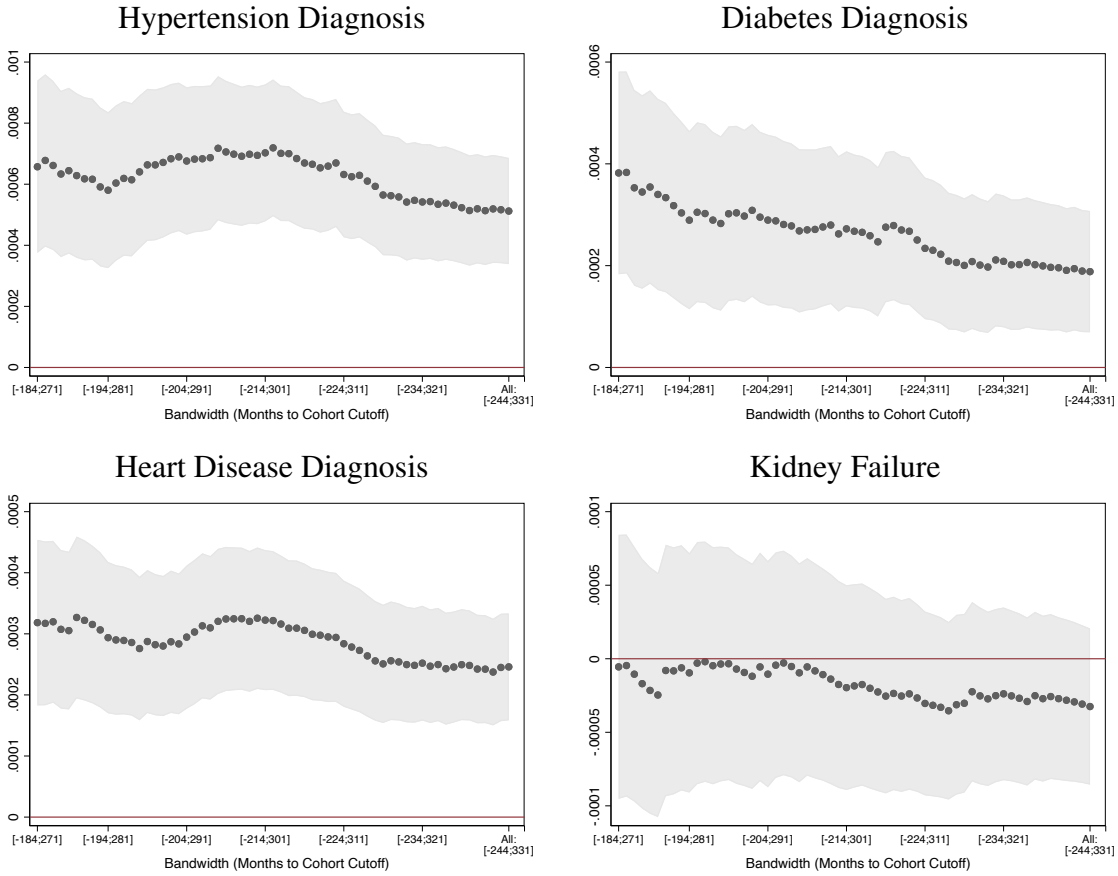
NOTE: 2SLS estimates of the effect of the Expected Pension Wealth (EPW) on health investment outcomes, for males. Point estimates are estimates of the parameter τ in the Equation (7) and the instrument is $(cohort - c_0) \times D$. Outcomes are binary variables and are estimated using linear models that include a first-order polynomial in the cohort centered at the kink $(cohort - c_0)$ and linear temporal trends. The sample includes observations from the EPS waves conducted in 2009 and 2015, that is the "two-waves" sample, for all outcomes but "Visited Doctor's Office", estimated using EPS waves conducted in 2004, 2006, and 2009. Shaded gray areas are 95% confidence intervals computed with standard errors clustered at the individual level. The "all" bandwidth includes all observations in the working sample.

Figure A.14: FRKD Estimates for the Sensitivity to Bandwidth Choice on Unhealthy Lifestyle Behaviors.



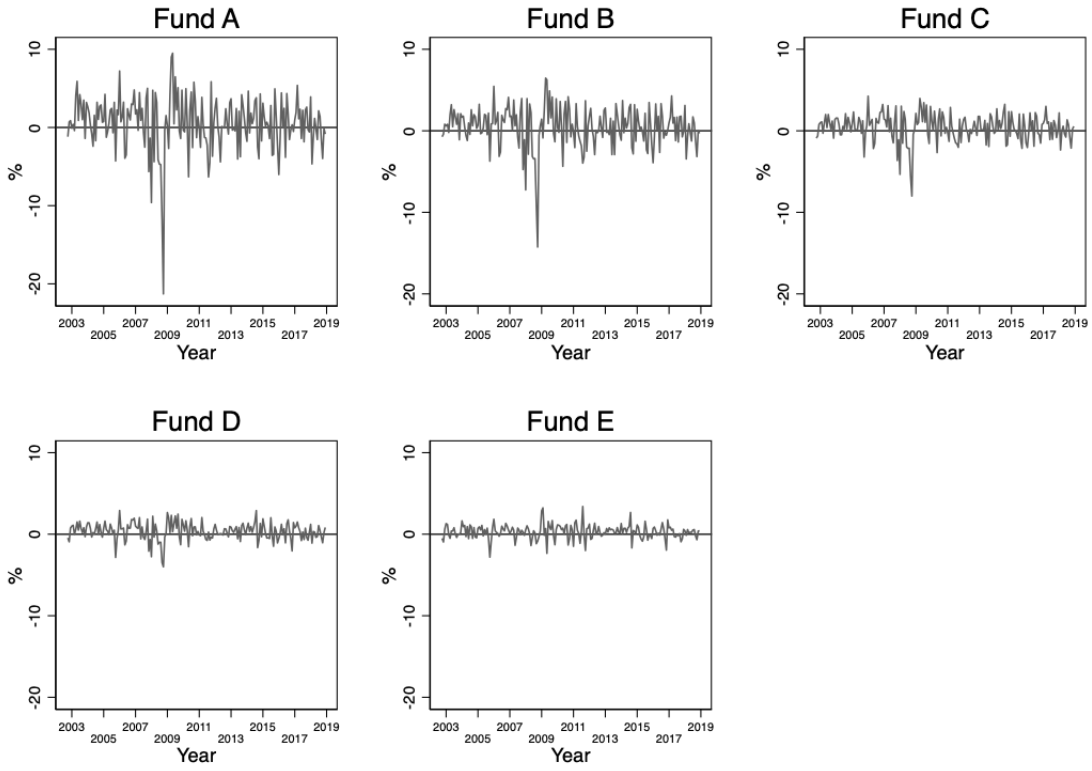
NOTE: 2SLS estimates of the effect of the Expected Pension Wealth (EPW) on health investment outcomes, for males. Point estimates are estimates of the parameter τ in the Equation (7) and the instrument is $(cohort - c_0) \times D$. Outcomes are binary variables and are estimated using linear models that include a first-order polynomial in the cohort centered at the kink $(cohort - c_0)$ and linear temporal trends. The sample includes observations from the EPS waves conducted in 2004, 2006, 2009 and 2015, that is the "four-waves" sample. Shaded gray areas are 95% confidence intervals computed with standard errors clustered at the individual level. The "all" bandwidth includes all observations in the working sample.

Figure A.15: FRKD Estimates for the Sensitivity to Bandwidth Choice on Diagnosed Conditions.



NOTE: 2SLS estimates of the effect of the Expected Pension Wealth (EPW) on health investment outcomes, for males. Point estimates are estimates of the parameter τ in the Equation (7) and the instrument is $(cohort - c_0) \times D$. Outcomes are binary variables and are estimated using linear models that include a first-order polynomial in the cohort centered at the kink $(cohort - c_0)$ and linear temporal trends. The sample includes observations from the EPS waves conducted in 22009 and 2015, that is the "two-waves" sample. Shaded gray areas are 95% confidence intervals computed with standard errors clustered at the individual level. The "all" bandwidth includes all observations in the working sample.

Figure A.16: Monthly Rate of Return by Fund Type.



Appendix Tables

Table A.1: Characteristics of Individuals in the "Four-Waves" Sample, by Exposure to the Pension Reform and Gender.

	Men			Women		
	All	Partially Exposed	Fully Exposed	All	Partially Exposed	Fully Exposed
	(1)	(2)	(3)	(4)	(5)	(6)
Expected Pension Wealth (mean)	135,193	60,293	192,441	68,192	26,444	91,374
Age (mean)	43	53	35	41	51	35
Categories of Level of Education Completed (proportion):						
1.None	0.03	0.04	0.02	0.02	0.03	0.02
2.Elementary school	0.29	0.38	0.22	0.23	0.32	0.18
3.High school	0.57	0.47	0.65	0.63	0.53	0.68
4.Undergrad or Higher	0.11	0.10	0.11	0.12	0.12	0.12
Proportion with Highest Level of Risk Aversion	0.63	0.66	0.61	0.69	0.71	0.68
Proportion of Smokers	0.38	0.33	0.42	0.33	0.32	0.33
Proportion that Drinks Alcohol	0.59	0.54	0.63	0.27	0.22	0.30
Proportion Physically Inactive	0.70	0.77	0.64	0.82	0.84	0.81
Proportion Diagnosed with Hypertension	0.12	0.20	0.05	0.15	0.25	0.09
Proportion Diagnosed with Diabetes	0.05	0.09	0.02	0.06	0.09	0.04
Proportion Diagnosed with a Heart Disease	0.03	0.05	0.01	0.03	0.06	0.02
Proportion Diagnosed with Kidney Failure	0.02	0.02	0.01	0.02	0.03	0.02
Observations	18,836	8,160	10,676	17,567	6,272	11,295

NOTE: Expected pension wealth values are CPI adjusted to December 2018 dollars.

Table A.2: Characteristics of Individuals in the "Two-Waves" Sample, by Exposure to the Pension Reform and gender.

	Male			Female		
	All	Partially Exposed	Fully Exposed	All	Partially Exposed	Fully Exposed
	(1)	(2)	(3)	(4)	(5)	(6)
Expected Pension Wealth (mean)	160,320	59,927	220,707	82,877	25,411	107,077
Age (mean)	44	56	36	42	54	37
Categories of Level of Education Completed (proportion):						
1.None	0.05	0.07	0.03	0.04	0.05	0.03
2.Elementary school	0.27	0.38	0.21	0.21	0.32	0.17
3.High school	0.58	0.45	0.65	0.63	0.52	0.67
4.Undergrad or Higher	0.10	0.09	0.11	0.12	0.11	0.13
Proportion with Highest Level of Risk Aversion	0.64	0.66	0.62	0.70	0.72	0.69
Proportion of Smokers	0.36	0.30	0.39	0.31	0.30	0.31
Proportion that Drinks Alcohol	0.57	0.52	0.60	0.28	0.22	0.31
Proportion Physically Inactive	0.71	0.80	0.66	0.82	0.85	0.81
Proportion Diagnosed with Hypertension	0.14	0.26	0.06	0.16	0.30	0.10
Proportion Diagnosed with Diabetes	0.06	0.11	0.03	0.07	0.12	0.05
Proportion Diagnosed with a Heart Disease	0.03	0.05	0.01	0.03	0.05	0.02
Proportion Diagnosed with Kidney Failure	0.02	0.02	0.01	0.02	0.03	0.02
Observations	8,685	3,262	5,423	8,504	2,520	5,984

NOTE: Expected Pension Wealth values are CPI adjusted to December 2018 dollars.

Table A.3: Chilean Men's Death Records from 2003 to 2018 and 2002 Chilean Population Census.

Age in Years	Population (in 2002)	Total Deaths (2003 to 2018)	Number of Deaths by Cause							
			Hypertension	Diabetes	Ischaemic Heart Disease	Pulmonary Heart Disease	Other Heart Diseases	Kidney Disease	Prostate Disease	Other Causes
Younger than 25	1,839,414	33,766	90	133	559	62	576	83	6	32,257
Between 25 and 44	2,346,908	107,346	1,360	1,807	8,551	328	3,081	702	359	91,158
Older than 44	743,798	96,073	2,127	3,437	11,119	304	3,150	999	1,610	73,327

Age in Years	Total deaths by 1,000 ind.	Deaths by Cause, by 1,000 Individuals							
		Hypertension	Diabetes	Ischaemic Heart Disease	Pulmonary Heart Disease	Other Heart Diseases	Kidney Disease	Prostate Disease	Other Causes
Younger than 25	18.36	0.05	0.07	0.30	0.03	0.31	0.05	0	17.54
Between 25 and 44	45.74	0.58	0.77	3.64	0.14	1.31	0.30	0.15	38.84
Older than 44	129.17	2.86	4.62	14.95	0.41	4.24	1.34	2.16	98.58

Table A.4: Reduced Form Estimates of Health Investments.

	Screenings				Visited	Influenza	Index
	Hypertension	Diabetes	Cholesterol	Prostate	Doctor's office	Vaccination	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cohorts Relative to Kink $(cohort - c_0)$	-.0011***	-.0009***	-.0009***	-.0014***	-.0008***	-.0013***	-.0028***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.00008)	(0.0001)	(0.0002)
Slope Change at Kink $((cohort - c_0) \times D)$	0.0006***	0.0004***	0.0005***	0.0006***	0.0009***	0.0014***	0.0018***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Observations	8679	8683	8690	8572	14871	8685	8504
Mean	0.299	0.2918	0.3251	0.1514	0.4428	0.2168	

NOTE: OLS estimates of α_1^h (cohort relative to the kink) and β_1^h (slope change at the kink), conditional on a first-order birth cohort polynomial and linear time trends, shown from Equation (5). Outcomes in columns (1) to (6) are binary variables and are estimated using linear models. The Index is computed following Anderson (2008) and is standardized. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.5: Reduced form estimates of Unhealthy Lifestyle Behaviors.

	Smokes Tobacco	Number of Cigarettes per Month	Drinks Alcohol	Frequency of Alcohol Consumption per Week	Physically Inactive	Index
	(1)	(2)	(3)	(4)	(5)	(6)
Cohorts Relative to Kink $(cohort - c_0)$	0.0008***	0.1081***	0.0003***	0.0006*	-.0003***	0.0004***
	(0.00009)	(0.0281)	(0.00008)	(0.0003)	(0.00006)	(0.0001)
Slope Change at Kink $((cohort - c_0) \times D)$	-.0005***	-.1485***	0.00007	0.0007	-.0006***	-.0008***
	(0.0001)	(0.042)	(0.0001)	(0.0005)	(0.0001)	(0.0002)
Observations	18781	18746	18780	18547	18681	18182
Mean	0.3825	71.2213	0.5879	1.3480	0.6962	

NOTE: OLS estimates of α_1^h (cohort relative to the kink) and β_1^h (slope change at the kink), conditional on a first-order birth cohort polynomial and linear time trends, shown from Equation (5). Outcomes in columns (1), (3), and (5) are binary variables and are estimated using linear models. The Index is computed following Anderson (2008) and is standardized. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.6: Reduced Form Estimates of Diagnosed conditions.

	Hypertension	Diabetes	Heart Disease	Kidney Failure	Index
	(1)	(2)	(3)	(4)	(5)
Cohorts Relative to Kink $(cohort - c_0)$	-.0010***	-.0004***	-.0003***	-.00002	-.0013***
	(0.00007)	(0.00005)	(0.00004)	(0.00002)	(0.00009)
Slope Change at Kink $((cohort - c_0) \times D)$	0.0005***	0.0002***	0.0003***	-.00003	0.0006***
	(0.00009)	(0.00006)	(0.00005)	(0.00003)	(0.0001)
Observations	18798	18793	18801	18782	18541
Mean	0.1171	0.0467	0.029	0.0178	

NOTE: OLS estimates of α_1^h (cohort relative to the kink) and β_1^h (slope change at the kink), conditional on a first-order birth cohort polynomial and linear time trends, shown from Equation (5). Outcomes in columns (1) to (4) are binary variables and are estimated using linear models. The Index is computed following Anderson (2008) and is standardized. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.7: Direct Financial Costs of Preventive Health Screening in Chile for Affiliates to the Public Health Insurance (FONASA)

	Public Health Care Provider				Private Health Care Provider	
	Total Cost	Copayment			Total Cost	Copayment
		Groups A-B (rate 0%)	Group C (rate 10%)	Group D (rate 20%)		Groups B-C-D (rate 40%)
Blood Glucose Test	1.6	0	0.16	0.32	2.4	0.96
Total Cholesterol Test	1.6	0	0.16	0.32	2.6	1.04
LDL Cholesterol Test	2.4	0	0.24	0.48	3.8	1.52
Visit to a General MD	6.7	0	0.67	1.34	16.7	6.68
Visit to an Urologist	11	0	1.1	2.2	29.4	11.76

NOTE: Values CPI adjusted to December 2017 dollars. The reported copayment rates correspond to the rates in effect in 2017. Since September 2022, all beneficiaries of public health insurance who receive care from public healthcare providers do not pay copayments `https://www.fonasa.cl/sites/fonasa/tramos`.
SOURCE: Financial costs for public providers: `https://www.fonasa.cl/sites/fonasa/adjuntos/MAI2017`. Financial costs for private providers: `https://www.fonasa.cl/sites/fonasa/adjuntos/MLE%202017`.

Table A.8: Distribution of Individual Men in the Sample by Type of Health Insurance.

	%
Public Health Insurance Group A (indigent)	18.14
Public Health Insurance Group B	22.27
Public Health Insurance Group C	14.74
Public Health Insurance Group D	12.74
Public Health Insurance (unknown group)	7.17
Private Health Insurance	16.44
Other or No-Insurance	8.5

Table A.9: Chilean National Health Survey Database: Existence of a Kink in the Prevalence of Selected Diseases - Laboratory Exams.

	High Level of Total Cholesterol (Total Cholesterol ≥ 240)		High Level of Bad Cholesterol (LDL > 100)		High Level of Glucose (Glucose>130)	
Order of the Polynomial	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)	(5)	(6)
Cohorts Relative to Kink $(cohort - c_0)$	0.0008**	0.003**	0.002***	0.002	-.0004	-.0003
	(0.0004)	(0.001)	(0.0006)	(0.002)	(0.0003)	(0.001)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		1.00e-05*		3.74e-06		-1.10e-06
		(7.08e-06)		(1.00e-05)		(9.30e-06)
Slope Change at Kink $((cohort - c_0) \times D)$	-.001**	-.003*	-.003***	-.001	0.0001	-.0006
	(0.0005)	(0.002)	(0.0008)	(0.003)	(0.0003)	(0.002)
BIC	101	110	1242	1250	-318	-311
Mean	0.081	0.081	0.401	0.401	0.079	0.079
Observations	872	872	872	872	1207	1207

NOTE: OLS estimates of α_1^h (cohort relative to the kink), α_2^h (square of cohort relative to kink), and β_1^h (slope change at the kink), conditional on a first-order birth cohort polynomial and linear time trends, shown from Equation (24). BIC is the Bayesian Information Criterion. Odd columns include in the list of controls a first-order polynomial in cohort. Even columns include in the list of controls a second-order polynomial in cohort. All outcomes are binary variables and are estimated using linear models. All regressions estimated using analytic weights provided in the survey database. Robust standard errors are reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.10: Chilean National Health Survey Database: Existence of a Kink in the Prevalence of Selected Diseases - Clinical Exams.

	Diastolic Blood Pressure		Systolic Blood Pressure		Hemo-Glucotest (Hgt)		Hgt>100		Bmi$\geq$30	
Order of the Polynomial	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Cohorts Relative to Kink $(cohort - c_0)$	0.017	-.027	-.064***	-.089	-.006	0.062	0.0006	0.0007	0.0007	0.0004
	(0.011)	(0.05)	(0.019)	(0.096)	(0.026)	(0.11)	(0.0006)	(0.002)	(0.0005)	(0.002)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-.0003		-.0003		0.0003		9.23e-08		4.77e-07
		(0.0003)		(0.0006)		(0.0007)		(1.00e-05)		(1.00e-05)
Slope Change at Kink $((cohort - c_0) \times D)$	-.046***	0.008	0.027	0.016	-.037	-.162	0.0004	0.00002	-.001	0.00003
	(0.014)	(0.06)	(0.023)	(0.114)	(0.036)	(0.148)	(0.0007)	(0.003)	(0.0007)	(0.003)
BIC	9498	9510	10649	10654	11659	11669	1560	1574	1743	1754
Mean	79.346	79.346	130.327	130.327	101.890	101.890	1.679	1.679	0.358	0.358
Observations	1282	1282	1282	1282	1272	1272	1282	1282	1275	1275

NOTE: OLS estimates of α_1^h (cohort relative to the kink), α_2^h (square of cohort relative to kink), and β_1^h (slope change at the kink), conditional on a first- or second-order birth cohort polynomial (in odd and even columns, respectively) and linear time trends, shown from Equation (24). BIC is the Bayesian Information Criterion. Outcomes in columns (7) to (10) are binary variables. All regressions estimated using analytic weights provided in the survey database. Robust standard errors are reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.11: Logit Estimates: Probability of Death by Age.

	Logit estimates
age	-.2682***
	(0.0181)
age^2	0.0032***
	(0.0003)
$(cohort - c_0)$	0.0032
	(0.0485)
$(cohort - c_0) \times D$	-.1115**
	(0.0562)

NOTE: Logit estimates of the survival model discussed in Section 4.2. Standard errors are clustered at the cohort level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.12: Multinomial Logit Estimates: Probability of Death by the Cause of Death and Age

	Hypertension	Diabetes	Ischaemich Heart Disease	Pulmonary Heart Disease	Other heart Diseases	Kidney Failure	Prostate Disease	Other Diseases
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
age	-.4997***	-.4702***	-.3955***	-.4995***	-.4093***	-.4838***	-.6059***	-.2665***
	(0.0211)	(0.0198)	(0.0187)	(0.0198)	(0.0175)	(0.0187)	(0.0288)	(0.0182)
age^2	0.0062***	0.0057***	0.0049***	0.0056***	0.0047***	0.0056***	0.0078***	0.0031***
	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0006)	(0.0003)
$(cohort - c_0)$	0.0554	-.0065	0.0161	0.0531	0.0084	0.0007	-.0067	0.0035
	(0.0531)	(0.0531)	(0.0517)	(0.0544)	(0.0501)	(0.0519)	(0.0614)	(0.0484)
$(cohort - c_0) \times D$	-.2594***	-.2028***	-.2108***	-.2731***	-.1912***	-.2194***	-.2529***	-.1132**
	(0.0626)	(0.063)	(0.0629)	(0.0614)	(0.0583)	(0.0607)	(0.0764)	(0.0559)

NOTE: Multinomial logit estimates of the survival model discussed in Section 4.1. Standard errors are clustered at the cohort level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.13: Existence of a Kink in the Slope of the EPW. Sensitivity Analysis to the Order of the Polynomial on The Running Variable.

Order of the polynomial	Four-Waves Sample		Two-Waves Sample	
	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)
Cohorts Relative to Kink $(cohort - c_0)$	16.8835	247.4569***	-29.4056	278.6383***
	(15.3540)	(55.0313)	(18.2088)	(61.9476)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		0.6283**		0.8281***
		(0.2506)		(0.3034)
Slope Change at Kink $((cohort - c_0) \times D)$	1037.5890***	325.7517***	1134.4460***	245.9527***
	(23.5525)	(85.7190)	(26.2401)	(95.1346)
BIC	479650	479255	221722	221471
Mean	135193	135193	160320	160320
Observations	18836	18836	8685	8685

NOTE: OLS estimates of α_1^h (cohort relative to the kink), α_2^h (square of cohort relative to kink), and β_1^h (slope change at the kink), conditional on a first- or second- order birth cohort polynomial (in odd and even columns, respectively) and linear time trends, shown from Equation (25). The "four-waves" sample includes observations from EPS waves conducted in 2004, 2006, 2009 and 2015. The "two-waves" sample includes observations from EPS waves conducted in 2009 and 2015 (see Section 3 for a description of the two samples). Expected Pension Wealth is CPI adjusted to December 2018 dollars. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.14: Existence of a Kink in the Slope of Individual Voluntary Pension Savings, Other Financial and Non-Financial Savings, and Households' Consumption. Sensitivity Analysis to the Order of the Polynomial on the Running Variable.

	Has Voluntary Pension Savings		Household Has Financial Assets		Household Has Non-Financial Savings		Monthly Household Expenditure	
Order of the Polynomial	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cohorts Relative to kink $(cohort - c_0)$	0.0002**	-.0004	0.0011	-.0031	0.0055***	0.0083*	19.7861	86.9078
	(0.00009)	(0.0003)	(0.0022)	(0.0057)	(0.0016)	(0.005)	(19.8723)	(87.2892)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-2.00e-06		-.0001		0.0002		0.3432
		(2.00e-06)		(0.0002)		(0.0002)		(0.3449)
Slope Change at Kink $((cohort - c_0) \times D)$	-.0007***	0.0004	0.0024	0.0129	-.0046	-.0030	-42.7917	-120.6474
	(0.0001)	(0.0005)	(0.0037)	(0.01)	(0.003)	(0.0084)	(42.8708)	(120.9849)
BIC	6016	6023	3813	3826	2917	2928	489943	489961
Mean	0.1372	0.1372	0.4208	0.4208	0.1768	0.1768	1326	1326
Observations	8737	8737	2279	2279	2279	2279	18560	18560

NOTE:OLS estimates of α_1^h (cohort relative to the kink), α_2^h (square of cohort relative to kink), and β_1^h (slope change at the kink), conditional on a first- or second- order birth cohort polynomial (in odd and even columns, respectively) and linear time trends, shown from Equation (24). BIC is the Bayesian Information Criterion. Outcomes in columns (1) to (6) are binary variables and are estimated with linear models. Household expenditure (Column (4)) is CPI adjusted to December 2018 dollars. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.15: (Non-)Existence of a kink in the Slope of Predetermined Observable Characteristics. Sensitivity Analysis to the Order of the Polynomial on the Running Variable.

Order of the Polynomial	Born in Chile's Metropolitan Area		High School Completed		Highest Level of Risk Aversion	
	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)	(5)	(6)
Cohorts Relative to Kink $(cohort - c_0)$	0.0003***	0.0002	0.0008***	0.0004	-.0003***	-.00003
	(0.0001)	(0.0004)	(0.0001)	(0.0004)	(0.00007)	(0.0003)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-3.39e-07		-2.00e-06		1.00e-06
		(2.00e-06)		(2.00e-06)		(1.00e-06)
Slope Change at Kink $((cohort - c_0) \times D)$	-.00008	0.00007	3.86e-08	0.0007	-.00004	-.0002
	(0.0001)	(0.0006)	(0.0001)	(0.0005)	(0.0001)	(0.0005)
BIC	24216	24236	26088	26102	19537	19553
Mean	0.309	0.309	0.5714	0.5714	0.6335	0.6335
Observations	18758	18758	18836	18836	14216	14216

NOTE: OLS estimates of α_1^h (cohort relative to the kink), α_2^h (square of cohort relative to kink), and β_1^h (slope change at the kink), conditional on a first- or second- order birth cohort polynomial (in odd and even columns, respectively) and linear time trends, shown from Equation (24). BIC is the Bayesian Information Criterion. All outcomes are binary variables and are estimated with linear models. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.16: FRKD Estimates of the Effect of EPW on Health Investments: Screenings. Sensitivity Analysis to the Order of the Polynomial on the Running Variable.

	Screenings							
	Hypertension		Diabetes		Cholesterol		Prostate	
Order of the Polynomial	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cohorts Relative to Kink $(cohort - c_0)$	-.0011***	-.0017*	-.0009***	-.0025**	-.0009***	-.0026**	-.0014***	-.0024***
	(0.0001)	(0.0009)	(0.00009)	(0.0011)	(0.0001)	(0.0012)	(0.00009)	(0.0008)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-2.00e-06		-6.00e-06		-6.00e-06		-4.00e-06
		(3.00e-06)		(4.00e-06)		(4.00e-06)		(3.00e-06)
EPW	0.0006***	0.0022	0.0004***	0.0044*	0.0004***	0.0049*	0.0006***	0.0024
	(0.0001)	(0.0021)	(0.0001)	(0.0025)	(0.0001)	(0.0027)	(0.0001)	(0.0018)
Romano-Wolf p-value	0.001	0.4486	0.002	0.1548	0.001	0.1548	0.001	0.3337
95% Robust confidence set	[.0003,.0008]	[-.0022,.0103]	[.0001,.0006]	[.0006,.0141]	[.0002,.0007]	[.0007,.0155]	[.0004,.0008]	[-.0011,.0091]
AR test p-value	3.00e-06	0.2788	0.0023	0.0281	0.0004	0.0263	1.83e-07	0.1543
F-stat	1861.6470	6.7288	1862.3720	6.5349	1868.5290	6.2406	1853.9960	7.7259
BIC	-14945	-14100	-15021	-11066	-14150	-10062	-19069	-17159
Observations	8679	8679	8683	8683	8690	8690	8572	8572
Mean	0.299	0.299	0.2918	0.2918	0.3251	0.3251	0.1514	0.1514

NOTE: 2SLS estimates of the effect of Expected Pension Wealth (EPW) on health outcomes. "Cohorts relative to kink" is the estimate of α_1^h, "Square of cohorts relative to kink" is the estimate of α_2^h, and "EPW" is the estimate of τ in Equation (26). EPW is measured in thousands of dollars and is CPI adjusted to December 2018 dollars. All outcomes are binary variables and are estimated using linear models. Odd columns include in the list of controls a first-order polynomial in cohort. Even columns include in the list of controls a second-order polynomial in cohort. All regressions include linear temporal trends. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.. Romano-Wolf p-values are step-down adjusted p-values robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b), implemented using the Stata command rwolf2 by Clarke et al. (2020). 95% confidence set and the AR test p-value are robust to the inclusion of weak instruments, are based on the minimum distance version of the Anderson-Rubin test statistics, and are implemented using the Stata command rivtest by Finlay (2009). F-stats is the F-statistic to test the statistical significance of the instrument in the first stage. BIC is the Bayesian Information Criterion.

Table A.17: FRKD Estimates of the Effect of EPW on Health Investments: MD Visits, Influenza Vaccination and Index. Sensitivity Analysis to the Order of the Polynomial of the Running Variable.

	Visited Doctor's Office		Influenza Vaccination		Index	
Order of the Polynomial	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(9)	(10)	(11)	(12)	(13)	(14)
Cohorts Relative to Kink $(cohort - c_0)$	-.0009***	-.0007	-.0013***	-.0009	-.0027***	-.0039***
	(0.00009)	(0.0006)	(0.0001)	(0.0009)	(0.0002)	(0.0015)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		8.51e-07		5.00e-06		-2.00e-06
		(2.00e-06)		(3.00e-06)		(5.00e-06)
EPW	0.001***	0.0008	0.0012***	0.0023	0.0016***	0.0058*
	(0.0002)	(0.0013)	(0.0001)	(0.002)	(0.0002)	(0.0033)
Romano-Wolf p-value	0.001	0.5654	0.001	0.4486		
95% Robust confidence set	[.0007,.0013]	[-.0024,.0035]	[.001,.0014]	[-.0018,.0101]	[.0013,.002]	[.0002,.0188]
AR test p-value	1.13e-10	0.644	3.68e-25	0.2375	1.40e-18	0.0526
F-stat	892.4926	14.2306	1869.1120	6.6838	1828.9320	7.2032
BIC	-21134	-21151	-15634	-14846	-9097	-6114
Observations	14871	14871	8685	8685	8504	8504
Mean	0.4428	0.4428	0.2168	0.2168		

NOTE: 2SLS estimates of the effect of Expected Pension Wealth (EPW) on health outcomes. "Cohorts relative to kink" is the estimate of α_1^h, "Square of cohorts relative to kink" is the estimate of α_2^h, and "EPW" is the estimate of τ in Equation (26). EPW is measured in thousands of dollars and is CPI adjusted to December 2018 dollars. Outcomes in columns (1) to (4) are binary variables and are estimated using linear models. The index includes the outcomes of this Table and those in Table A.16, is computed following Anderson (2008), and is standardized. Odd columns include in the list of controls a first-order polynomial in cohort. Even columns include in the list of controls a second-order polynomial in cohort. All regressions include linear temporal trends. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Romano-Wolf p-values are step-down adjusted p-values robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b), implemented using the Stata command rwolf2 by Clarke et al. (2020). 95% confidence set and the AR test p-value are robust to the inclusion of weak instruments, are based on the minimum distance version of the Anderson-Rubin test statistics, and are implemented using the Stata command rivtest by Finlay (2009). F-stats is the F-statistic to test the statistical significance of the instrument in the first stage. BIC is the Bayesian Information Criterion.

Table A.18: FRKD Estimates of the Effect of EPW on Health Related Behaviors. Sensitivity Analysis to the Order of the Polynomial on the Running Variable.

	Smokes Tobacco		Number of Cigarettes per Month		Drinks Alcohol	
Order of the Polynomial	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)	(5)	(6)
Cohorts Relative to Kink $(cohort - c_0)$	0.0008***	-.0006	0.1107***	-.0963	0.0003***	-.0004
	(0.00009)	(0.0008)	(0.0288)	(0.2306)	(0.00008)	(0.0007)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-5.00e-06*		-.0008		-2.00e-06
		(3.00e-06)		(0.0008)		(2.00e-06)
EPW	-.0005***	0.0025	-.1433***	0.2765	0.00007	0.0019
	(0.0001)	(0.0017)	(0.0405)	(0.4969)	(0.0001)	(0.0014)
Romano-Wolf p-value	0.001	0.2797	0.001	0.7892	0.5834	0.3457
95% Robust confidence set	[-.0008,-.0003]	[-.0005,.0074]	[-.2219,-.0678]	[-.7662,1.4766]	[-.0002,.0003]	[-.0008,.0059]
AR test p-value	0.00006	0.1015	0.0003	0.6159	0.5627	0.1551
F-stat	1929.4740	14.3498	1926.1980	14.2235	1935.8670	14.3805
BIC	-27487	-23560	188951	189606	-26841	-25503
Observations	18781	18781	18746	18746	18780	18780
Mean	0.3825	0.3825	71.2213	71.2213	0.5879	0.5879

	Frequency of Alcohol Consumption per Week		Physically Inactive		Index	
Order of the Polynomial	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(7)	(8)	(9)	(10)	(11)	(12)
Cohorts Relative to Kink $(cohort - c_0)$	0.0005	-.0003	-.0003***	0.0004	0.0004***	-.0002
	(0.0003)	(0.0026)	(0.00006)	(0.0006)	(0.0001)	(0.0008)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-1.00e-06		2.00e-06		-2.00e-06
		(9.00e-06)		(2.00e-06)		(3.00e-06)
EPW	0.0006	0.0035	-.0006***	-.0023*	-.0007***	0.0005
	(0.0005)	(0.0057)	(0.0001)	(0.0013)	(0.0001)	(0.0018)
Romano-Wolf p-value	0.3187	0.7892	0.001	0.1618		
95% Robust confidence set	[-.0003,.0016]	[-.008,.0176]	[-.0008,-.0004]	[-.0058,-.0001]	[-.001,-.0005]	[-.0032,.0048]
AR test p-value	0.1768	0.5122	7.73e-10	0.0473	6.26e-07	0.7587
F-stat	1943.0630	14.5375	1934.8360	14.4705	1905.8550	14.4139
BIC	28734	28930	-29767	-27556	-18149	-18003
Observations	18547	18547	18681	18681	18182	18182
Mean	1.3480	1.3480	0.6962	0.6962		

NOTE: 2SLS estimates of the effect of Expected Pension Wealth (EPW) on health outcomes. "Cohorts relative to kink" is the estimate of α_1^h, "Square of cohorts relative to kink" is the estimate of α_2^h, and "EPW" is the estimate of τ in Equation (26). EPW is measured in thousands of dollars and is CPI adjusted to December 2018 dollars. Outcomes in columns (1), (2), (5), (6), (9), and (10) are binary variables and are estimated using linear models. The Index is computed following Anderson (2008) and is standardized. Odd columns include in the list of controls a first-order polynomial in cohort. Even columns include in the list of controls a second-order polynomial in cohort. All regressions include linear temporal trends. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Romano-Wolf p-values are step-down adjusted p-values robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b), implemented using the Stata command rwolf2 by Clarke et al. (2020). 95% confidence set and the AR test p-value are robust to the inclusion of weak instruments, are based on the minimum distance version of the Anderson-Rubin test statistics, and are implemented using the Stata command rivtest by Finlay (2009). F-stats is the F-statistic to test the statistical significance of the instrument in the first stage. BIC is the Bayesian Information Criterion.

Table A.19: FRKD Estimates of the Effect of EPW on Diagnosed Conditions. Sensitivity Analysis to the Order of the Polynomial on the Running Variable.

Order of the Polynomial	Hypertension		Diabetes		Heart Disease	
	1^{st}	2^{nd}	1^{st}	2^{nd}	1^{st}	2^{nd}
	(1)	(2)	(3)	(4)	(5)	(6)
Cohorts Relative to Kink $(cohort - c_0)$	-.0010***	-.0015***	-.0004***	-.0014***	-.0003***	-.0006**
	(0.00007)	(0.0005)	(0.00005)	(0.0005)	(0.00004)	(0.0003)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-1.00e-06		-3.00e-06*		-6.98e-07
		(2.00e-06)		(2.00e-06)		(9.60e-07)
EPW	0.0005***	0.0019*	0.0002***	0.0024**	0.0002***	0.001*
	(0.00009)	(0.0011)	(0.00006)	(0.0009)	(0.00004)	(0.0005)
Romano-Wolf p-value	0.001	0.1339	0.005	0.0559	0.001	0.1339
95% Robust confidence set	[.0003,.0007]	[.0001,.0052]	[.0001,.0003]	[.001,.0055]	[.0002,.0003]	[.0001,.0026]
AR test p-value	4.93e-09	0.0442	0.0018	0.0007	2.17e-08	0.0277
F-stat	1934.6070	14.5636	1930.8610	14.4118	1944.3370	14.8923
BIC	-43953	-39768	-59139	-47273	-66970	-62975
Observations	18798	18798	18793	18793	18801	18801
Mean	0.1171	0.1171	0.0467	0.0467	0.029	0.029

Order of the Polynomial	Kidney Failure		Index	
	1^{st}	2^{nd}	1^{st}	2^{nd}
	(7)	(8)	(9)	(10)
Cohorts Relative to Kink $(cohort - c_0)$	-.00002	-.0003*	-.0013***	-.0031***
	(0.00002)	(0.0002)	(0.00009)	(0.0009)
Square of Cohorts Relative to Kink $(cohort - c_0)^2$		-1.00e-06**		-6.00e-06*
		(5.66e-07)		(3.00e-06)
EPW	-.00003	0.0005	0.0006***	0.005***
	(0.00003)	(0.0003)	(0.0001)	(0.0019)
Romano-Wolf p-value	0.2248	0.1339		
95% Robust confidence set	[-.0001,0]	[-.0001,.0015]	[.0004,.0008]	[.0022,.0114]
AR test p-value	0.2306	0.1151	1.68e-07	0.00009
F-stat	1931.8560	14.1601	1903.8680	14.6497
BIC	-76005	-74098	-29698	-18150
Observations	18782	18782	18541	18541
Mean	0.0178	0.0178		

NOTE: 2SLS estimates of the effect of Expected Pension Wealth (EPW) on health outcomes. "Cohorts relative to kink" is the estimate of α_1^h, "Square of cohorts relative to kink" is the estimate of α_2^h, and "EPW" is the estimate of τ in Equation (26). EPW is measured in thousands of dollars and is CPI adjusted to December 2018 dollars. All outcomes are binary variables and are estimated using linear models, with the exception of the Index, that is computed following Anderson (2008) and is standardized. Odd columns include in the list of controls a first-order polynomial in cohort. Even columns include in the list of controls a second-order polynomial in cohort. All regressions include linear temporal trends. Standard errors are clustered at the individual level and reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Romano-Wolf p-values are step-down adjusted p-values robust to multiple hypothesis testing (Romano and Wolf 2005a and Romano and Wolf 2005b), implemented using the Stata command rwolf2 by Clarke et al. (2020). 95% confidence set and the AR test p-value are robust to the inclusion of weak instruments, are based on the minimum distance version of the Anderson-Rubin test statistics, and are implemented using the Stata command rivtest by Finlay (2009). F-stats is the F-statistic to test the statistical significance of the instrument in the first stage. BIC is the Bayesian Information Criterion.