Social Security, Retirement, and Disability

230B: Public Economics

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RETIREMENT PROBLEM

Life-Cycle: Individuals ability to work declines with aging and they continue to live after they are unwilling/unable to work

Standard Life-Cycle Model Prediction: Absent any government program, rational individual would save while working to consume savings while retired [Modigliani life cycle graph]

Optimal saving problem is extremely complex: uncertainty in returns to saving, in life-span, in future ability/opportunities to work, in future tastes/health

In practice: When government was small $\Rightarrow$ Most people worked until unable to (often until death) and then were taken care of by family members

Today: Government is taxing workers to provide for retirees through social security retirement systems

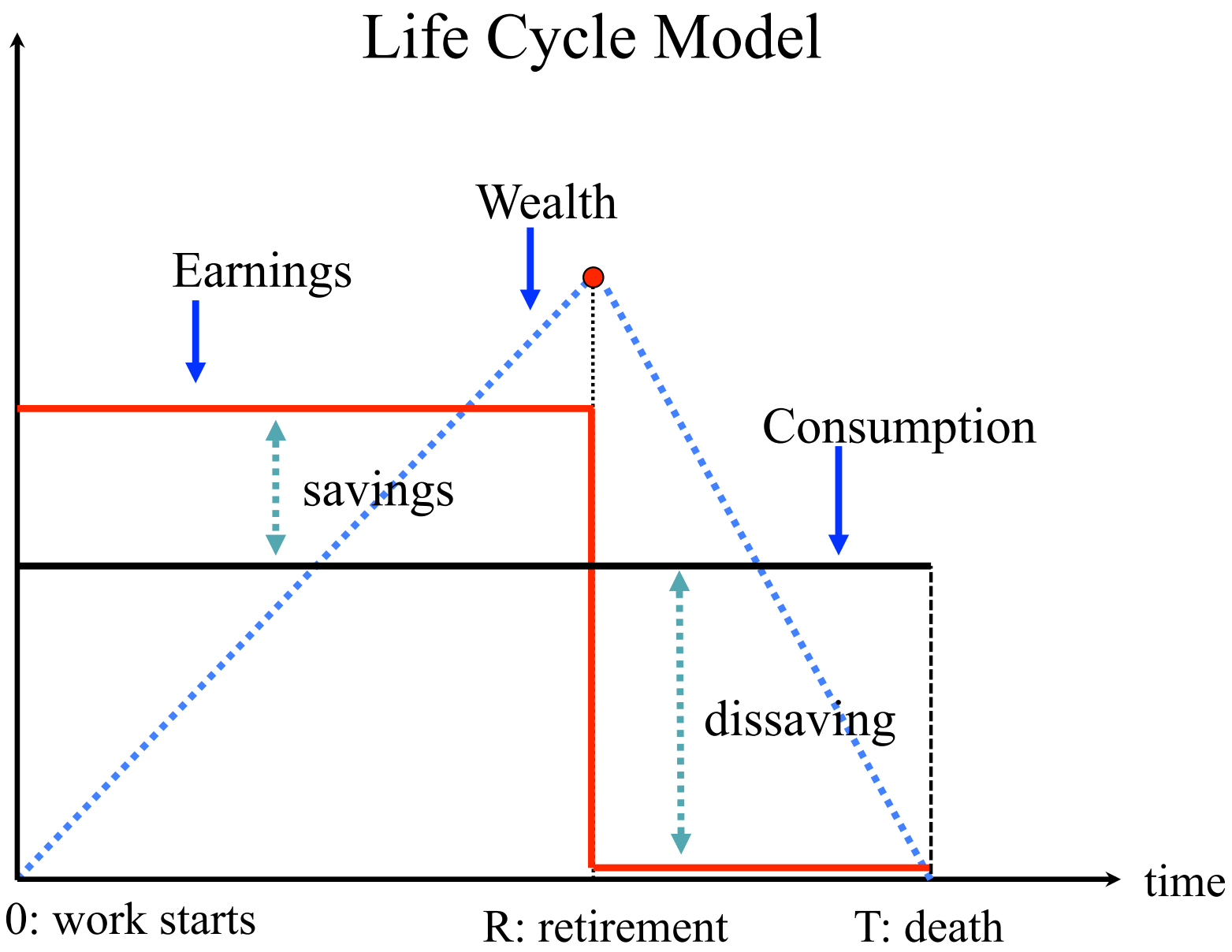
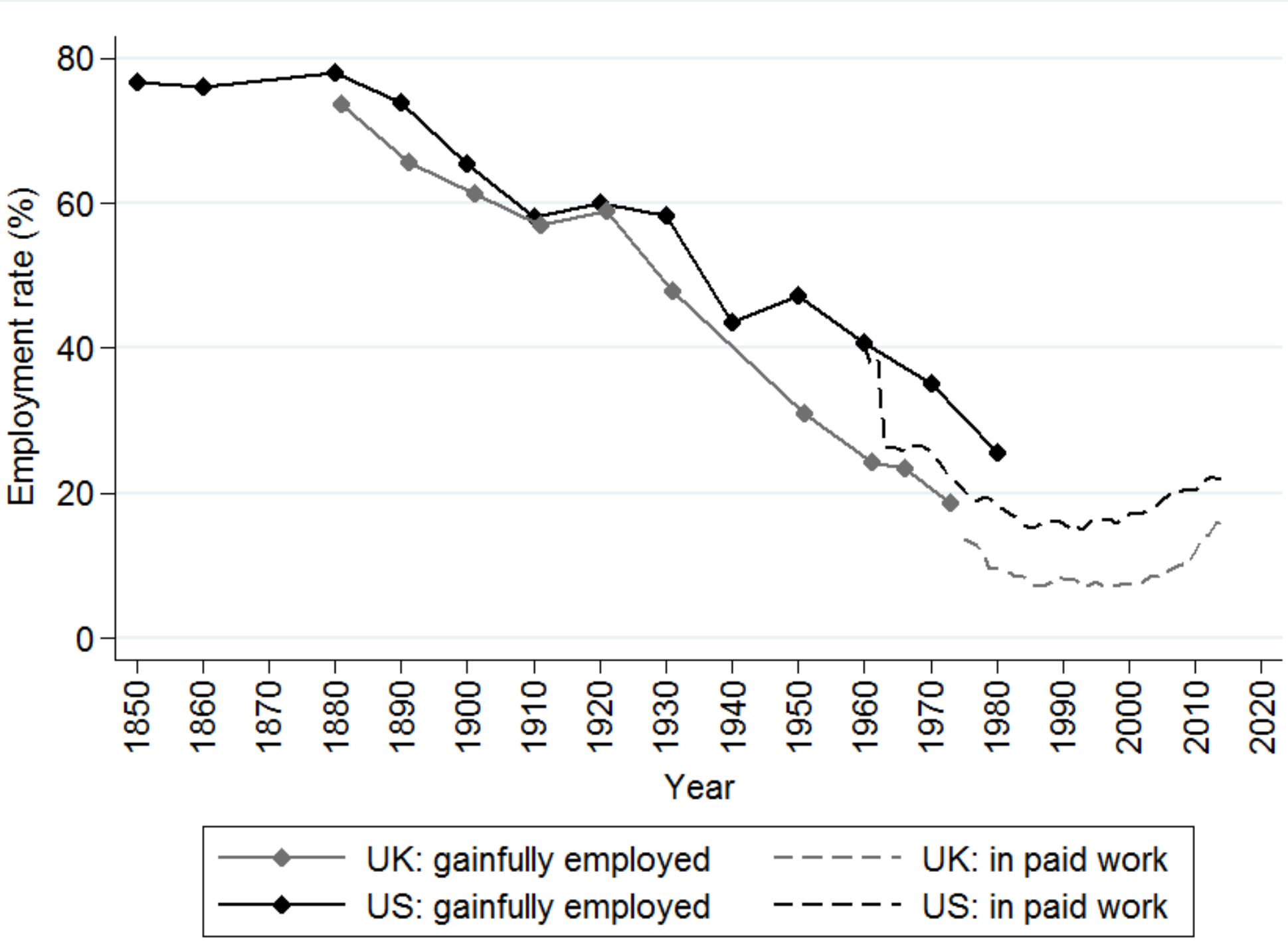
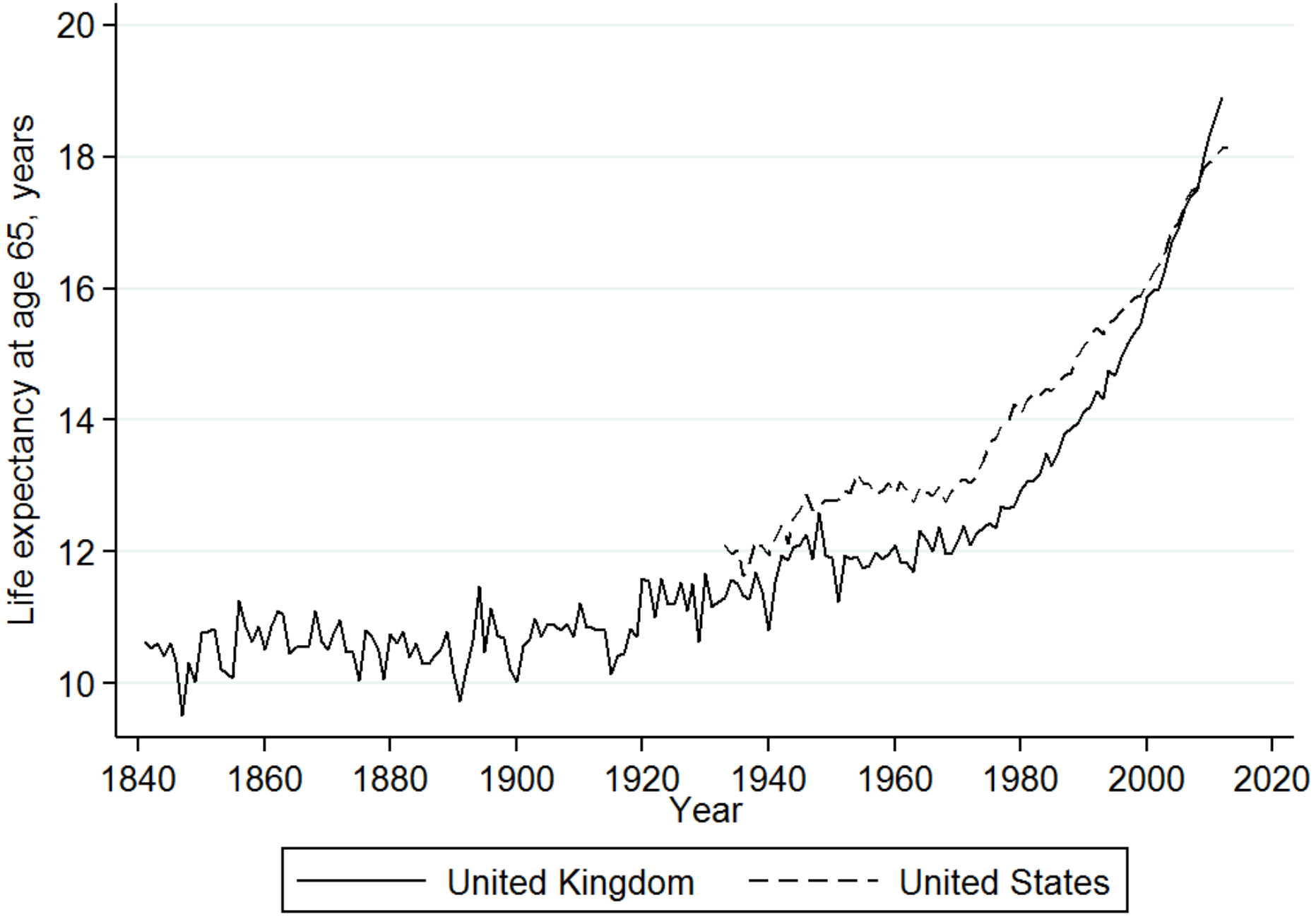

Life Cycle Model
Wealth
Earnings
Consumption
savings
dissaving
time
0: work starts
R: retirement
T: death

Figure 2.6: Employment rate of men aged 65+ in the UK and the US



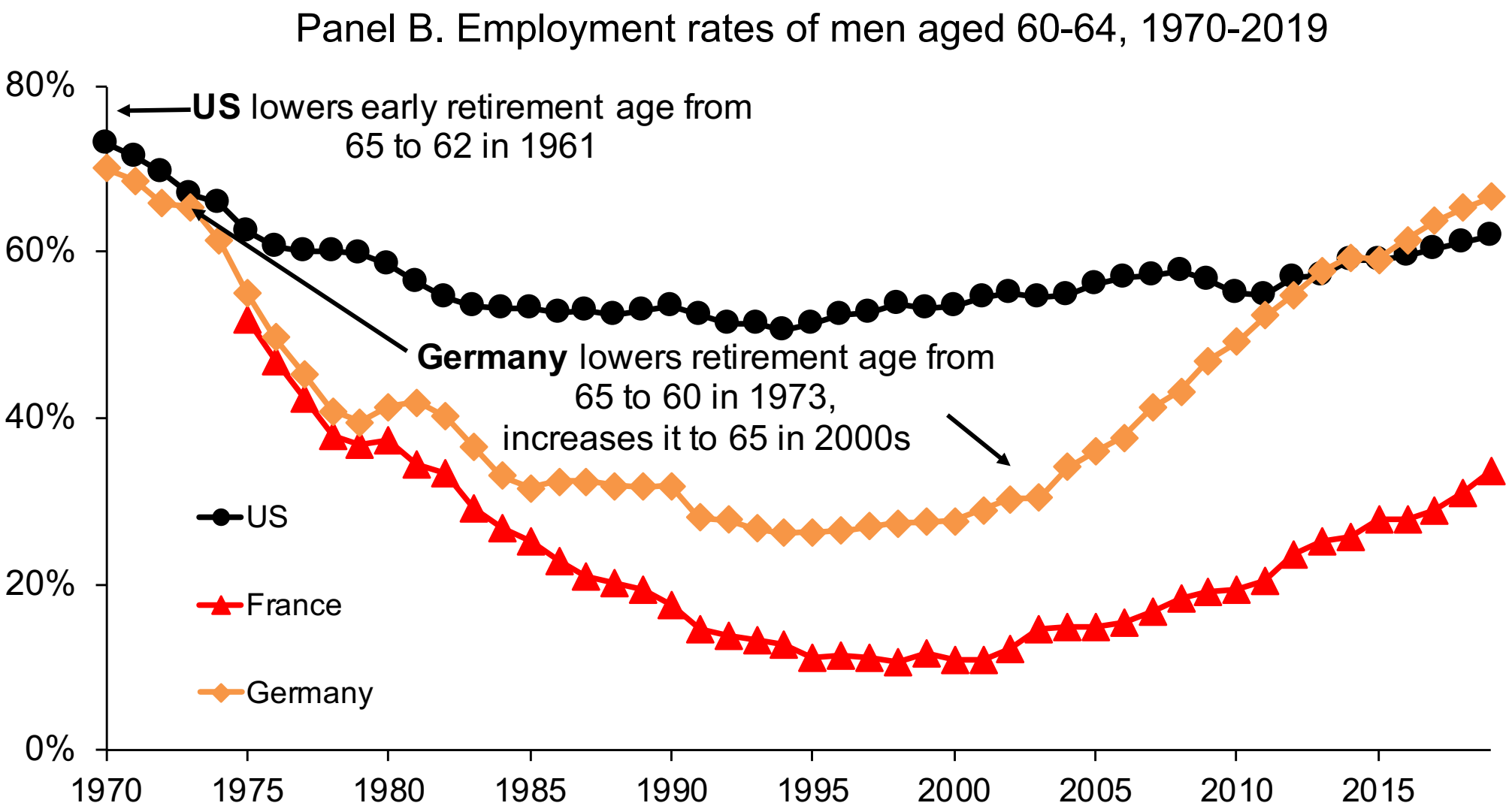
Source: Blundell, French, and Tetlow (2017)

Figure 2.7: Life expectancy of men at age 65 in the UK and the US



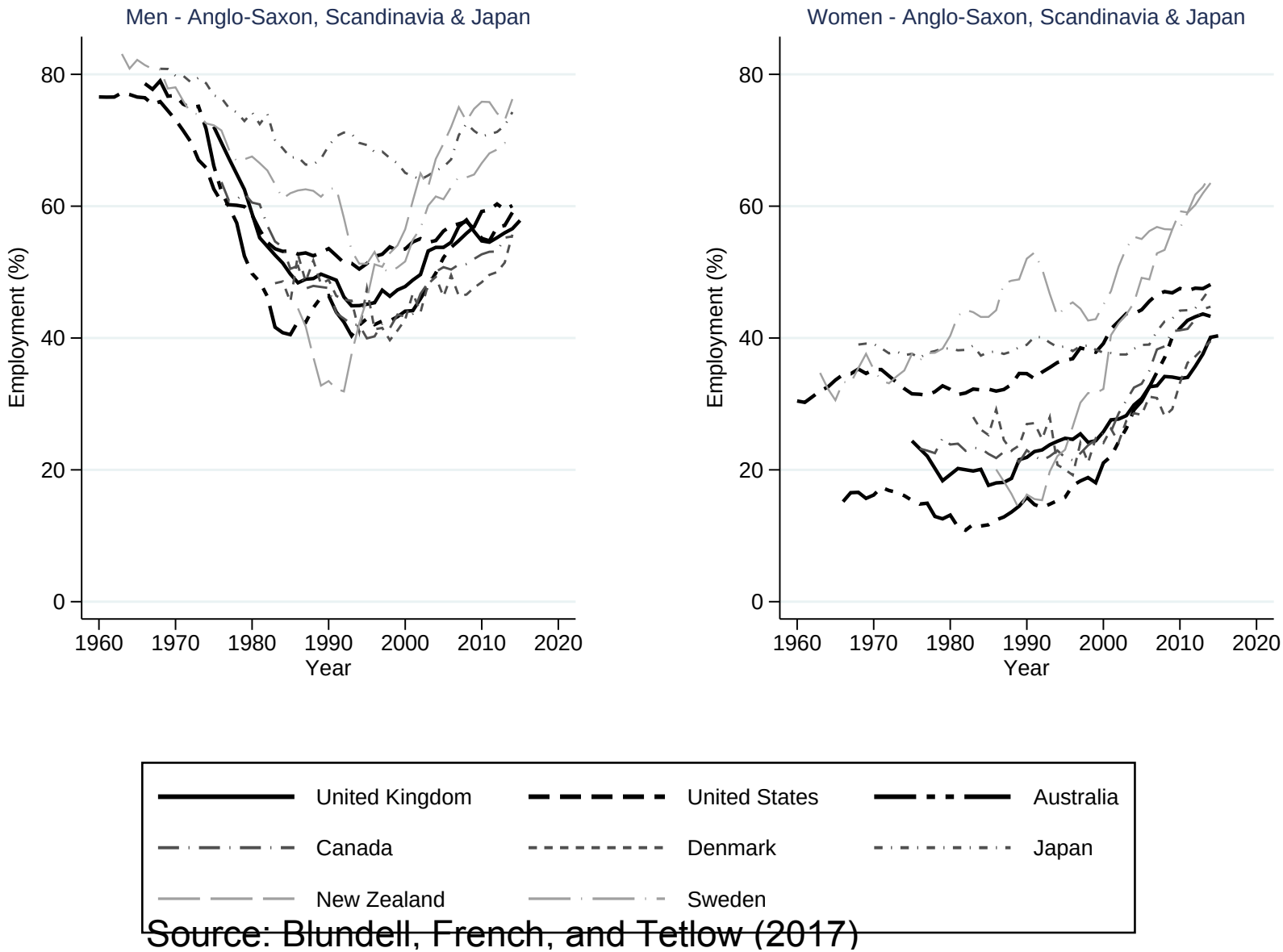
Source: UK data from the Office for National Statistics, US data from the Human Mortality Database.

Source: Blundell, French, and Tetlow (2017)

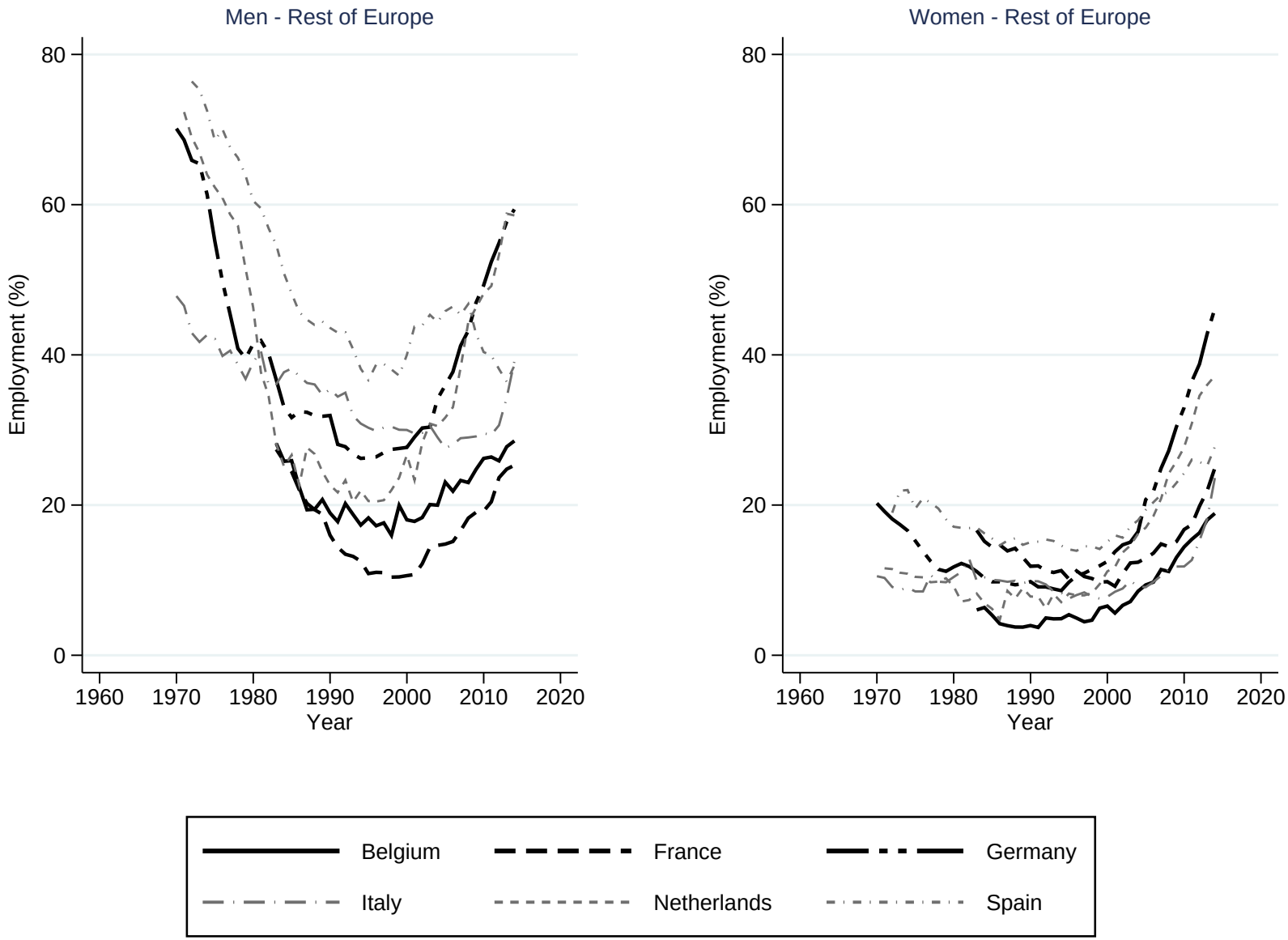


Source: Saez '21 using OECD database

Figure 2.2: Employment of those aged 60–64



Source: Blundell, French, and Tetlow (2017)



Source: Blundell, French, and Tetlow (2017)

GOVT INTERVENTION IN RETIREMENT POLICY

Actual Retirement Programs: All OECD countries implement substantial retirement programs (substantial share of GDP around 6-12%, US smaller around 6%)

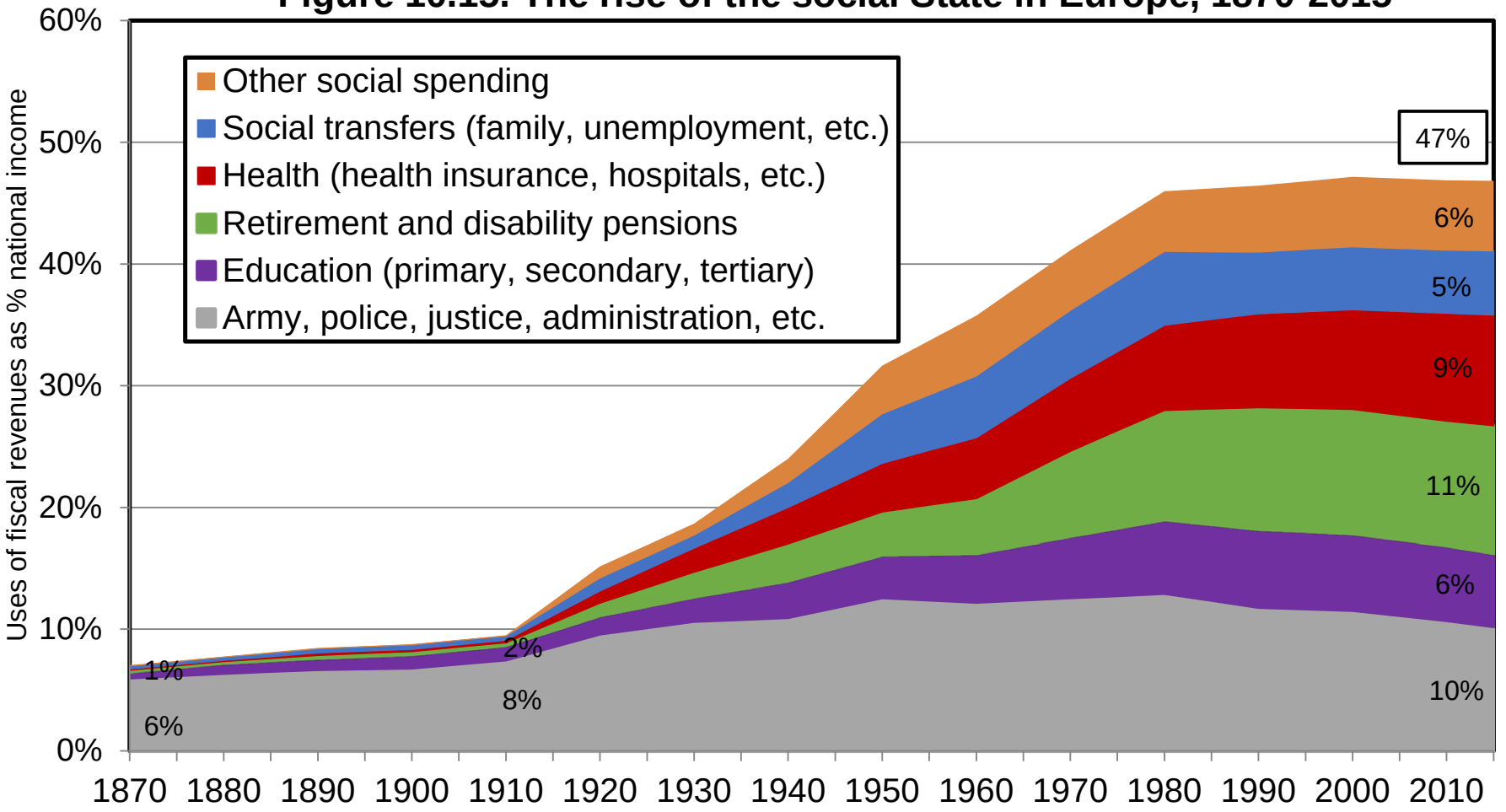
Started in first part of 20th century and have been growing. Common structure:

Individual pay social security contributions (payroll taxes) while working and receive retirement benefits when they stop working till the end of their life (annuity)

Various types of retirement programs (private or public):

(a) Funded vs. Unfunded, (b) Defined Benefits vs. Defined Contributions, (c) Mandatory vs. Voluntary, (d) Universal vs. Means-tested, (e) Annuitized benefits vs. lumpsum

Figure 10.15. The rise of the social State in Europe, 1870-2015



Interpretation. In 2015, fiscal revenues represented 47% of national income on average in Western Europe et were used as follows: 10% of national income for regalian expenditure (army, police, justice, general administration, basic infrastructure: roads, etc.); 6% for education; 11% for pensions; 9% for health; 5% for social transfers (other than pensions); 6% for other social spending (housing, etc.). Before 1914, regalian expenditure absorbed almost all fiscal revenues. **Note.** The evolution depicted here is the average of Germany, France, Britain and Sweden (see figure 10.14). Sources and séries: see piketty.pse.ens.fr/ideology.

FUNDED VS. UNFUNDED PROGRAMS

Unfunded (pay-as-you-go): benefits of current retirees paid out of contributions from current workers [generational link]

current benefits = current contributions

Funded: workers contributions are invested in financial assets and will pay for benefits when they retire [no generational link]

current benefits = past contributions + market returns on past contributions

Defined Contributions vs. Defined Benefits

Defined Contributions (DC): System specifies the level of contributions [e.g., 10% of earnings]. Benefits then depend on level of contributions and returns on contributions.

Defined Benefits (DB): System specifies the level of benefits [e.g., 60% of average earnings during career]. Contributions adjusted to meet required level of benefits.

DC pro: Easier to implement and contributions-benefit link most transparent (but harder to do redistribution in DC plan)

DC con: Benefits are risky. Risk in benefits worse than risk in contributions [as workers can adjust and absorb shocks more easily than retirees].

EXAMPLES

1) Unfunded DB: most public retirement programs (such as Social Security in the US)

2) Funded DB: traditional US private employer pension plans [e.g., annual benefits = 2.5% $\times$# years worked$\times$ last salary], a govt DB retirement program could also be funded [govt invests payroll taxes into "sovereign fund" as in Norway]

3) Funded DC: new US private employer pensions plans [401(k)s]: worker contributes fraction of salary and invests contributions in financial assets in account managed by private pension fund

4) Unfunded DC: Notional accounts in some government retirement programs (Sweden): payroll taxes yield fictitious returns and benefits are based on contributions plus this fictitious (notional) return.

WHY SHOULD GOVERNMENT INTERVENE?

1) Individual failures to behave like in standard econ model. More of a model failure than "individual failure". Most individuals unable to save adequately for retirement on their own

Large fraction of individuals do not accumulate for their retirement absent government/institution/employer help

2) Market Failure: Adverse selection in annuitization market

3) Redistribution:

(a) Cross-sectional basis: older people have lower earning ability and hence are more in need of support

(b) Lifetime basis: Retirement programs can redistribute based on life-time earnings (instead of annual income)

SOURCES OF RETIREMENT INCOME IN THE US

1) Govt provided retirement benefits (US Social Security): For 2/3 of retirees, SS is more than 50% of income. 1/3 of elderly households depend almost entirely on SS.

2) Home Ownership: 75% of US elderly are homeowners. Home purchase with 30-year mortgage = life-cycle savings

3) Employer pensions (tax favored): 40-45% of elderly US households have employer pensions. Two types:

a) Traditional: DB and mandatory: **employer** carries full risk [in sharp decline, many in default, non-portable across jobs]

b) New: DC and elective: 401(k)s, **employee** carries full risk but portable

4) Extra savings through non-tax favored instruments: significant only for wealthy minority [=10% of retirees]

SOURCES OF RETIREMENT INCOME IN THE US

Key lesson: Bottom 90% wealth is

(a) housing (net of mortgage debt)

(b) pensions

(c) minus other debts (consumer credit, student loans)

All 3 components are heavily affected by government policy (education financing), institutions (such as employers pensions), financial regulations (mortgage refinance, credit card and loans)

MODEL: MYOPIC SAVERS

1) Some individuals are rational:

$$\max u(c_1) + \delta \cdot u(c_2) \text{ subject to}$$

$c_1 + s = w$ and $c_2 = s \cdot (1 + r)$, $c_1 + c_2/(1 + r) = w$ [draw graph]

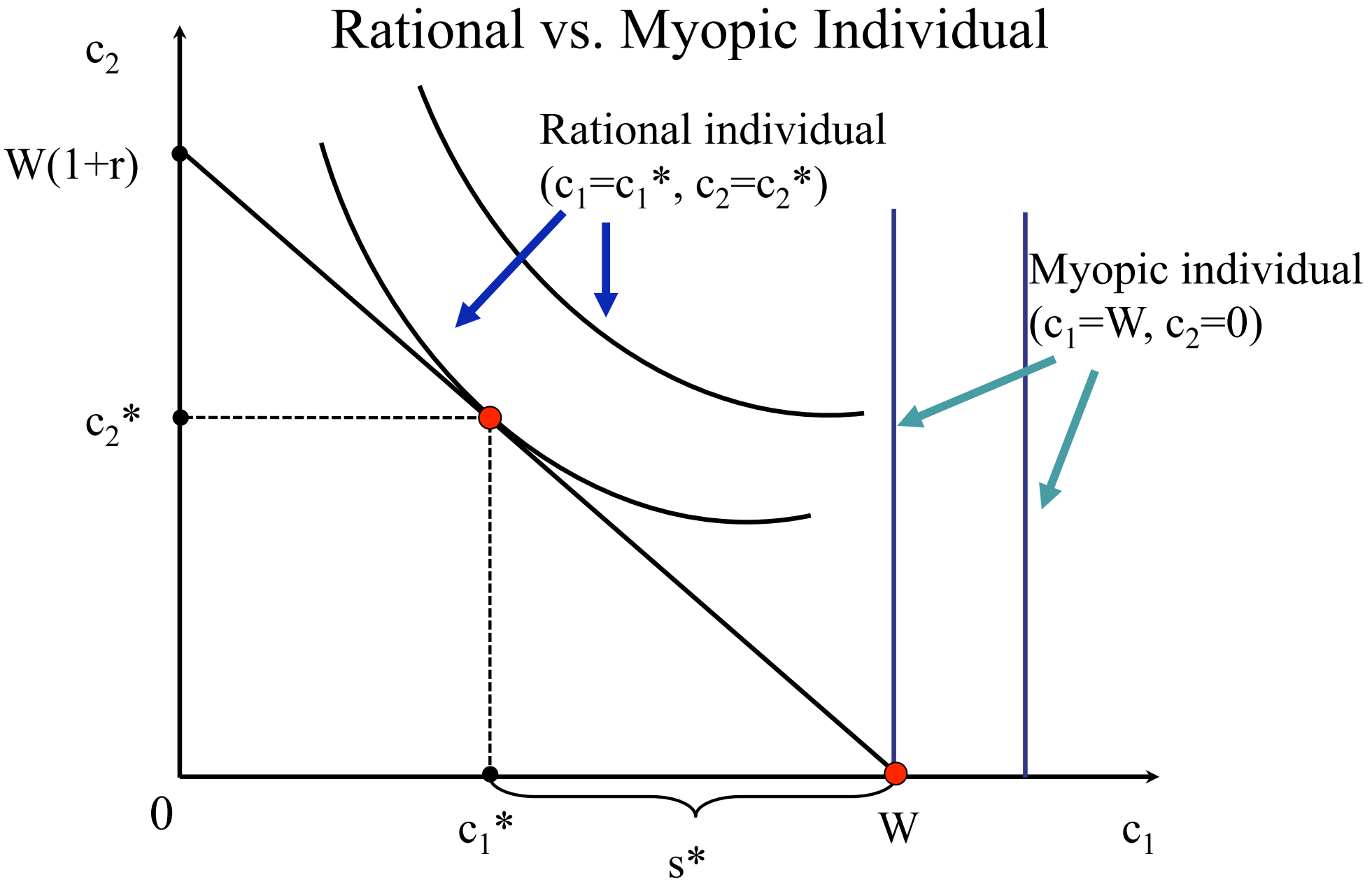
FOC: $u'(c_2)/u'(c_1) = 1/[(1 + r)\delta]$, let s^* be optimal saving

Example: If $\delta = 1$ and $r = 0$ then $s^* = w/2$ and $c_1 = c_2 = w/2$

2) Some individuals are myopic:

$$\max u(c_1) \text{ subject to}$$

$c_1 + s = w$ and $c_2 = s \cdot (1 + r) \Rightarrow c_1 = w$ and $s = c_2 = 0$


Rational vs. Myopic Individual
c2
W(1+r)
c2*
Rational individual
(c1=c1*, c2=c2*)
Myopic individual
(c1=W, c2=0)
0
c1*
s*
W
c1

MODEL: MYOPIC SAVERS

Social welfare is always $u(c_1) + \delta \cdot u(c_2)$

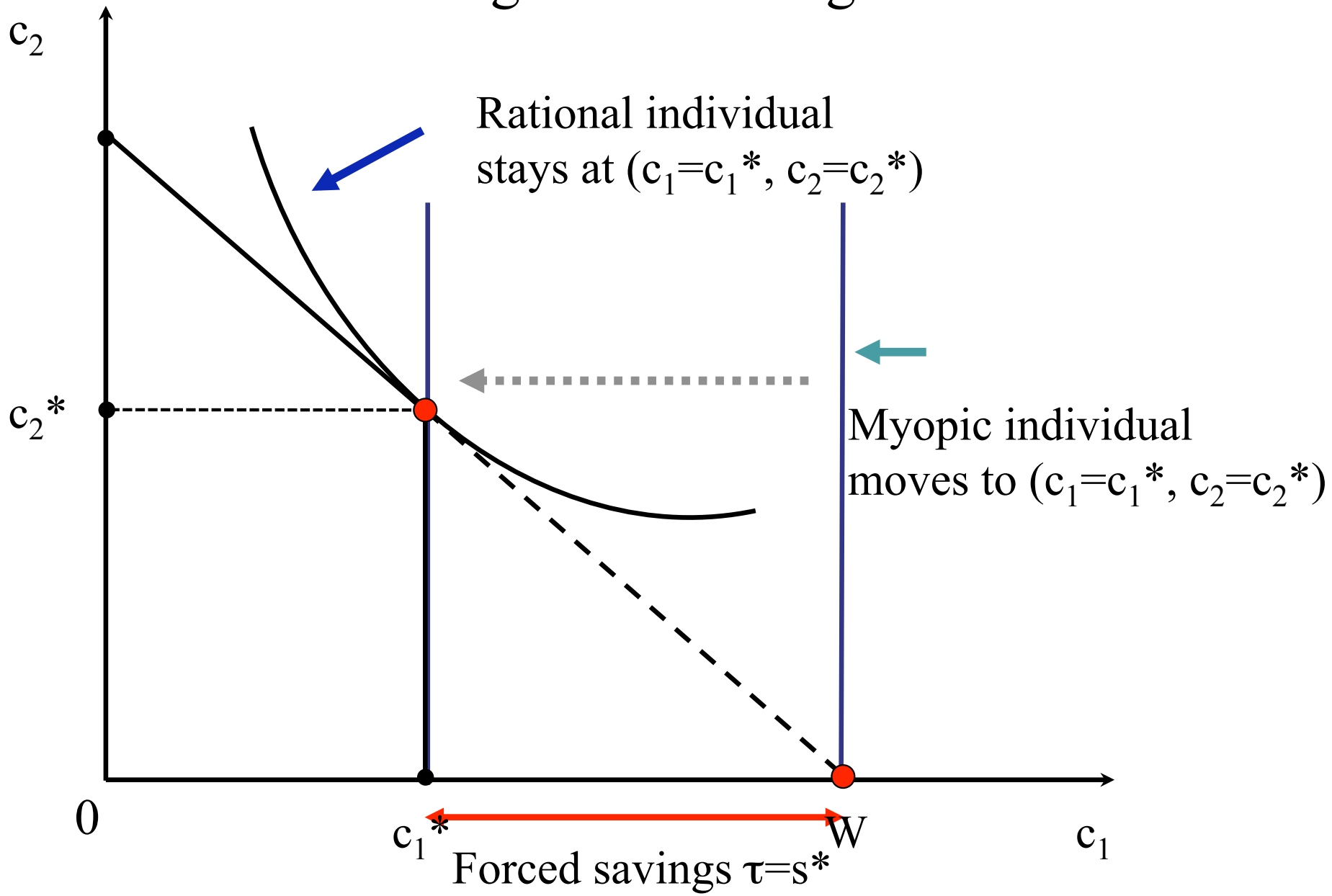
Govt imposes forced saving tax τ such that $\tau = s^*$ and benefits $b = \tau \cdot (1 + r)$. We consider a funded system. Cannot borrow against b [as in current Social Security]

1) Rational individual unaffected: adjusts s one-to-one so that outcome unchanged [rational unaffected as long as $\tau \leq s^*$]: 100% crowding out of private savings by forced savings

2) Myopic individual affected (0% crowding out): new outcome maximizes Social Welfare

Forced savings is a good solution: (a) does not affect rational individuals, (b) affects the myopic individuals in the socially desired way

Adding forced savings τ=s*



MODEL: COMMENTS

1) Universal vs. Means-Tested Program: Means-tested program helping only the poor elderly and financed by tax on everybody is worse than universal forced savings social security for 2 reasons:

a) Rational individuals subsidize myopic individuals (unfair)

b) Incentives to under-save to get means-tested pension

$\Rightarrow$ Less sustainable politically

2) Heterogeneity in w: Forced saving should be proportional to w (as long as govt does not care about redistribution).

FUNDED VS. UNFUNDED SYSTEMS

OLG model with 2 periods (work and retirement). Generation t lives in periods t and $t+1$, cohort size N_t, wage w_t

1) Unfunded system: Free benefits to 1st generation of retirees. For Generation t, per capita, we have:

$tax_t = \tau \cdot w_t$, $ben_t = \tau \cdot w_{t+1} \cdot N_{t+1}/N_t = \tau \cdot w_t \cdot (w_{t+1}/w_t)(N_{t+1}/N_t)$

$\Rightarrow ben_t = tax_t \cdot (1+g)(1+n) = tax_t \cdot (1+\gamma)$

All the other generations get return equal to $\gamma \simeq n + g$ where n is population growth and g real wage growth per capita

2) Funded system: each generation gets a market return r on contributions: $ben_t = tax_t \cdot (1+r)$

FUNDED VS. UNFUNDED SYSTEMS

Famous theoretical results:

1) Samuelson JPE'58: In OLG economy with no capital and no way to save (chocolate economy), unfunded system generates **Pareto** improvement because it allows trade across generations [same result with fiat-money]

2) Diamond AER'65: In OLG economy with capital and saving, unfunded pension generates Pareto improvement iff $n + g > r$ (dynamically inefficient economy with too much capital)

If $n + g < r$, unfunded pension redistributes to 1st generation at the expense of all other generations

FUNDED VS. UNFUNDED SYSTEMS (skip)

In practice $r > n+g$ almost everywhere: funded system delivers higher returns because it does not deliver a free lunch to 1st generation

US economy: Annual $n = 1\%$ and $g = 1\%$ [$n + g$ was higher in 1940-1970].

$r = 5 - 6\%$ if r is average return on all capital assets held by households over the long-run

Note that r is much more risky than $n+g$: risk adjusted market rate of return should be lower than average market rate r but still higher than $n + g$

GENERATIONAL ACCOUNTING (skip)

Let $\gamma = n + g$ be the generational growth rate

1) Generation 0 nets: $V_0 = -0 \cdot w_0 N_0 + \tau w_1 N_1/(1+r) = \tau w_0 N_0 (1+\gamma)/(1+r)$

2) Generation t nets: $V_t = -\tau w_t N_t + \tau w_{t+1} N_{t+1}/(1+r) = \tau w_0 N_0 (1+\gamma)^t [-1 + (1+\gamma)/(1+r)]$

3) Accounting from period 0: $\sum_{t=0}^{\infty} V_t/(1+r)^t =$

$$\tau w_0 N_0 \frac{1+\gamma}{1+r} + \tau w_0 N_0 \sum_{t=1}^{\infty} \frac{(1+\gamma)^t}{(1+r)^t} \left[-1 + \frac{1+\gamma}{1+r} \right] = 0$$

No behavioral responses $\Rightarrow$ No net effect

Unfunded vs. Funded is about redistribution across cohorts

Originally: priority was to alleviate old age poverty so most govt started with unfunded system

FUNDED VS. UNFUNDED SYSTEMS

Historical development of pension systems:

1) Before 20th century: family based informal pensions (kids take care of aging parents) which is an unfunded system [funded private saving was never a major source of retirement income for the majority of the population]

2) 20th century: Governments introduce unfunded pension systems to replace the family based system [workers start paying taxes but no longer have to care for elderly parents]

3) Today: some debate on whether government systems should be funded instead of unfunded [social security privatization debate] but funding requires transitional generation to pay twice [for the old and themselves]

SOCIAL SECURITY IN THE US

1) **Financed** by payroll taxes: 6.2% on employee and 6.2% on employer (up to annual cap of about $175,000 in 2025, indexed for wage growth): funds retirement and disability benefits [1.45%+1.45% with no cap funds medicare]

2) **Benefits** based on AIME (Average Indexed Monthly Earnings) over the best 35 years of (indexed) taxable earnings

Indexation based on average wage growth

PIA (primary insurance amount) is a piece-wise linear function of AIME: 90% of first $1200 of AIME, 32% of AIME over $1200 to $7400, 15% of AIME above $7400

$\Rightarrow$ Formula is **Redistributive** but this compensates for longevity differences by earnings groups

Average replacement rate around 40% (higher for low earners)

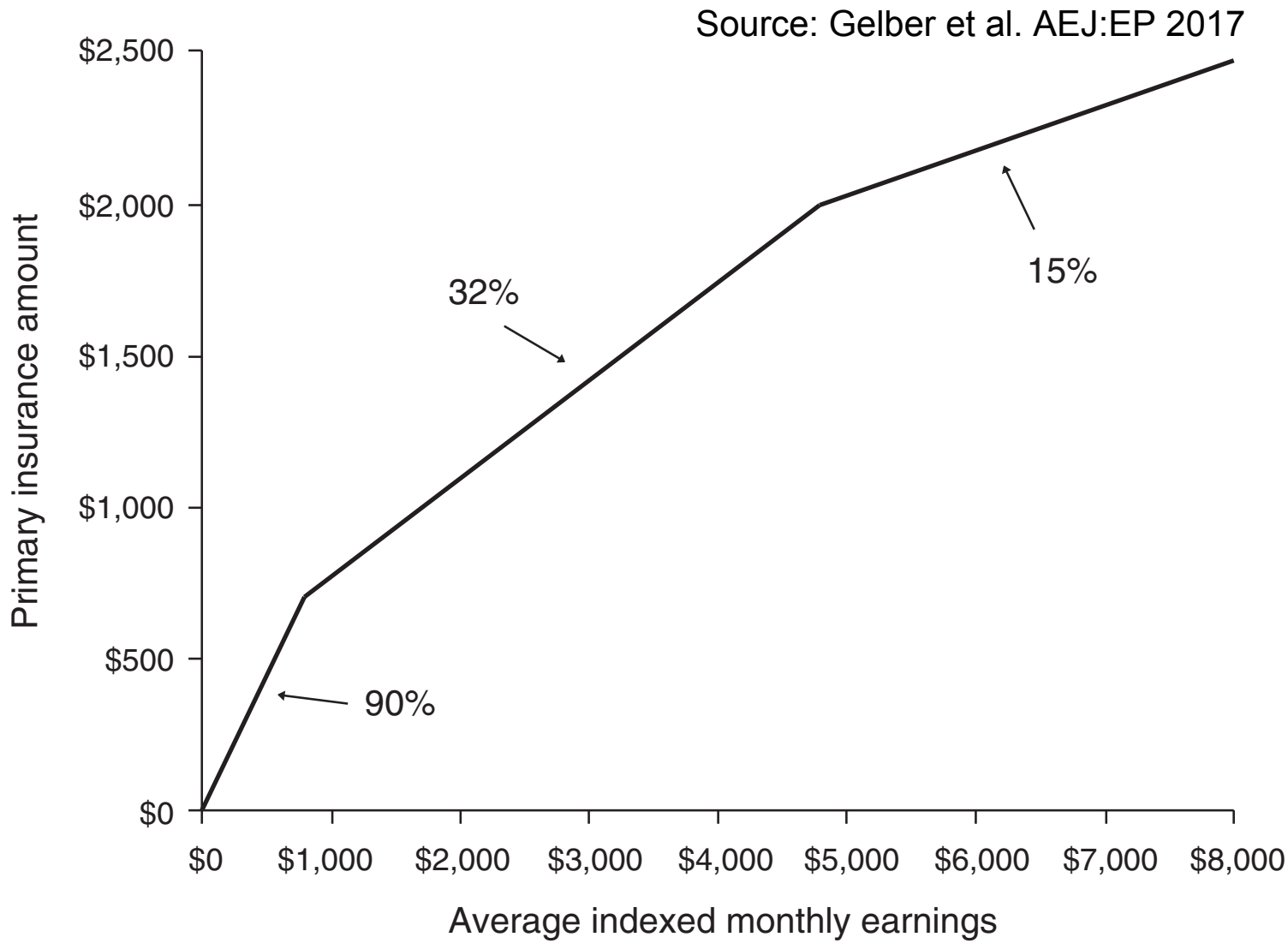


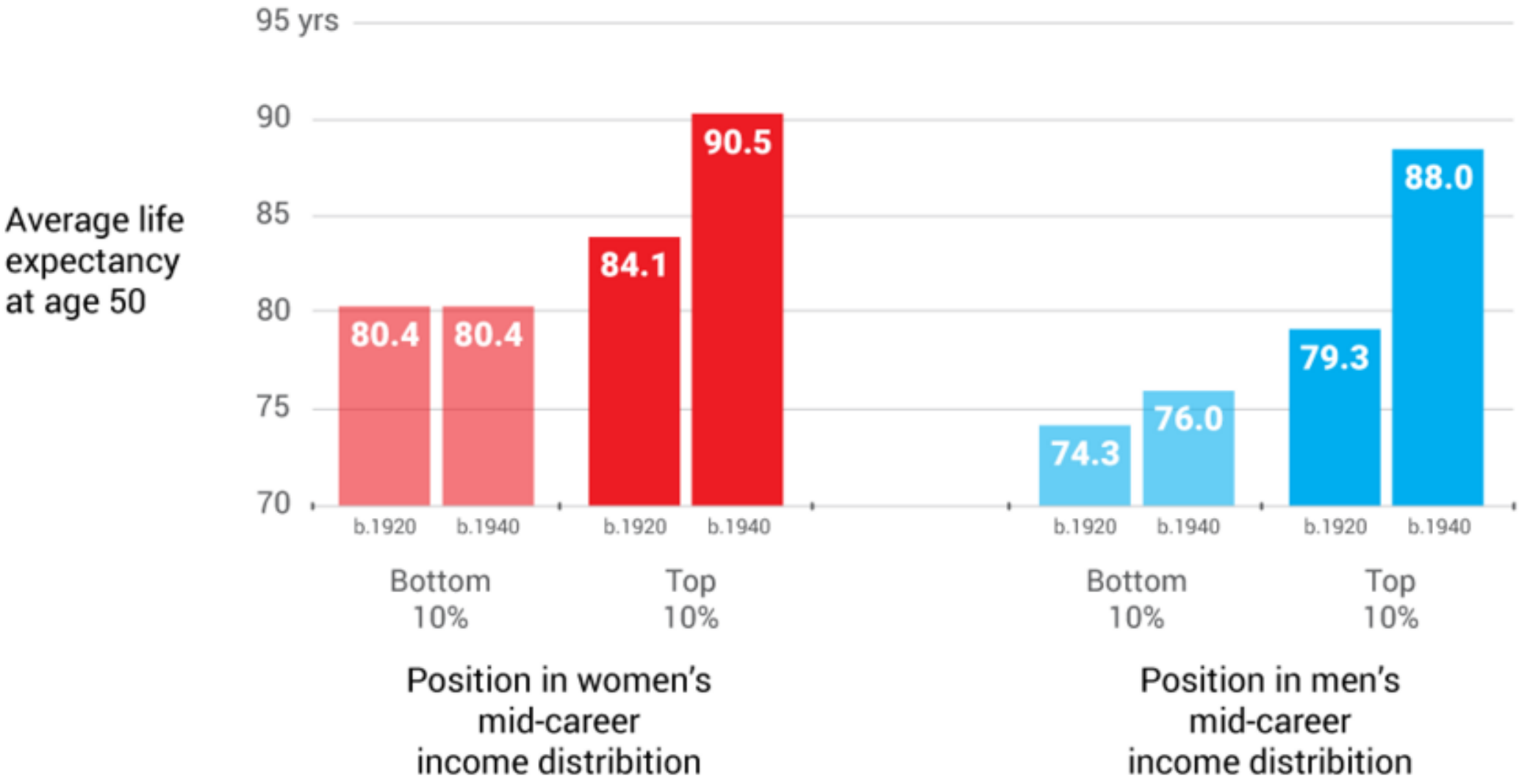
FIGURE 1. PRIMARY INSURANCE AMOUNT AS A FUNCTION OF AVERAGE INDEXED MONTHLY EARNINGS

Notes: The figure shows the primary insurance amount (PIA) as a function of average indexed monthly earnings (AIME) in 2013. The percentages are marginal replacement rates.

Source: SSA (2013)

Americans making more money are living longer than those earning less

This means gaps in life expectancy by income have grown over time.



Source: Bosworth et al. 2016

SOCIAL SECURITY IN THE US

Married couple with PIA_H, PIA_W get maximum of

$1.5 \cdot \max(PIA_H, PIA_W)$ and $PIA_H + PIA_W$.

Surviving spouse gets $\max(PIA_H, PIA_W)$

Divorced spouse is eligible for benefits based on ex-spouse PIA if marriage spell longer than 10 years (no empirical spike in divorces after 10th anniversary though!)

Benefits are fully **annuitized** indexed based on consumer price index (debate about moving to less generous chained CPI)

RETIREMENT AGE IN SOCIAL SECURITY

1) **Normal Retirement Age (NRA):** Used to be 65. Increases to 67 for 1960+ cohorts. Get PIA if retire at NRA

2) **Early Retirement Age:** Earliest age you can get SS benefits (unless disabled) is **62**. Benefits reduced permanently by 8% if retire 1 year before NRA, 16% if 2 years before NRA, etc. [actuarially fair on average]

Early retirement age is needed to prevent people from retiring too early on SS benefits that are too small

3) **Late Retirement:** get permanently higher benefits. Get 8% more permanently if delay by 1 year, 16% for 2 year delay, etc. (actuarially fair). Benefits automatic at age **70**.

$\Rightarrow$ Current SS system should not distort retirement age on average if people fully rational (actuarially fair adjustments)

EARNINGS TEST OF SS

Currently: $62 \leq Age < NRA$, benefits taxed away at 50% above \$20,000 of annual earnings.

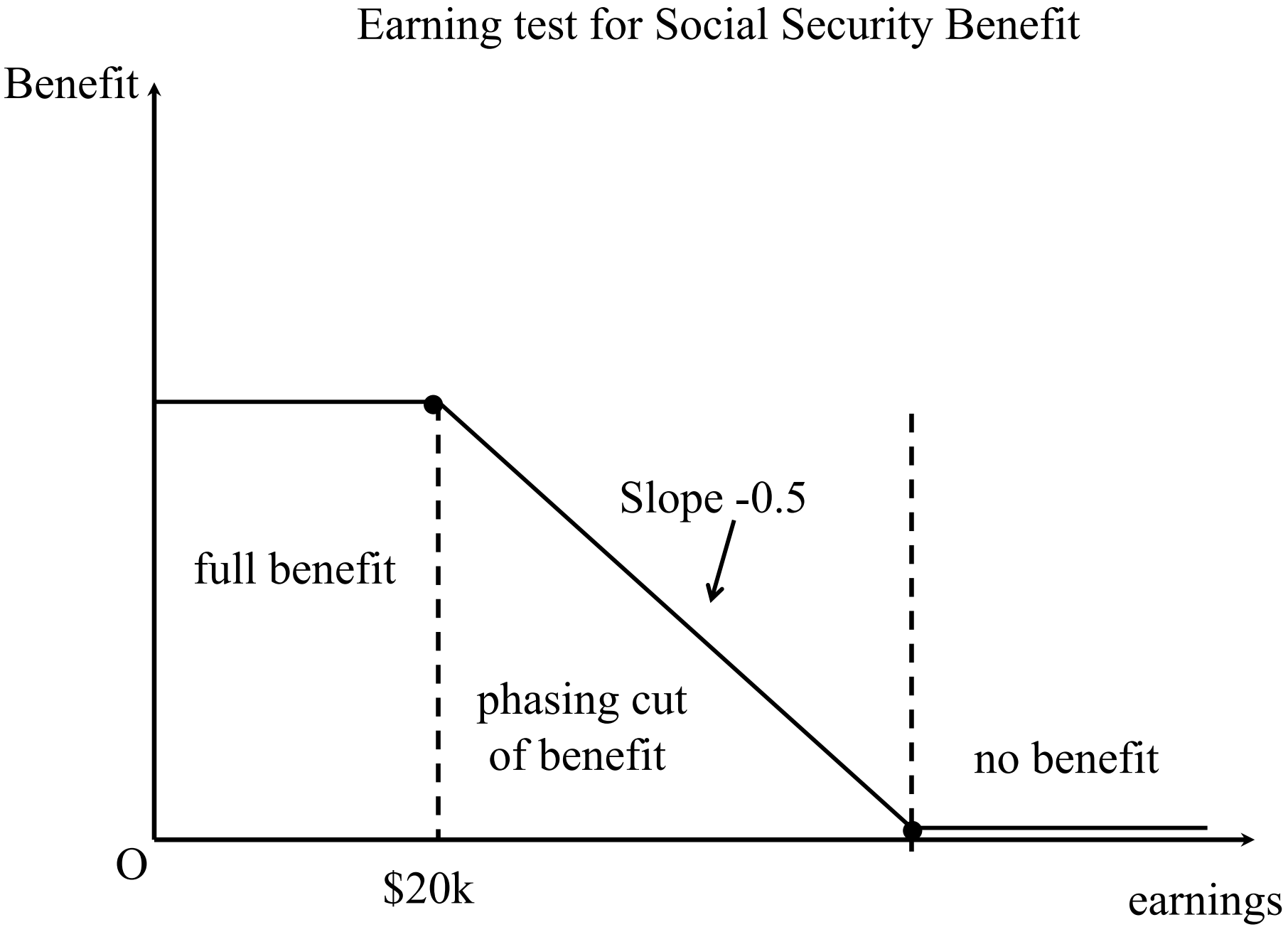
$Age = NRA$, benefits taxed away at 33% above \$50,000 of annual earnings.

No earnings test for age above NRA

Actually, not a pure tax, as benefits taxed away will be credited back at NRA (as if you had retired later).

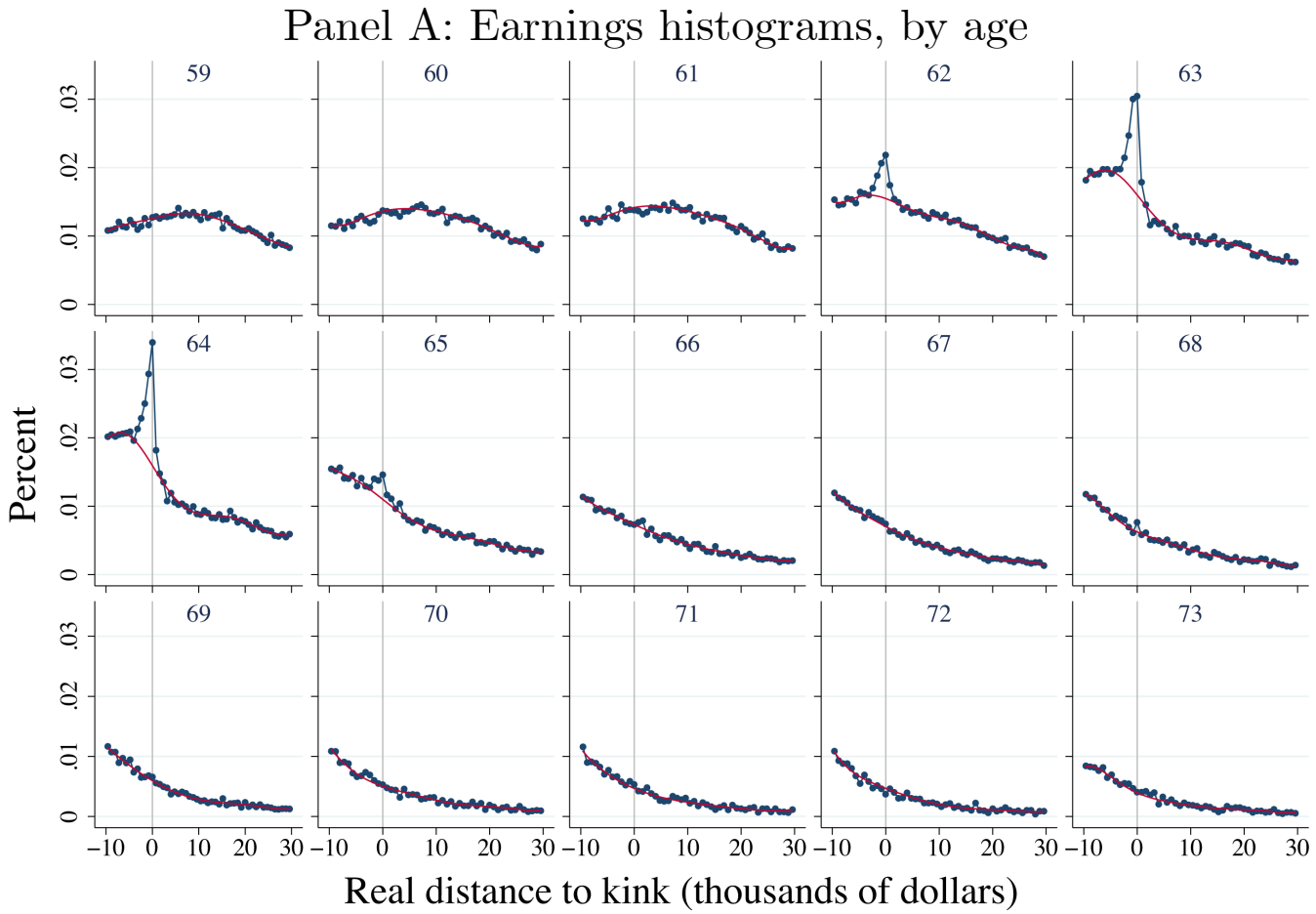
However, individuals may not understand this and actually bunch at the kink point of the Earnings Test

See Friedberg Restat '00 with CPS data and Gelber-Jones-Sacks '19 with SSA admin data (when NRA was 65)


Earning test for Social Security Benefit
Benefit
full benefit
Slope -0.5
phasing cut
of benefit
no benefit
O
$20k
earnings

Source: Gelber, Jones, Sacks (2013)

Figure E.6: Adjustment Across Ages: Histograms of Earnings and Normalized Excess Mass, 59-73-year-olds Claiming OASI by Age 65, 2000-2006



KEY QUESTIONS ABOUT SOCIAL SECURITY

1) How does Social Security affect private savings? (capital response)

2) How does Social Security affect retirement? (labor response)

3) Funding problems: Social Security Reform and Privatization

EVIDENCE ON LACK OF FINANCIAL LITERACY

401(k) private pensions in the US offer strong evidence of lack of financial literacy assumed in life-cycle model:

0) Employers often offer matches as way to encourage enrollment (workers need institutional support).

1) $1/N$ investment choices of 401(k) contributions: many people invest contributions by dividing them equally into investment options (regardless of the options)

2) Default effects: opt-in vs. opt-out have enormous effects on 401(k) enrollment [Madrian and Shea QJE'01]

3) People often invest 401(k) in company stock which is extremely risky (Enron). Strong evidence of default effects in investment choices as well

4) Financial education and advice can have large impact on savings decisions (Thaler and Benartzi JPE '04: Saving More Tomorrow experiment)

$\Rightarrow$ Much better to force people to save via mandatory social security system than rely on individual rationality

Behavioral Effects: Default Effects in 401(k) decisions

Madrian-Shea QJE'01: tremendous impact in economics:

Effect of switching to automatic participation for new hires:

Before= [opt-in] new employees needed to voluntarily enroll

After = [opt-out] new employees are automatically enrolled by default at a given contribution/investment [3% salary, money market fund]

Empirical strategy: compare 401(k) outcomes for hires before and after reform

Note: company offers a 50% match on contributions below or at 6% of salary: put 6%, gets 3% more from employer

Behavioral Effects: Default Effects

Two key findings of Madrian and Shea (2001)

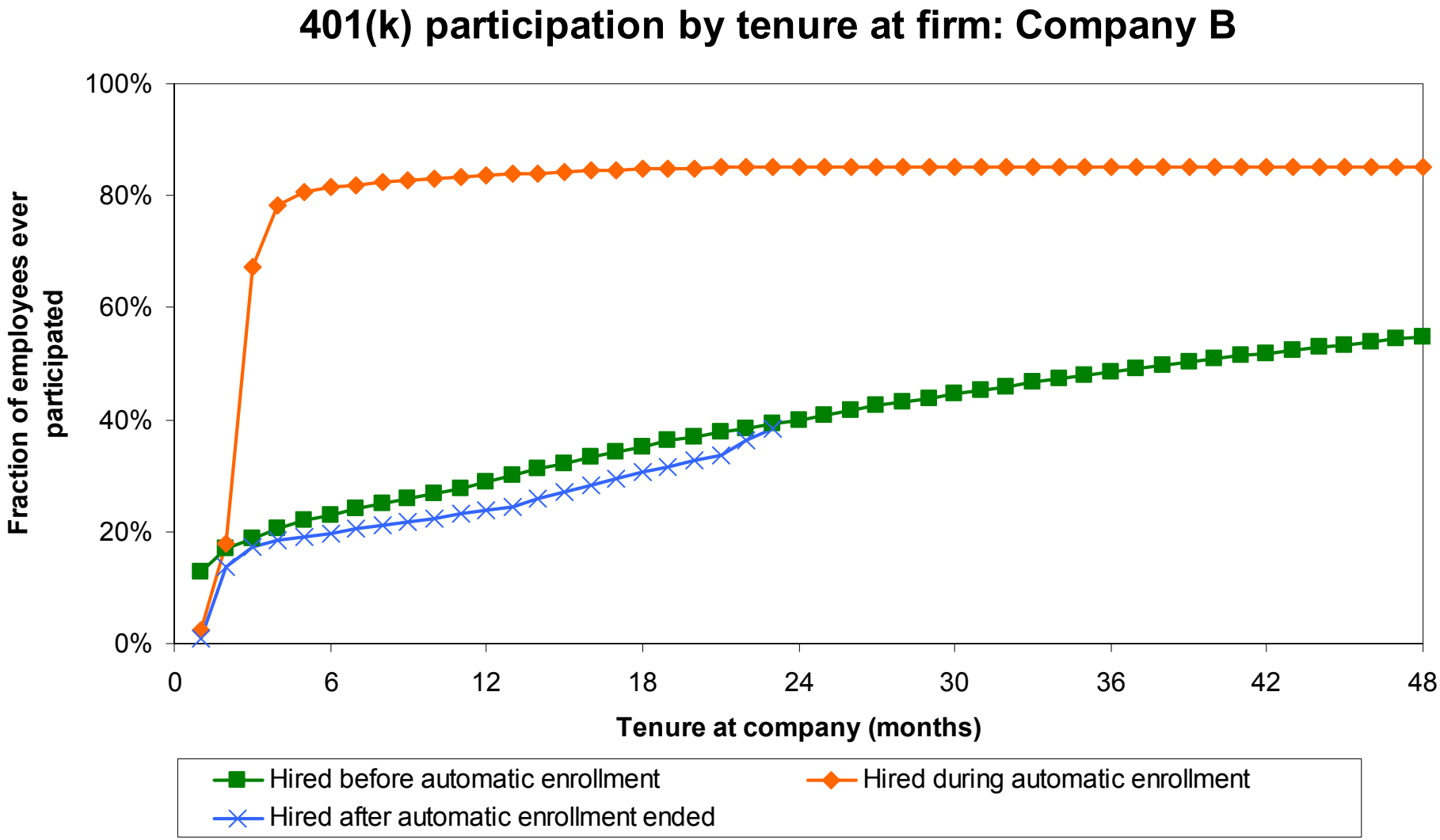
1) Auto-enrollment has enormous impact on enrollment in short-term (60 points) and substantial effect remains in long-run (30 points)

2) Most employees stick to default choice which could be bad for long-term investment [2% contribution default even though 50% employer match offered up to 6% of contributions]

$\Rightarrow$ Individuals do not behave as in standard model where defaults are irrelevant

Automatic enrollment effect

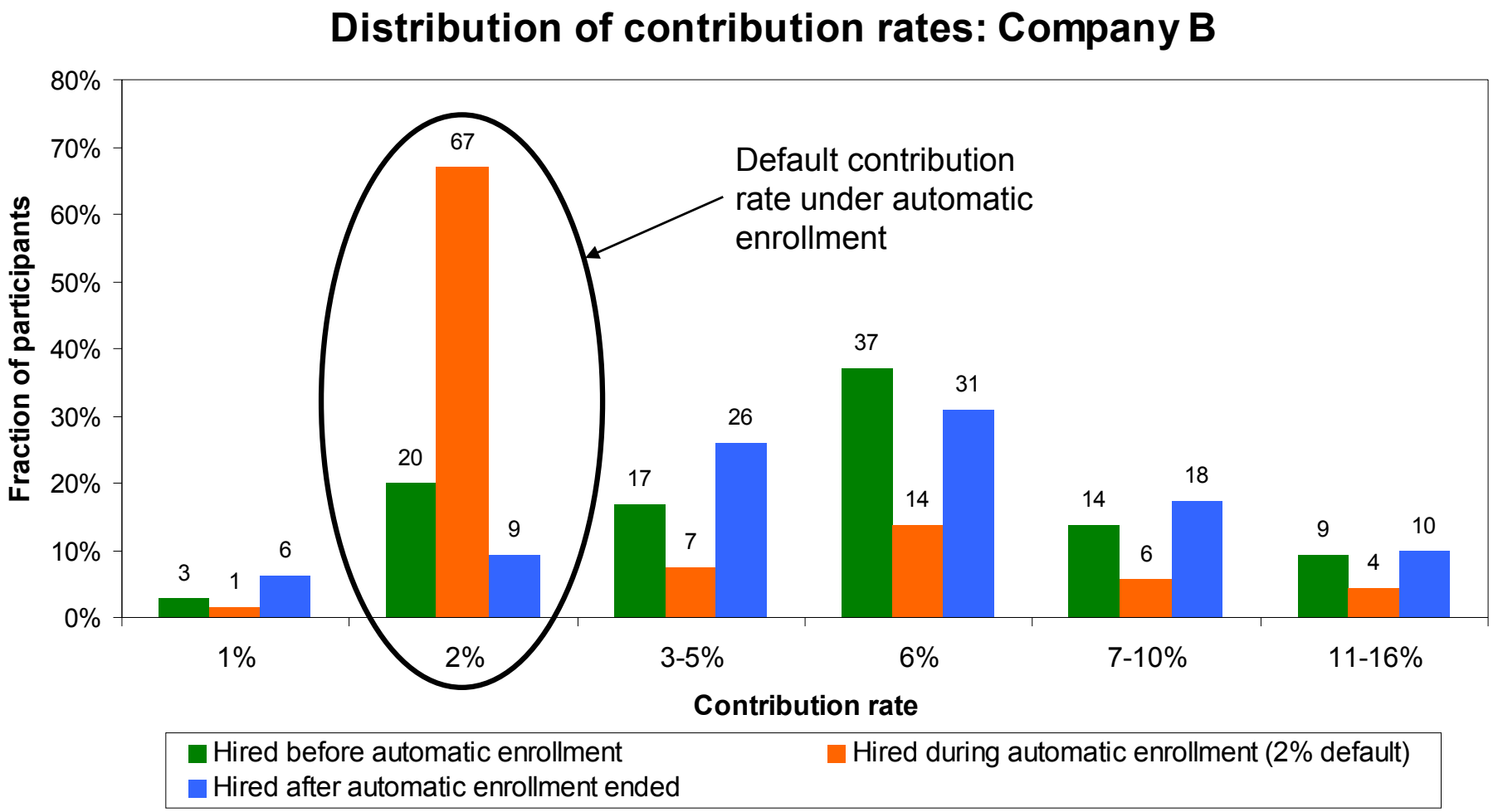
Automatic enrollment dramatically increases participation.



Source: Madrian and Shea (2001)

Automatic enrollment effect

Employees enrolled under automatic enrollment cluster at the default contribution rate.



Source: Madrian and Shea (2001)

Default Effects, Extensions

Series of papers by Beshears-Choi-Laibson-Madrian-Metrick have confirmed and replicated those results.

Quick enrollment (active choice required, need to choose) has also a positive impact but not as large

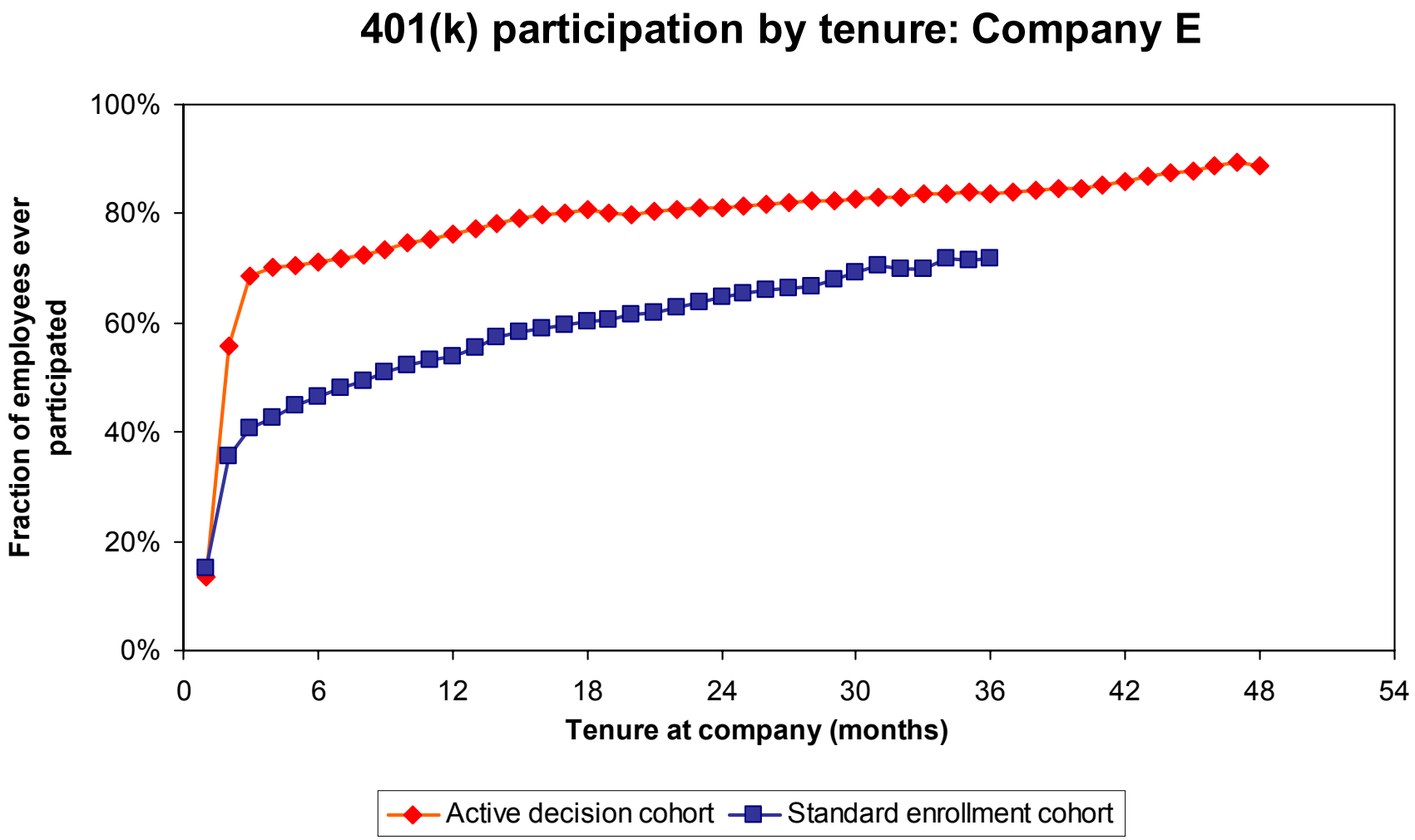
Default effects also found in match investment allocation, cash distributions, and annuitization decisions

Effect on savings and retirement wealth unknown [very hard to get data on both 401(k) features and actual total savings and wealth]

Beshears et al. 2021 use change in default in US army civilian workers and find no effect on debt/financial distress implying that extra default savings not offset by extra borrowing

Active decision effect on participation

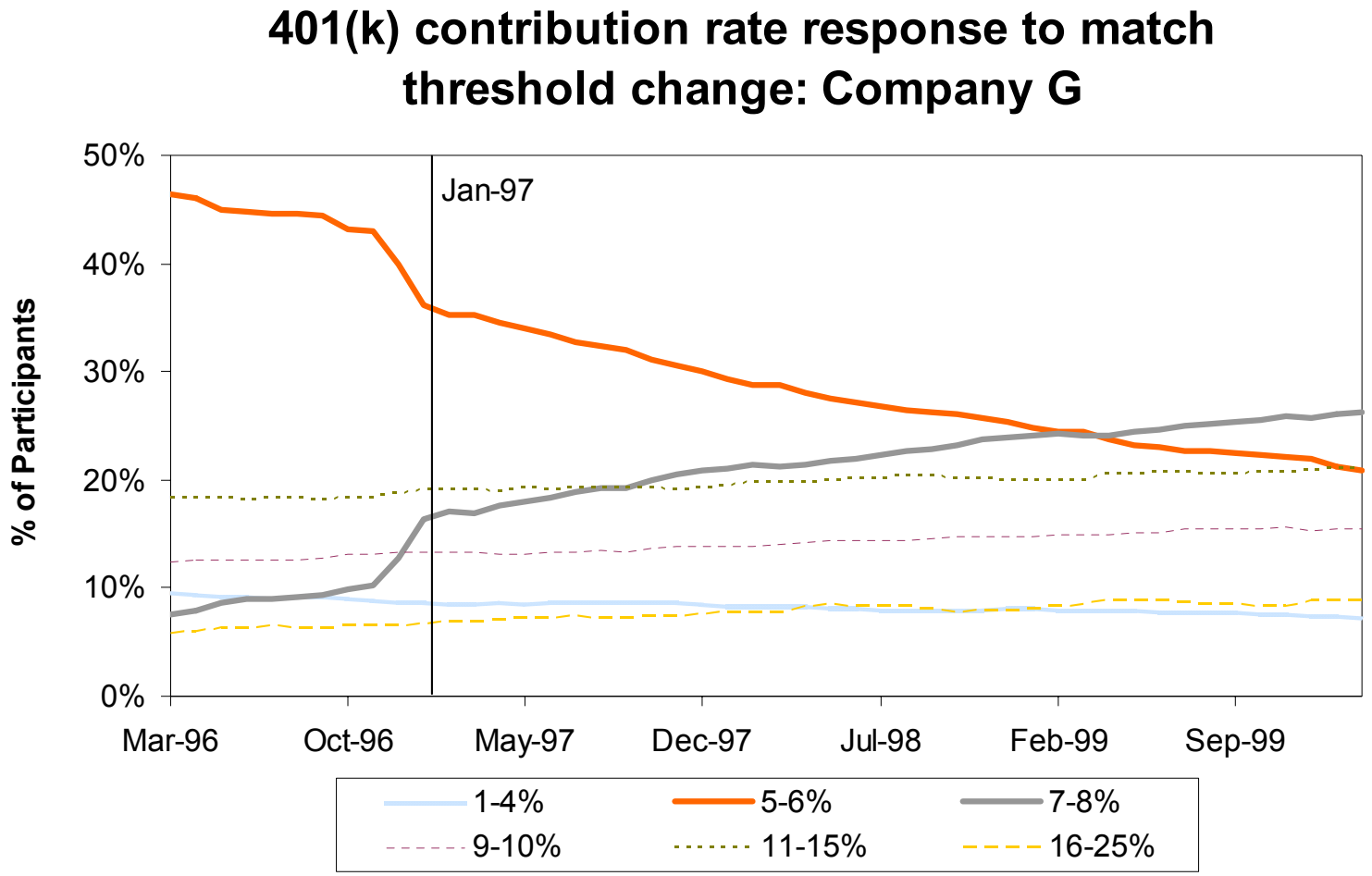
401(k) participation increases substantially when employees are not allowed to be passive about savings.



Source: courtesy of David Laibson

Employer match threshold and contribution rates

Changing the match threshold caused employees to slowly move from the old threshold to the new threshold.



Source: courtesy of David Laibson

Evidence for Myopia and adequate savings

1) Diamond JpubE 1977: old age poverty has fallen as SS expanded. Poverty for other groups has not fallen nearly as much. Consistent with inability to save.

2) Fall in consumption **at** retirement: Bernheim, Skinner, Weinberg (2001) show that drop in consumption is significant and sharply correlated with wealth. Consistent with myopia.

3) Countervailing view: Aguiar-Hurst JPE05 show that it is important to differentiate between consumption and expenditures (you can eat the same but more cheaply by cooking at home rather than going out to restaurants)

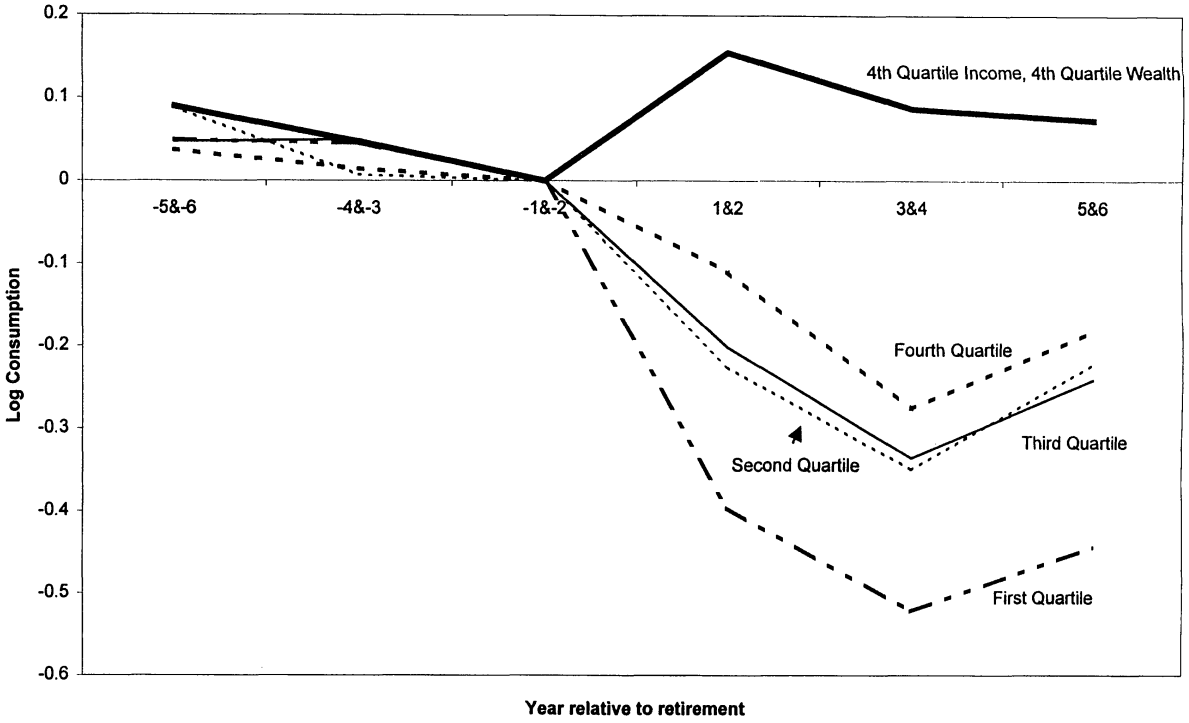


FIGURE 4. CHANGE IN CONSUMPTION AT RETIREMENT, BY WEALTH QUARTILE

Source: Bernheim et al. (2001), p. 847

Consumption drop at retirement: Aguiar-Hurst JPE' 05

Starting point: Empirically, consumption falls at retirement... but studies use expenditures as measure of consumption

Aguiar-Hurst JPE05 shows that it is important to differentiate between consumption and expenditures. Further, the paper provides new information on the complementarity of consumption and leisure after retirement.

1) Confirm that food expenditure falls by 17% at retirement

2) But time spent on home production rises by 60%

3) All measures of caloric intake, vitamin intake, meat quality, etc. do not drop at retirement (find that caloric intake falls when getting unemployed, hard to believe but suggestive)

Flamang '23 using supermarket scanner panel data finds drop in quantity and quality of purchases after retirement

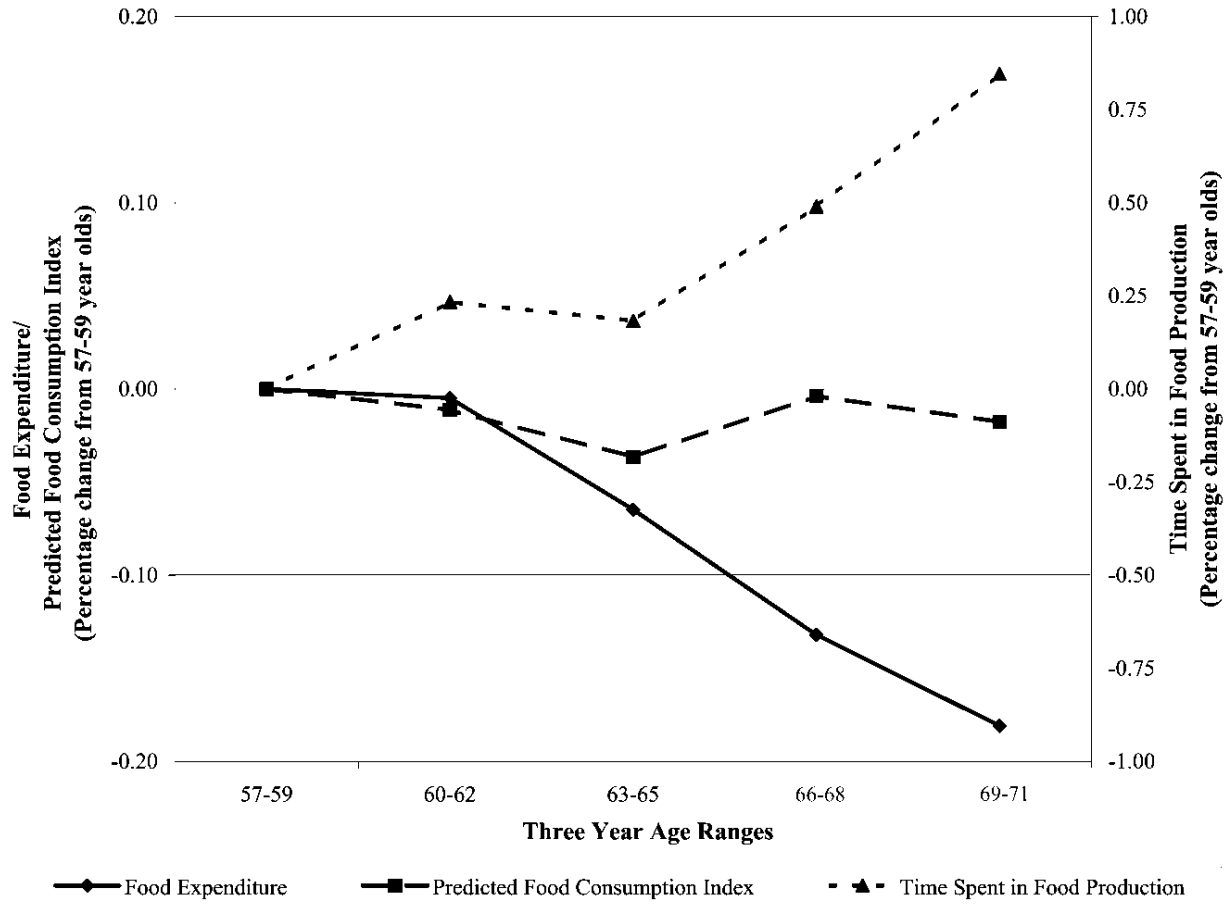


FIG 1.—Percentage change in food expenditure, predicted food consumption index, and time spent on food production for male household heads by three-year age ranges. Data are taken from the pooled 1989–91 and 1994–96 cross sections of the CSFII, excluding the oversample of low-income households. The sample is restricted to male household heads (1,510 households). All series were normalized by the average levels for household heads aged 57–59. All subsequent years are the percentage deviations from the age 57–59 levels. See Sec. IV for details of data and derivation of food consumption index

Source: Aguiar and Hurst (2005), p. 925

SOCIAL SECURITY AND RETIREMENT: THEORY

Two key elements of a social security system may affect retirement behavior:

1) Availability of benefits at **Early Retirement Age** (ERA): (62 in US)

2) Non-actuarially fair adjustments of benefits for those retiring after the ERA

Social Security and Retirement: Early retirement age

Conceptually early retirement age can be seen as a device to force myopic people to keep working

(a) Rational individual: Wants to retire at age 60 but benefits not available till age 62=ERA. Rational individual saves ex-ante to fund retirement at age 60-61 out of savings before getting benefits at age 62.

$\Rightarrow$ ERA does not affect the rational person [if she can perfectly forecast retirement age]

(b) Myopic person: Person retires once benefits are available because current job painful and permanent benefit reduction not as salient. Myopic person will typically have no savings so cannot retire before ERA.

$\Rightarrow$ ERA affects positively the myopic person to prevent her from retiring too early (optimal ERA analysis yet to be done)

Retirement Hazard Spikes

Retirement hazard at age t is the fraction of people who retire at age t among those still working at age $t-1$

Retirement spike at Early Retirement Age of 62 very clear and convincing: spike moves from 65 to 62 when the ERA was reduced from 65 to 62

$\Rightarrow$ Suggests strong liquidity effects / myopic behavior

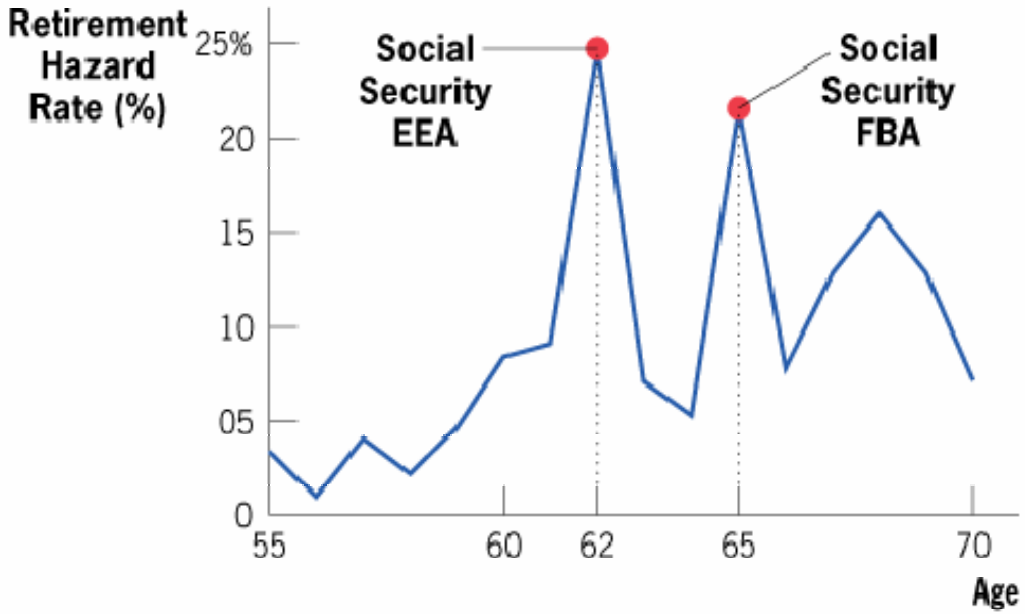
Evidence from other countries also shows strong spike effects

Note: those macro-level studies do not always define carefully retirement: claiming benefits vs. stopping to work. Stopping to work is fuzzy.

Social Security and Retirement

Evidence

■ FIGURE 13-4



Hazard Rate of Retirement for Males in the United States • The male hazard rate, or exit rate at each age given that a man has worked to that age, has a distinct spike at age 62 (the Early Entitlement Age, EEA) and 65 (the Full Benefit Age, FBA), key ages for the Social Security system.

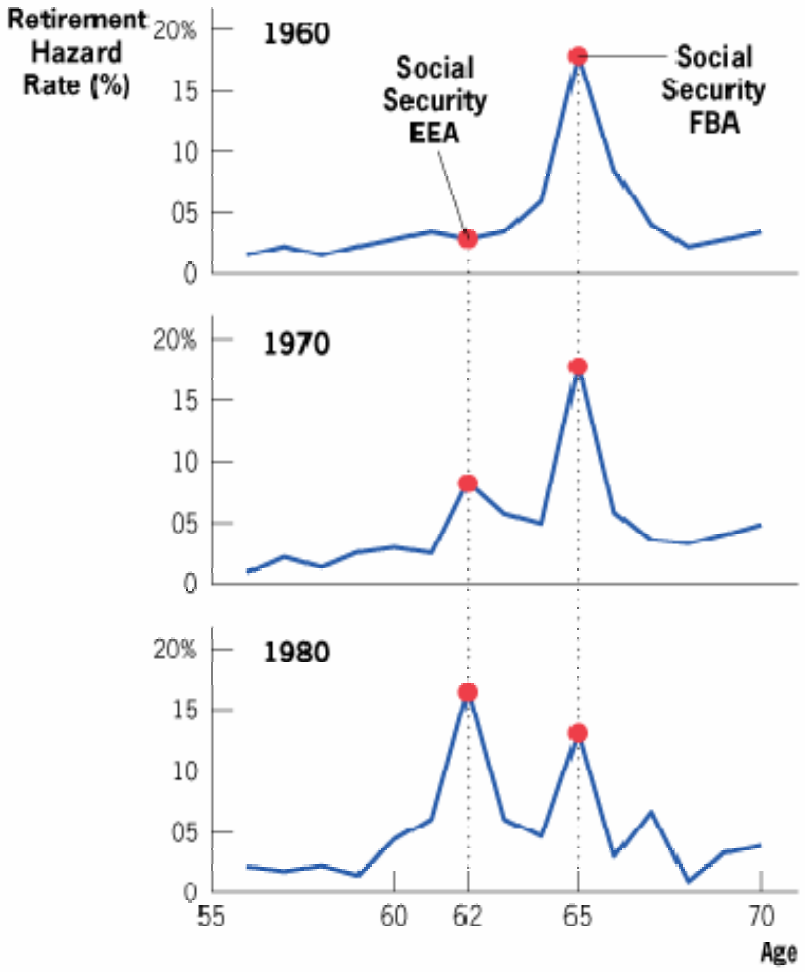
Source: Diamond and Gruber (1999), Figure 11.12.

retirement hazard rate The percentage of workers retiring at a certain age.

Social Security and Retirement

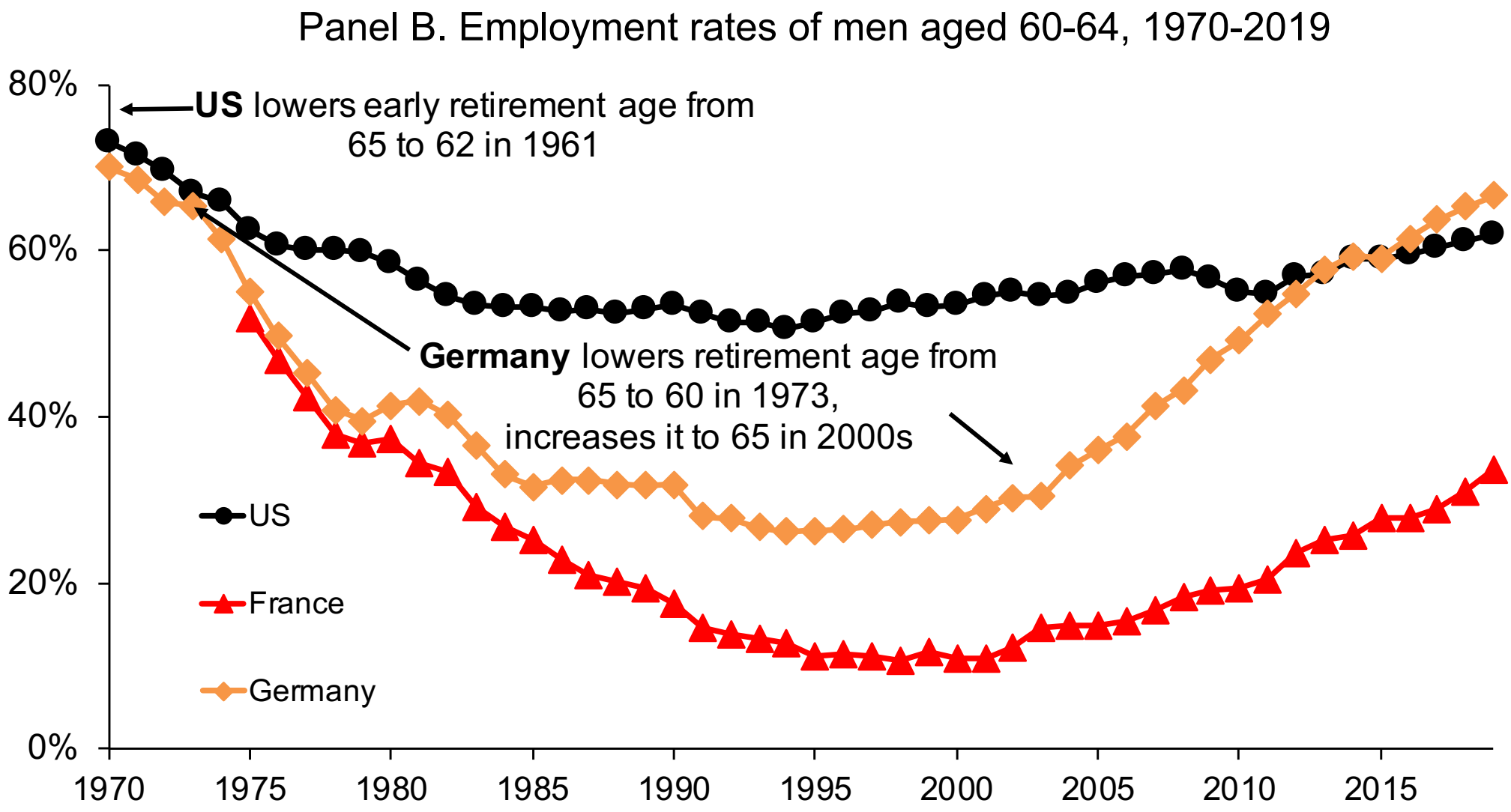
Evidence

■ FIGURE 13-5



The Evolution of the U.S. Male Retirement Hazard • In 1960, before the EEA of 62 was introduced for men, the hazard rate for men was highest at age 65 (the FBA), with no spike at age 62. By 1970, the spike at 62 had begun to emerge, and by 1980 it was larger than the spike at age 65.

Source: Gruber and Wise (1999), Figure 12



Source: Saez '21 using OECD database

Social Security and Retirement: Implicit tax

Adult life-time budget constraint: Live T years, work R years and retire $T - R$ years. [next graph from Germany]

C life-time consumption and R retirement age. With constant wage w and interest rate $r = 0$: $C = w \cdot R$

With retirement system $\tau, b(R)$: $C = (w - \tau)R + (T - R)b(R)$

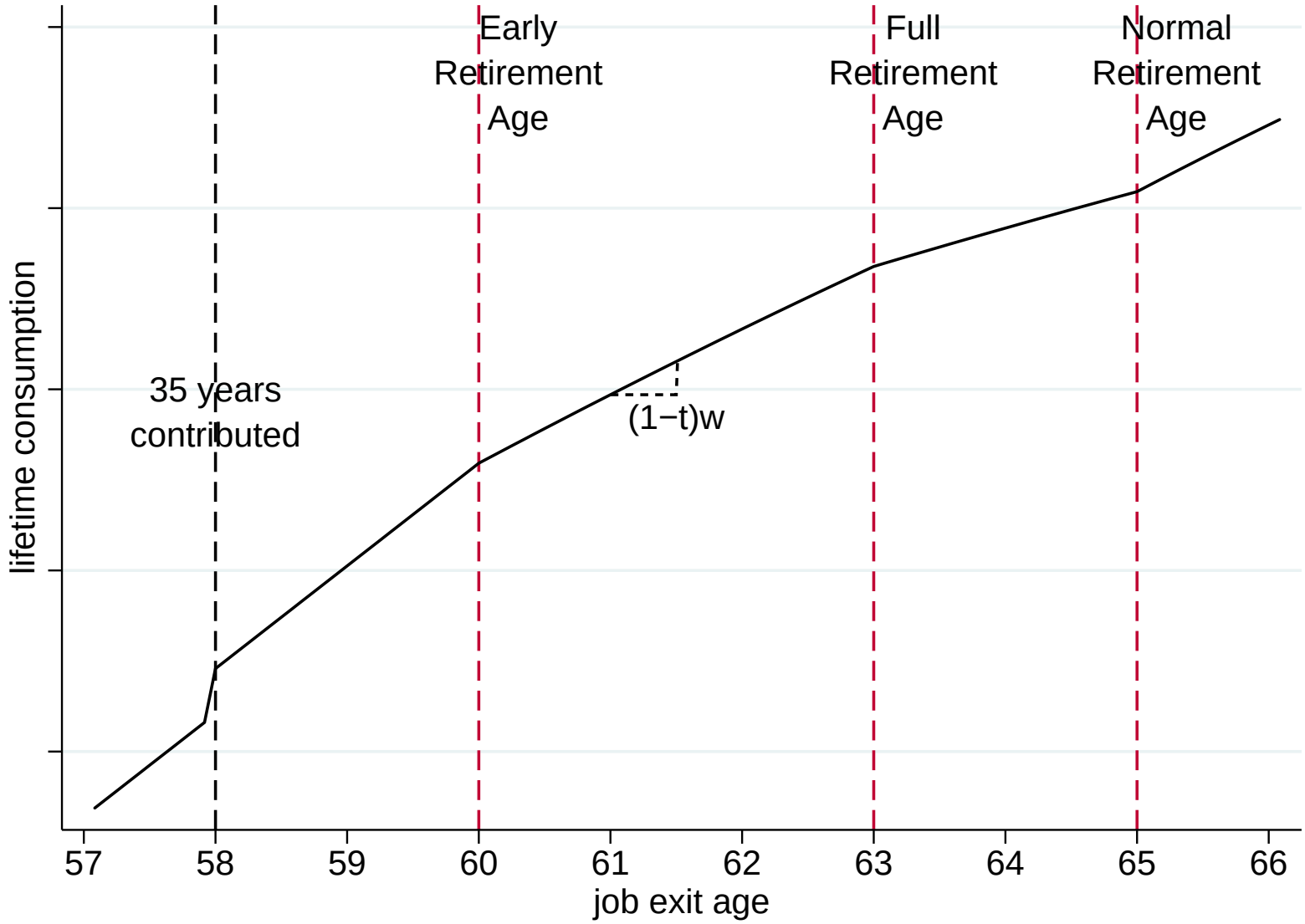
$dC/dR = w - \tau - b + (T - R)b'(R) = (1 - t) \cdot w$

Implicit tax rate of retirement program: $t = [w - dC/dR]/w$ creates distortionary substitution effects

Actuarially fair program: $dC/dR = w$ (or equivalently $t = 0$). Need $b(R) = \tau R/(T - R)$

$\Rightarrow$ Actuarially fair system does not "distort" retirement age [with no uncertainty, no myopia, and no credit constraints]

Figure 2: Stylized Lifetime Budget Constraint



Note: The figure shows a stylized lifetime budget constraint for a worker who faces an Early Retirement Age of 60, a Full Retirement Age of 63 and an Normal Retirement Age of 65, who becomes eligible for a pathway requiring 35 years of contributions at age 58. The slope of the BC is the implicit net wage defined as $w_i^{net} = (1 - \tau_i)w_i$ as shown in section 2.3. The stylized shape of the constraint corresponds to incentives faced by the average worker: On average, workers face a 32% reduction in the implicit net wage ("kink size") at age 60, a 42% reduction at age 63%, and a 21% reduction in the implicit net wage at age 65.

Source: Siebold '17

Social Security and Retirement

Some European systems had $b'(R) = 0$ (no adjustment of benefits) $\Rightarrow dC/dR = w - \tau - b$

If $b = 0.6 \cdot w$ and $\tau = .15 \cdot w$, then $dC/dR = w \cdot (1 - 0.75) \Rightarrow$ enormous implicit tax $t = 75\%$

United States social security now has $b'(R) = .08 \cdot w$ (8% adjustment per year) which is about actuarially fair

Substitution Effects on Retirement Age

Best evidence from Manoli-Weber AEJ'16. Austria has a system of discontinuous severance payments for retirees based on tenure at job [that's separate from retirement benefits]

$\Rightarrow$ Creates notches [draw graph] in the lifetime budget constraint that can be exploited to estimate substitution effects. Information on those notches likely to be widespread.

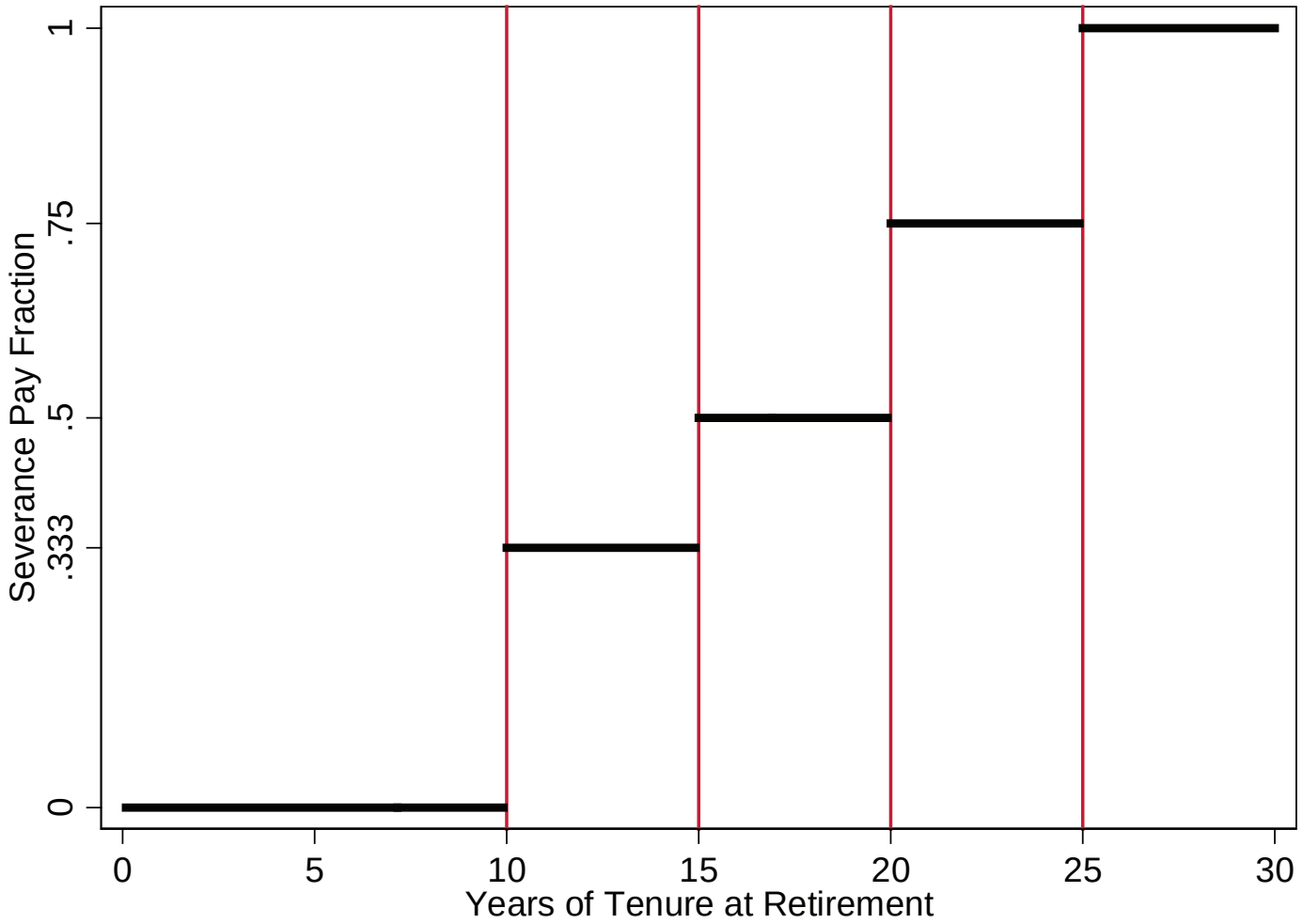
Use complete admin earnings data linking workers/firms/benefits claims. Key results:

1) Very clear evidence of substitution effects

2) Clear evidence that some people are constrained and cannot respond [unhealthy sample]

3) Overall implied elasticity is fairly modest [possibly due partly to frictional constraints, lack of information]

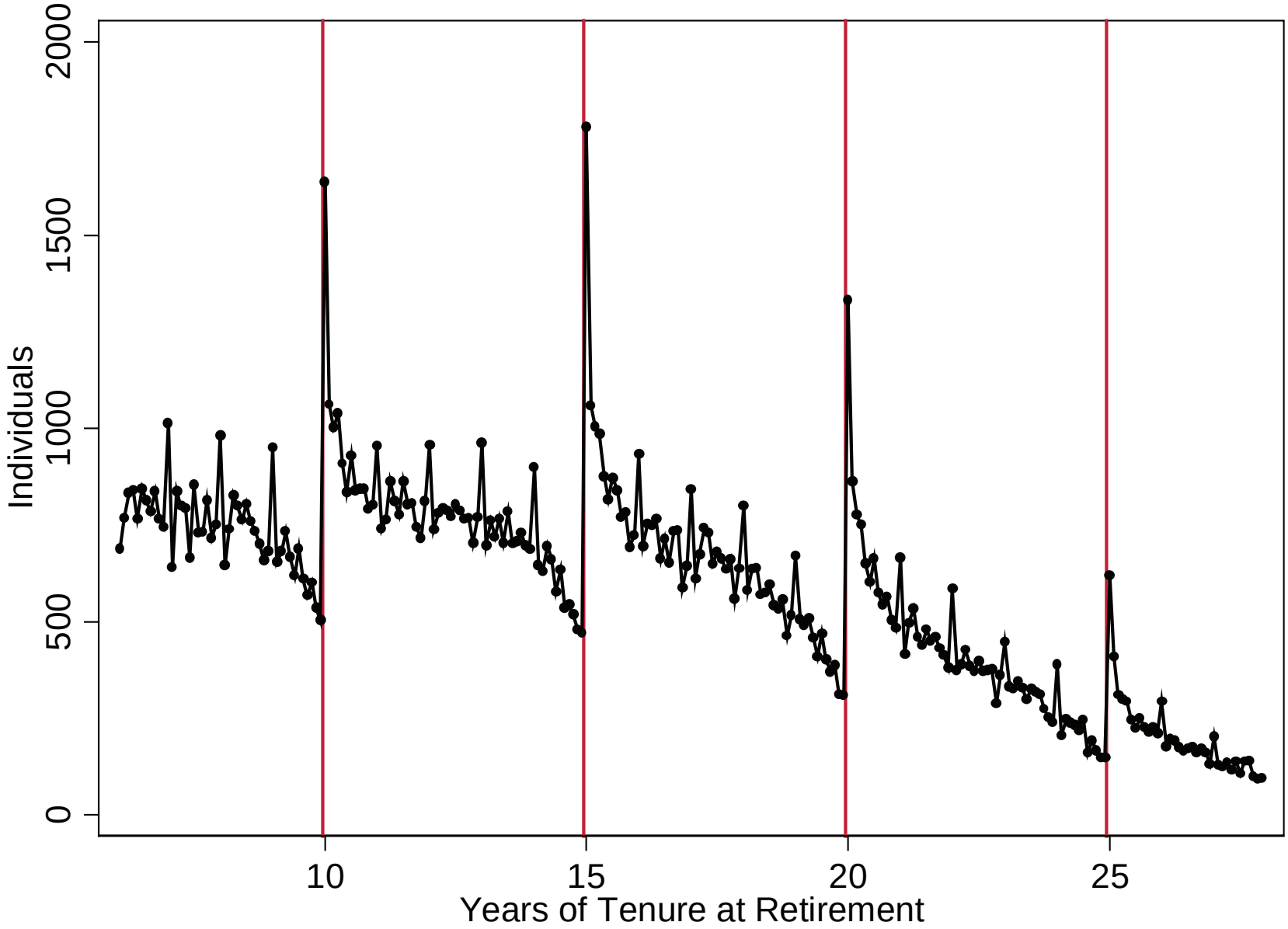
Fig. 1. Payment Amounts based on Tenure at Retirement



Notes: There are two forms of government-mandated retirement benefits in Austria: (1) government-provided pension benefits and (2) employer-provided severance payments. The employer-provided severance payments are made to private sector employees who have accumulated sufficient years of tenure by the time of their retirement. Tenure is defined as uninterrupted employment time with a given employer and retirement is based on claiming a government-provided pension. The payments must be made within 4 weeks of claiming a pension according to the following schedule. If an employee has accumulated at least 10 years of tenure with her employer by the time of retirement, the employer must pay one third of the worker's last year's salary. This fraction increases from one third to one half, three quarters and one at 15, 20 and 25 years of tenure respectively. Since payments are based on an employee's salary, overtime compensation and other non-salary payments are not included when determining the amounts of the payments. Provisions to make these payments come from funds that employers are mandated to hold based on the total number of employees. Severance payments are also made to individuals who are involuntarily separated (i.e. laid off) from their firms if the individuals have accumulated sufficient years of tenure prior to the separation. The only voluntary separation that leads to a severance payment, however, is retirement. Employment protection rules hinder firms from strategically laying off workers to avoid severance payments and there is no evidence on an increased frequency of layoffs before the severance pay thresholds.

Source: Manoli and Weber NBER'11

Fig. 3. Distribution of Tenure at Retirement, Full Sample

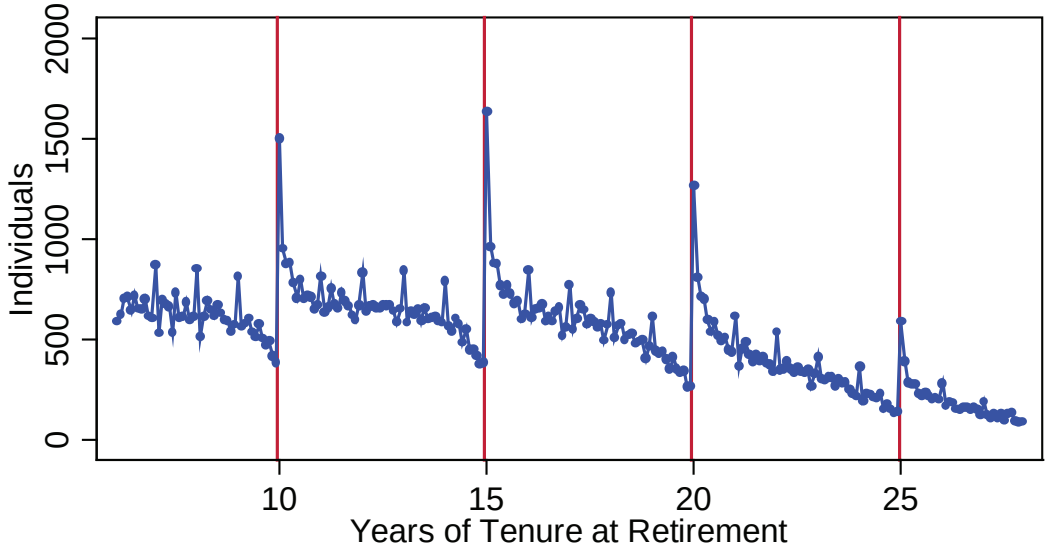


Notes: This figure plots the distribution of tenure at retirement at a monthly frequency. Each point captures the number of people that retire with tenure greater than the lower number of months, but less than the higher number of months. Tenure at retirement is computed using observed job starting and job ending dates. Since firm-level tenure is only recorded beginning in January 1972, we restrict the sample to individuals with uncensored tenure at retirement (i.e. job starting after January 1972).

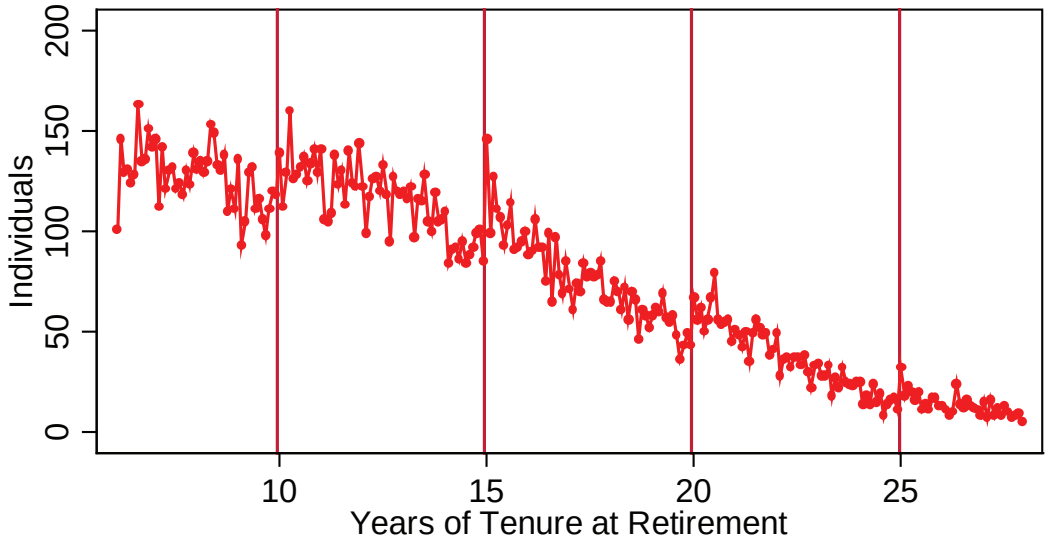
Source: Manoli and Weber NBER'11

Fig. 6. Tenure at Retirement by Health Status

Healthy



Unhealthy



Notes: Health status is measured based on the fraction of time between age 54 and retirement that is spent on sick leave. An individual is classified as unhealthy if his health status is below the median level. The median health status is computed within the sample of individuals with positive sick leave and uncensored tenure at retirement.; this median health status is 0.076.

Source: Manoli and Weber NBER'11

Focal points and social norms

SS programs have a normal retirement age (NRA) but such NRAs are not always associated with real economic incentives (e.g. US SS is actuarially fair so NRA should be irrelevant)

Seibold '21 shows that in Germany, 30% of workers retire at statutory retirement ages even with no specific underlying economic incentives and not option by default

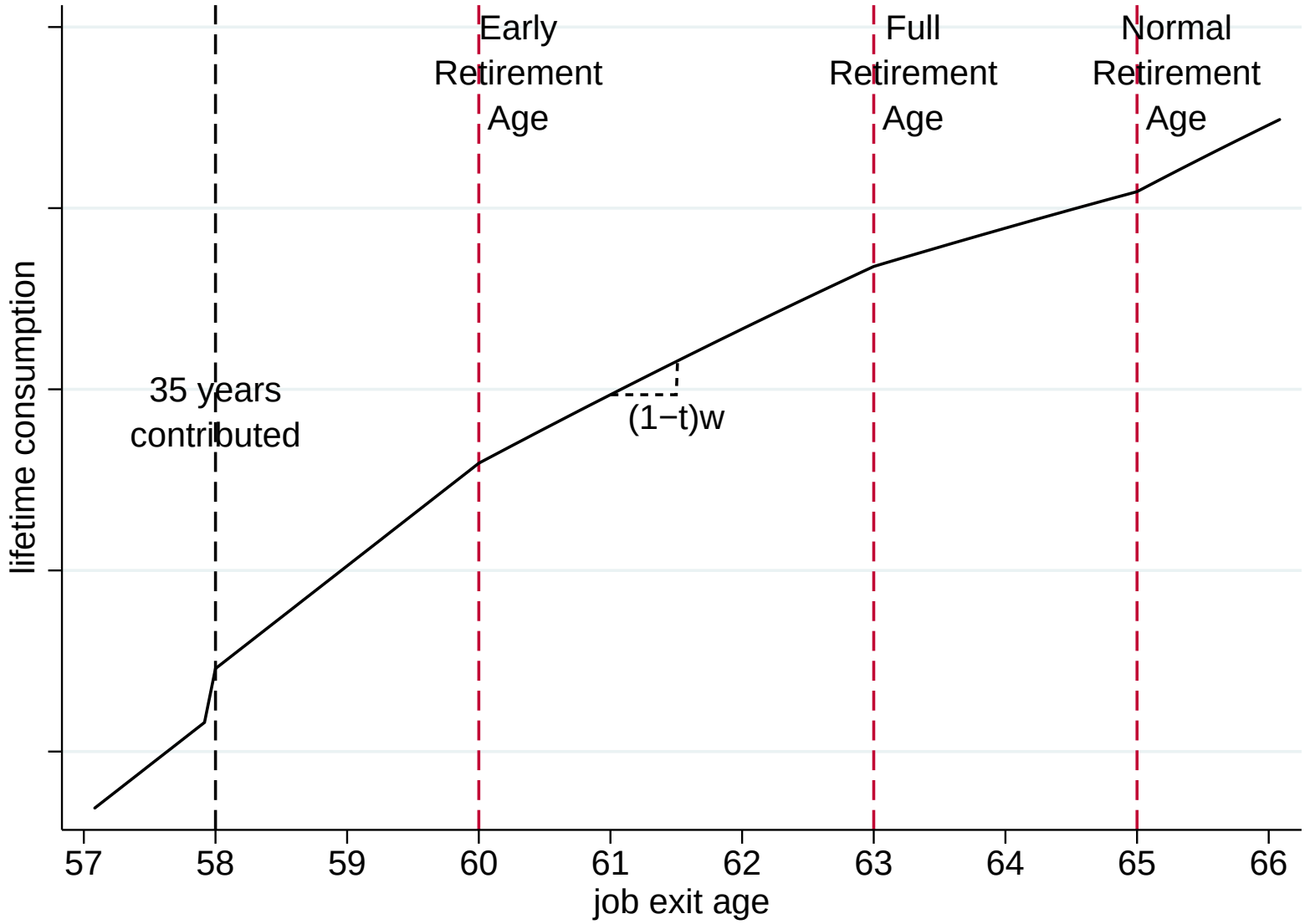
Seibold '21 shows that statutory age bunching much larger than bunching around kinks of lifetime budget constraints created by retirement system

$\Rightarrow$ Cannot be explained within standard model

$\Rightarrow$ NRA perceived as a social injunction obeyed by workers

$\Rightarrow$ Nominal NRAs can potentially be a powerful govt tool to change the retirement age

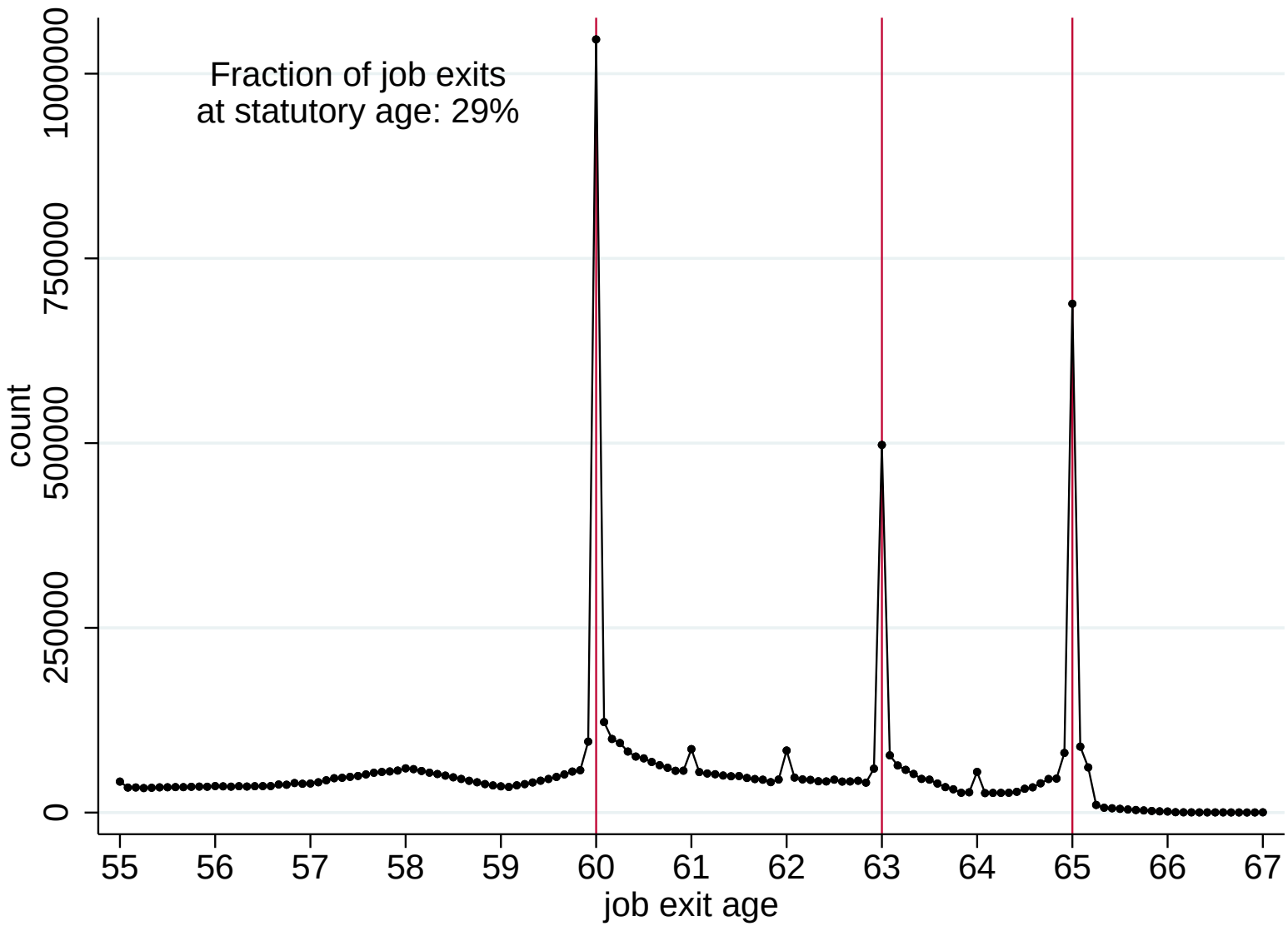
Figure 2: Stylized Lifetime Budget Constraint



Note: The figure shows a stylized lifetime budget constraint for a worker who faces an Early Retirement Age of 60, a Full Retirement Age of 63 and an Normal Retirement Age of 65, who becomes eligible for a pathway requiring 35 years of contributions at age 58. The slope of the BC is the implicit net wage defined as $w_i^{net} = (1 - \tau_i)w_i$ as shown in section 2.3. The stylized shape of the constraint corresponds to incentives faced by the average worker: On average, workers face a 32% reduction in the implicit net wage ("kink size") at age 60, a 42% reduction at age 63%, and a 21% reduction in the implicit net wage at age 65.

Source: Siebold '17

Figure 1: Job Exit Age Distribution (Full Sample)

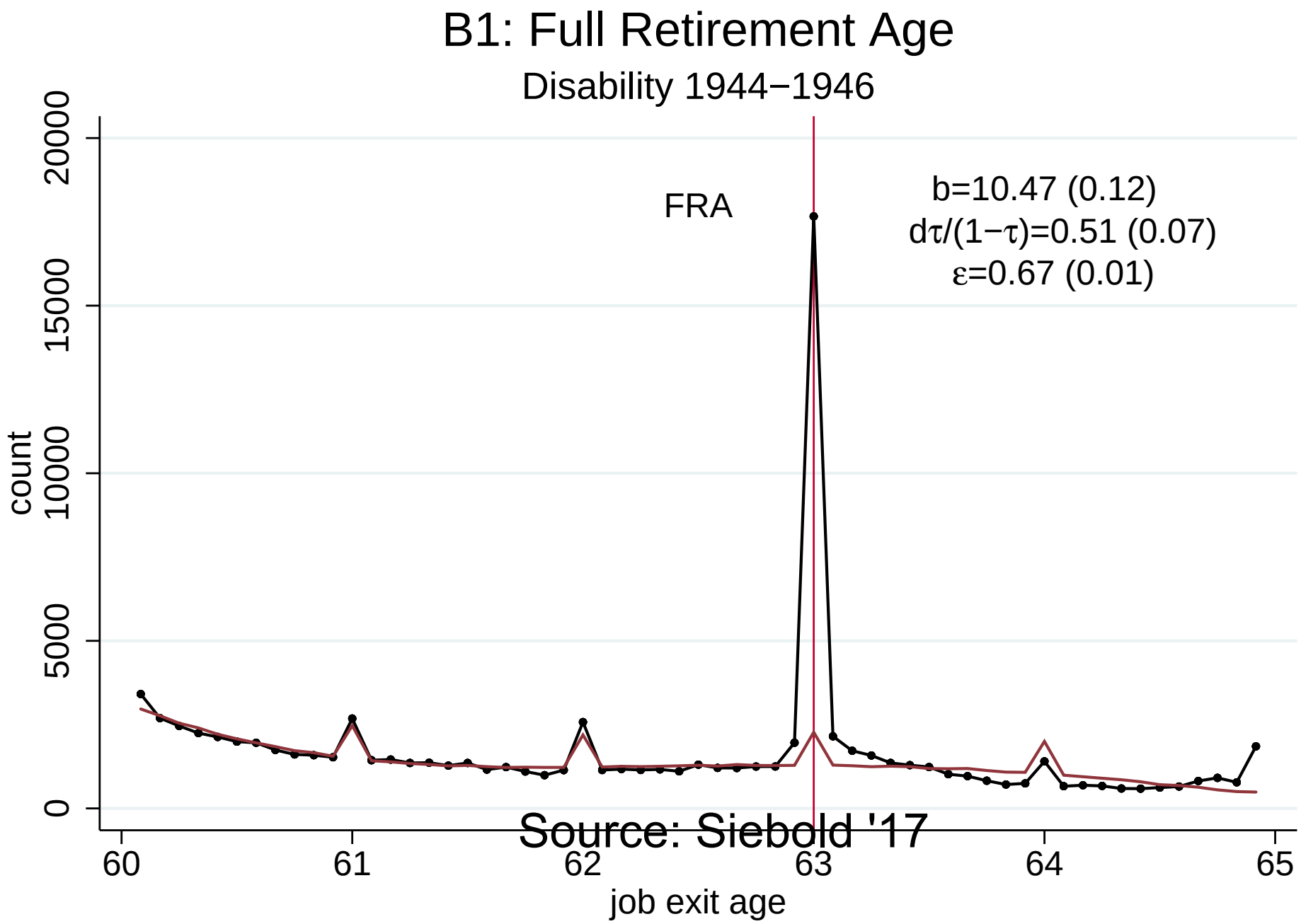


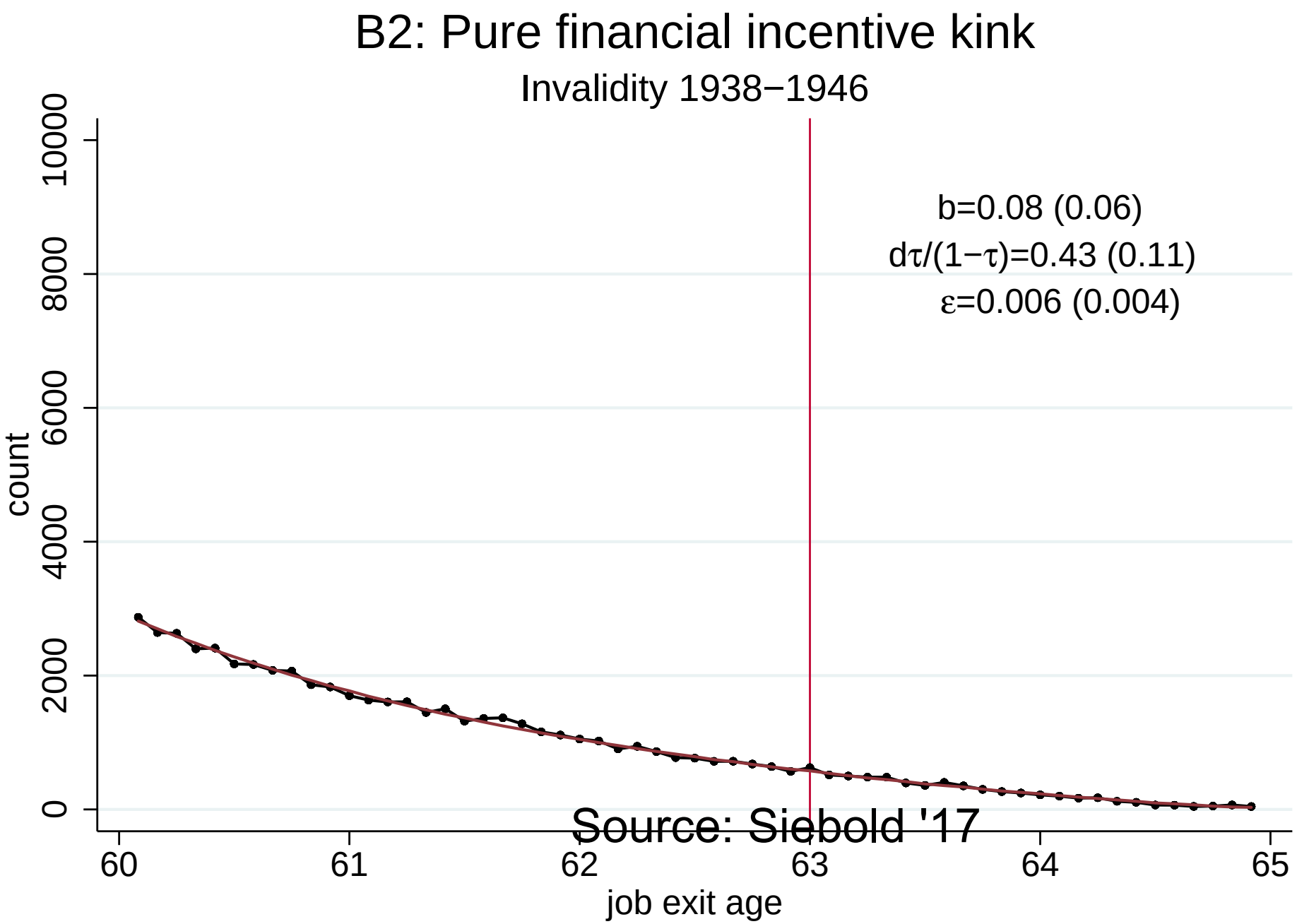
Note: This figure shows the pooled distribution of job exit ages for all workers born between 1933 and 1948. The connected dots show the count of job exits within monthly bins. Vertical red lines indicate the location of main statutory ages throughout the sample period.

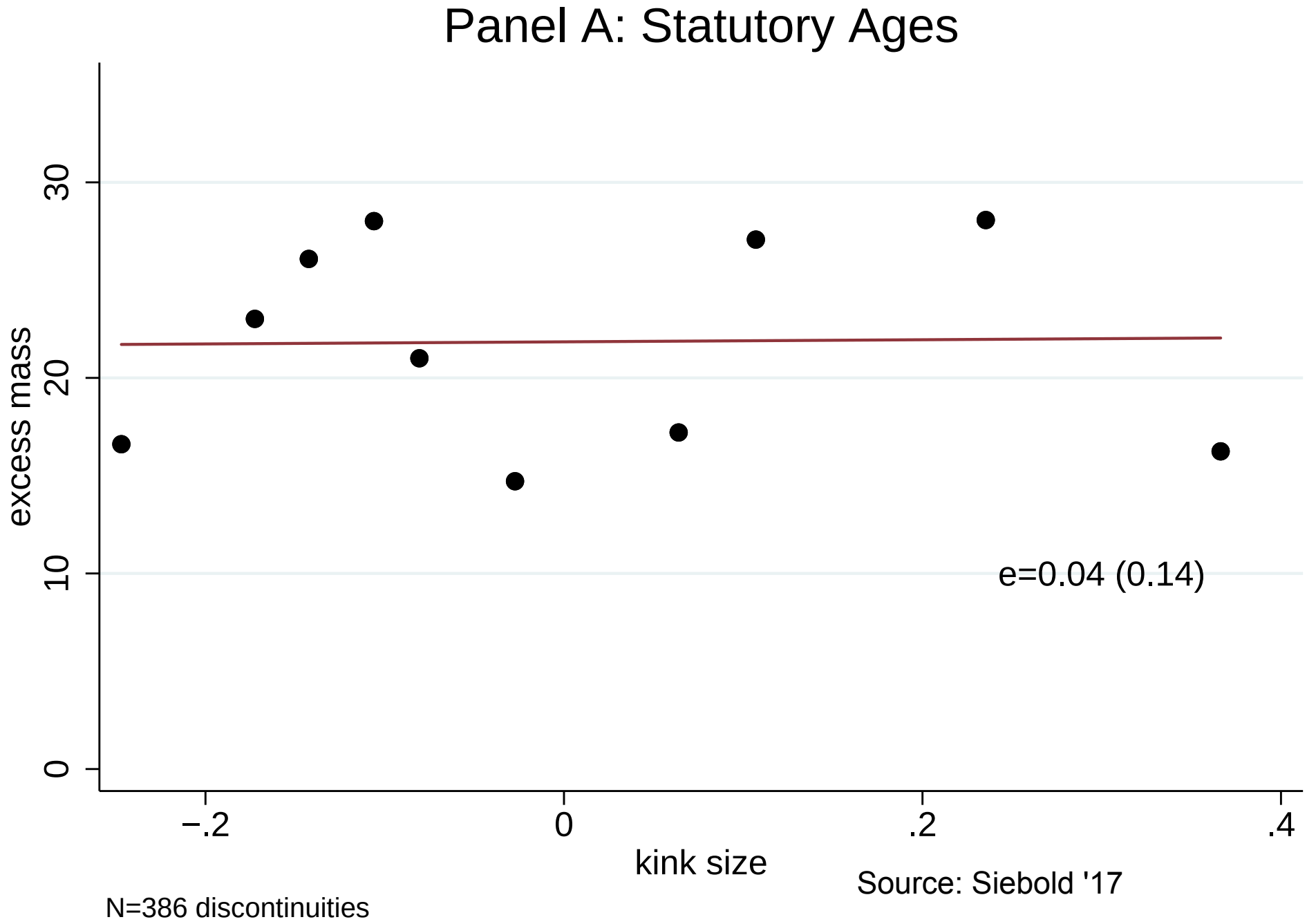
Source: Siebold '17

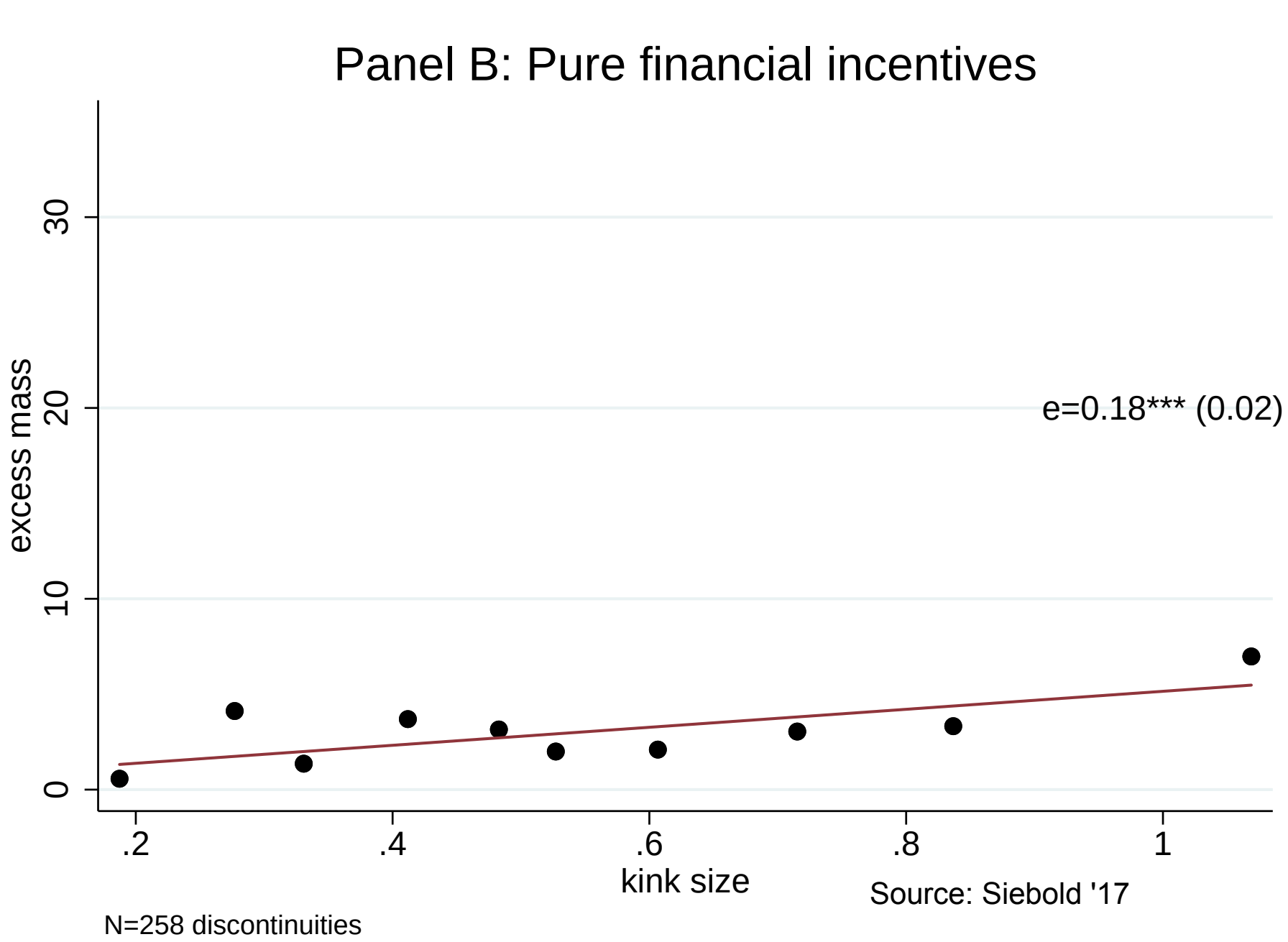
Data source: FDZ-RV - Themenfile SUFRTZN1992-2014XVSBB_Seibold

Panel B: Statutory age vs. p




B2: Pure financial incentive kink
Invalidity 1938−1946
b=0.08 (0.06)
dτ/(1−τ)=0.43 (0.11)
ε=0.006 (0.004)
Source: Siebold '17
count
0
2000
4000
6000
8000
10000
60
61
62
63
64
65
job exit age


Panel A: Statutory Ages
excess mass
0
10
20
30
−.2
0
.2
.4
kink size
e=0.04 (0.14)
Source: Siebold '17
N=386 discontinuities


Panel B: Pure financial incentives
excess mass
0
10
20
30
.2
.4
.6
.8
1
kink size
e=0.18*** (0.02)
Source: Siebold '17
N=258 discontinuities

SOCIAL SECURITY REFORM: PROBLEMS WITH CURRENT SYSTEM

Rate of return $n + g$ has declined from over 3% to about 2%:

1) Demographics: n: Retirement of baby boom large cohorts born 1945-1965: 1995: 3.3 workers per beneficiary, 2030: 2 workers per beneficiaries

Due to (a) fall in fertility, (b) increased longevity at retirement age (note bottom half earners have made almost no life expectancy gains in recent decades)

2) Growth: g: Slower productivity growth since 1975 (g has fallen from 2% to 1%)

Requires adjusting taxes or benefits to remain in balance

1983 GREENSPAN COMMISSION

Demographic changes are predictable, so 1st reform was implemented in 1983 (designed to solve budget problems over next 75 years)

1) Increased payroll taxes to build a trust-fund

2) Increased retirement age in the future (from age 65 to 67)

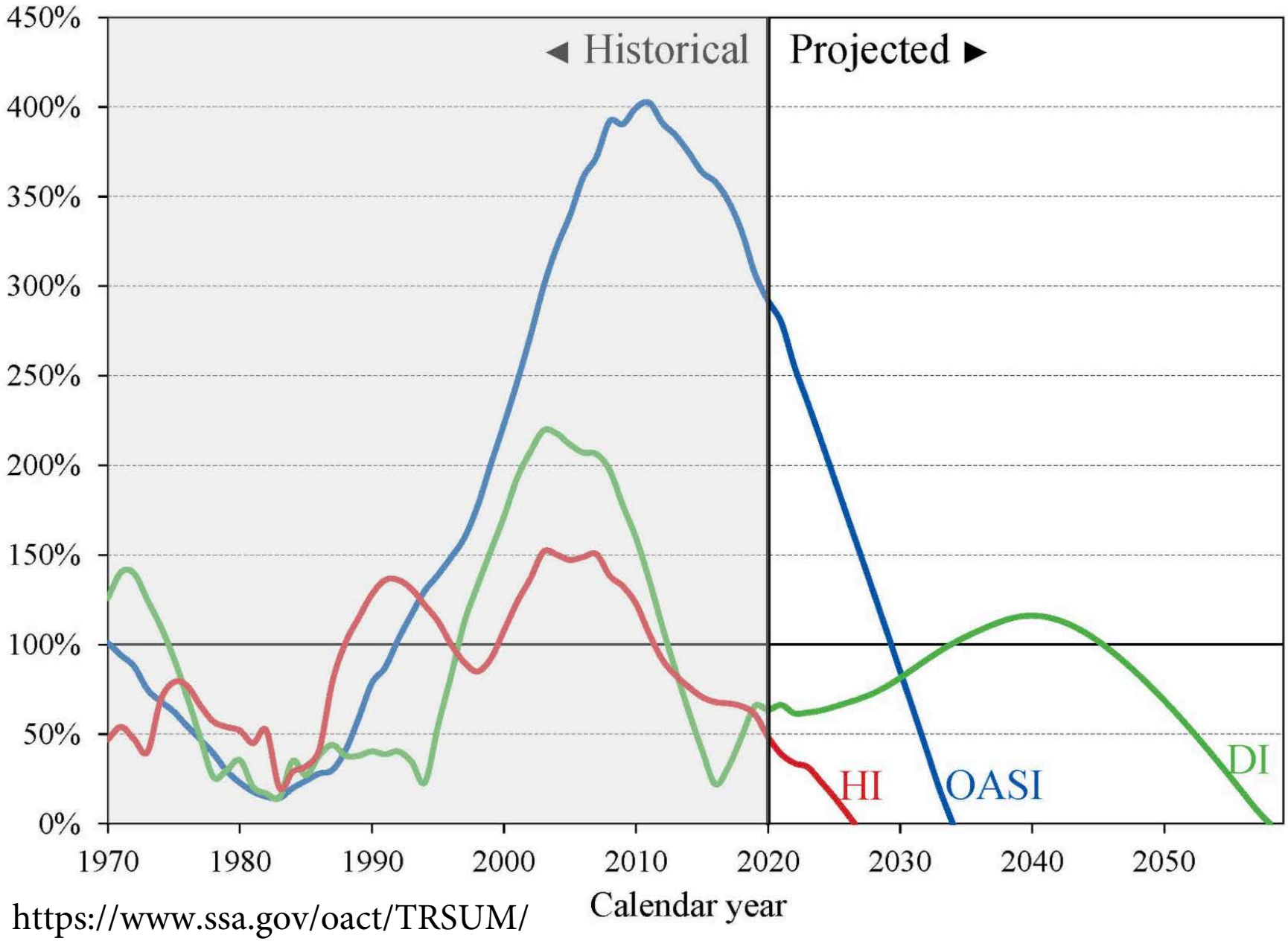
Trust fund invested in Treasury Bills (Fed gov debt): $TF_{t+1} = TF_t \cdot (1+i) + SSTax_t - SSBen_t$

Trust fund (relative to annual total SS benefits) peaked in 2013 and now declines. Will be exhausted by 2033, taxes will then cover about 75% of promised benefits

Requires additional adjustment: can fix it for next 75 years by increasing payroll tax rate now by 3.5 percentage points (1.2 GDP points) (not huge)

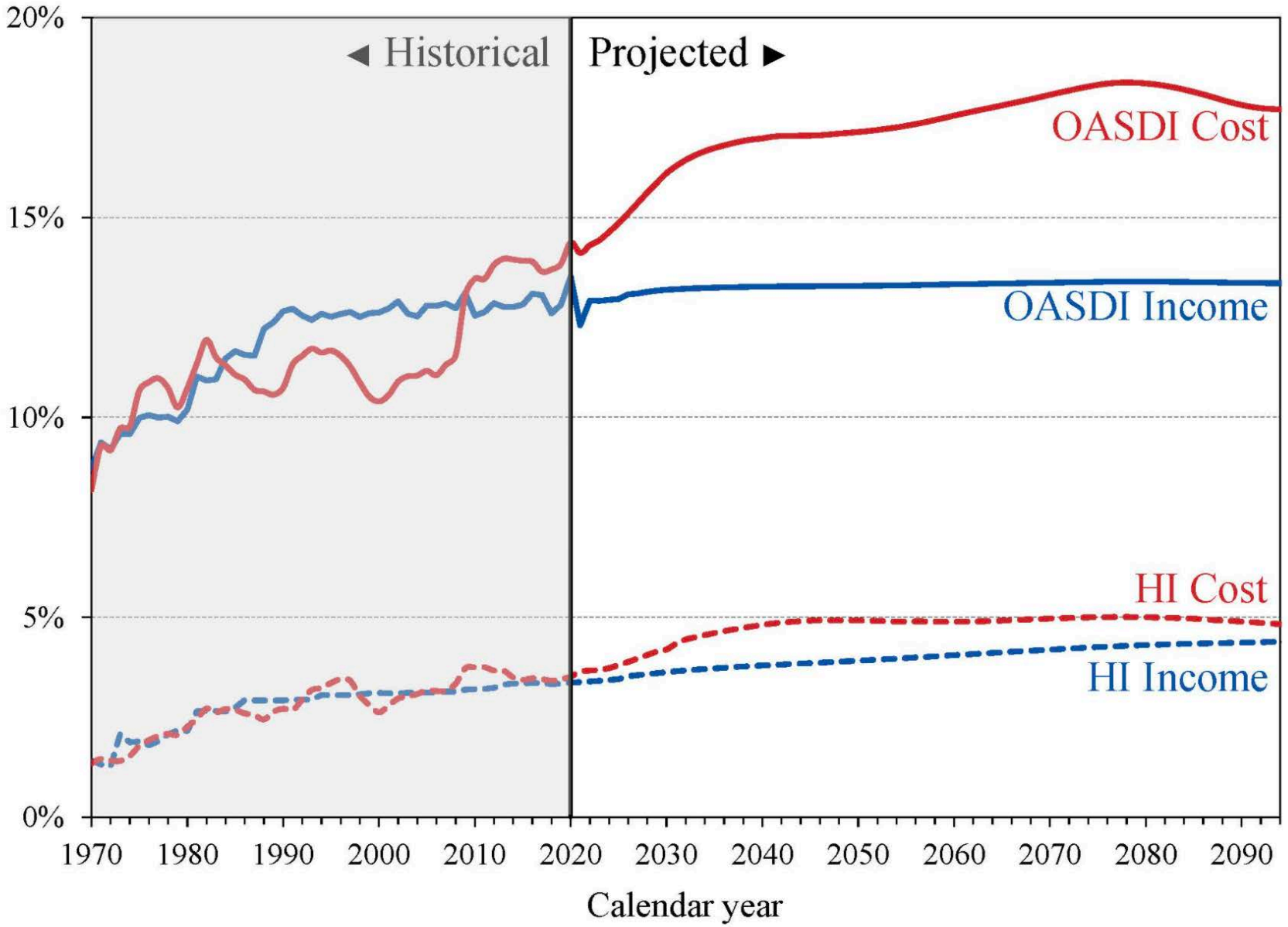
Chart A—OASI, DI, and HI Trust Fund Ratios

[Asset reserves as a percentage of annual cost]



https://www.ssa.gov/oact/TRSUM/

Chart B—OASDI and HI Income and Cost as Percentages of Their Respective Taxable Payrolls



Source: US Social Security Trust Fund https://www.ssa.gov/oact/TRSUM/

SOCIAL SECURITY REFORM OPTIONS

1) Increased contributions: increase tax rate or earnings cap [eliminating cap entirely would likely produce income shifting so often paired with similar tax increase on capital income of top earners]

2) Reduce benefits: straight cut not politically feasible: a) Index NRA on life expectancy, b) Index benefits using chained CPI instead of regular CPI, c) Make benefits fully taxable

3) Means-tested benefits: bad for savings incentives and could make program politically unstable [a program for the poor is a poor program]. Explains conservatives support.

4) Major reform: privatization (attempted by Bush in 2005)

SOCIAL SECURITY PRIVATIZATION

Two components:

1) Funding the system

2) Replace DB by DC:

benefits = past contributions + market return

Main arguments in favor:

(a) Micro: get higher return on contributions $r > n + g$ for individuals

(b) Macro: higher savings and hence increased capital stock and future wages

Some countries such as Chile, Mexico, Uruguay, UK have privatized (partly) their systems

SOCIAL SECURITY PRIVATIZATION ACCOUNTING

With 1 macro r, exactly reverse of pay-as-you-go calculations:

1) First generation loses as they need to fund current retirees and own contributions. All future generations gain [generational redistribution]

2) If govt increases debt to pay for current retirees: future generations get higher return on contributions but need to re-pay higher govt debt $\Rightarrow$ Complete wash for all generations:

tax to pay debt interest = returns on funded contributions - returns on paygo contributions

$\Rightarrow$ Only way funding generates real changes is by hurting some transitional generations which have to double pay

Calculations look better if $r_{\text{contributions}} >> r_{\text{govt debt}}$. Should govt exploit this equity-premium opportunity?

ADDITIONAL PRIVATIZATION ISSUES

1) Risk: individuals bear investment risk (stock market fluctuates too much relative to economy) and cannot count on defined level of benefits [$\Rightarrow$ Privatization needs to include minimum pension provision]

2) Annuitization: hard to impose in privatized system bc of political constraints [sick person forced to annuitize her wealth] $\Rightarrow$ Some people will exhaust benefits before death and be poor in very old age [looming problem with 401(k) system]

3) Lack of financial literacy: Individuals do not know how to invest. Complicated choice, govt can do it for people more efficiently

4) Administrative costs: privatized systems (Chile, UK) admin costs very high (1% of assets) due to consumers' imperfect understanding and wasteful advertisement by private mutual funds [Social Security has very low admin costs]

DISABILITY INSURANCE

Disability is conceptually close to retirement: some people become unable to work before old age (due to accidents, medical conditions, etc.)

All advanced countries offer public Disability Insurance (DI) almost always linked to the public retirement system

DI allows people to get retirement benefits before the **Early Retirement Age** if they are unable to work due to disability

$\Rightarrow$ DI is a way to screen those who really need to retire early

Empirics: Bound and Burkhauser Handbook Labor Economics '99 provide survey of empirical evidence

Theory: Diamond-Sheshinski JpubE'05 analyze optimal DI

US DISABILITY INSURANCE

1) Federal program funded by OASDI payroll tax, pays SS benefits to disabled workers below retirement age (similar computation of benefits based on past earnings)

2) Program started in 1956 and became more generous overtime (age 50+ condition removed, definition of disability liberalized, replacement rate has grown)

3) Eligibility: Medical proof of being unable to work for at least a year, Need some prior work experience, 5 months waiting period with no earnings required (screening device)

4) Social security examiners rule on applications. Appeal possible for rejected applicants. Imperfect process with big type I and II errors (Parsons AER'91) $\Rightarrow$ Scope for Moral Hazard

5) DI tends to be an absorbing state (most beneficiaries won't ever work again). Can earn up of $1200/month while on DI.

US DISABILITY INSURANCE

1) In 2021: 9.2m DI beneficiaries (not counting widows+children), about 5% of working age (20-64) population

2) Very rapid growth: In 1960, less than 1% of working age population was on DI.

3) Growth particularly strong during recessions: early 1990s, late 00s. Some decline from 10m in 2013 to 8m in 2024

Key empirical question: Are DI beneficiaries unable to work? or are DI beneficiaries not working because of DI.

Chart 2.
All Social Security disabled beneficiaries in current-payment status, December 1970–2017

The number of disabled beneficiaries has risen from 1,812,786 in 1970 to 10,059,166 in 2017, driven predominately by an increase in the number of disabled workers. The number of disabled adult children has grown slightly, and the number of disabled widow(er)s has remained fairly level. In December 2017, there were 8,695,475 disabled workers; 1,105,405 disabled adult children; and 258,286 disabled widow(er)s receiving disability benefits.

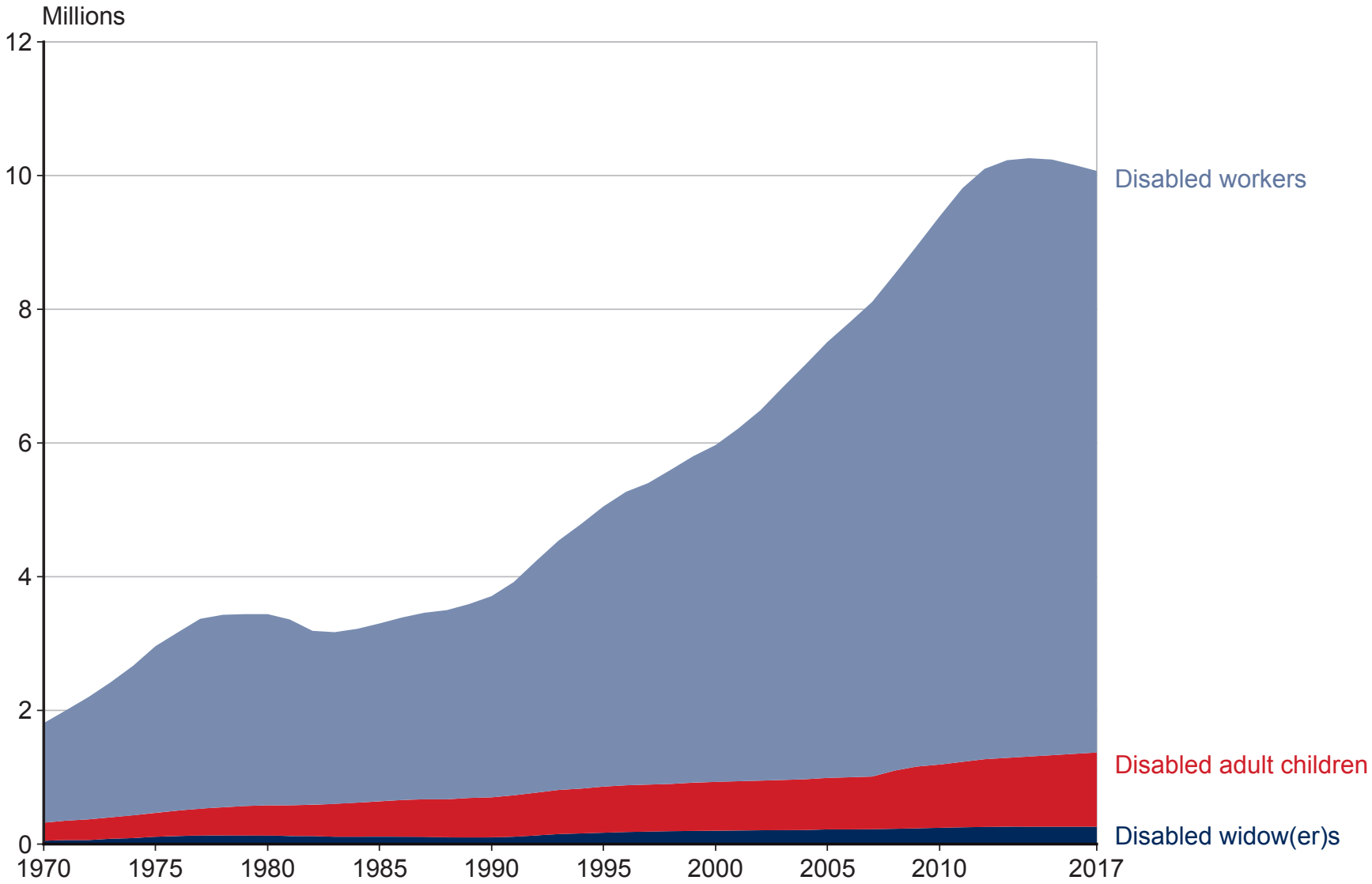
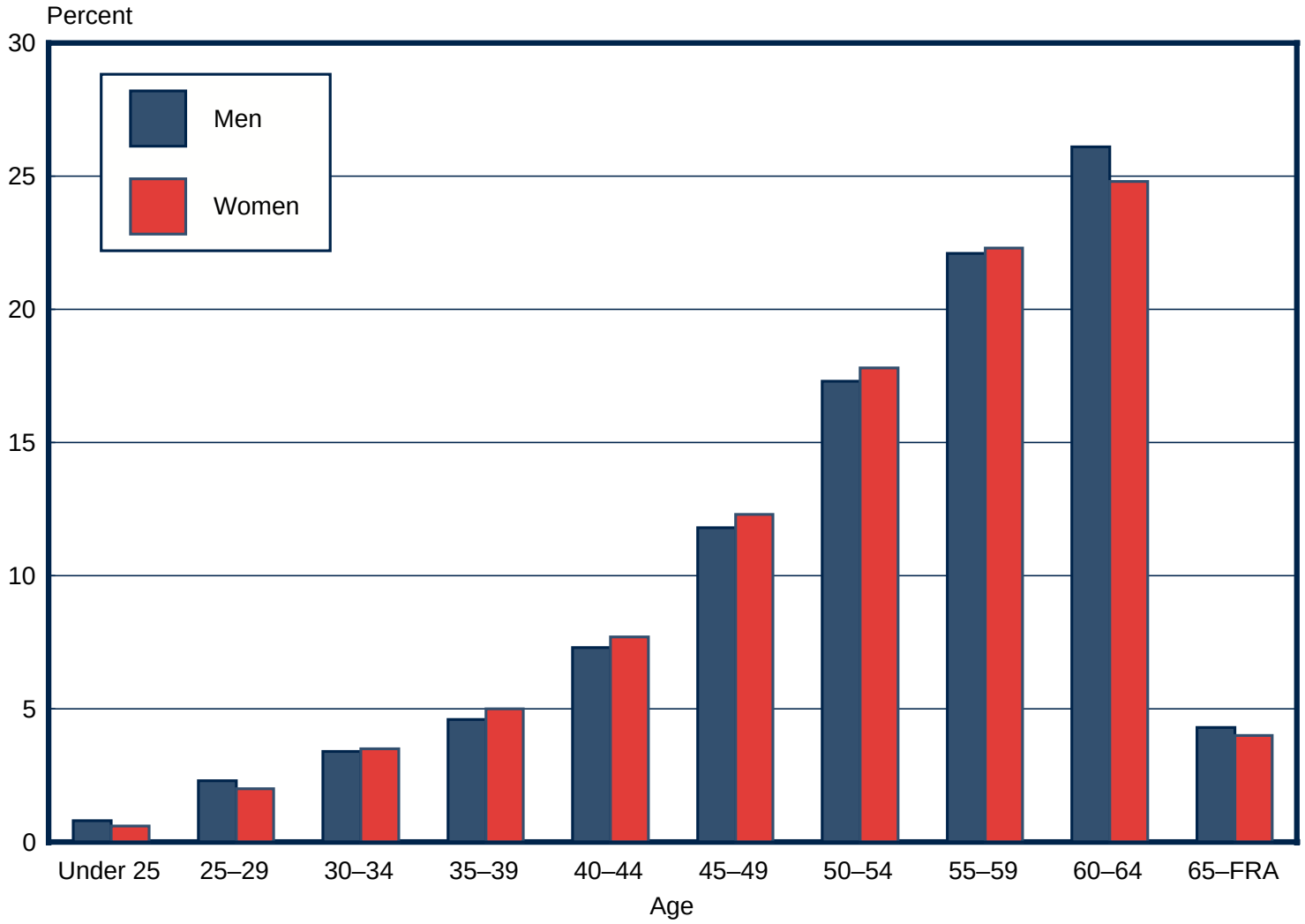


Chart 4. Source: SSA DI annual report

Age of disabled-worker beneficiaries in current-payment status, by sex, December 2010

The percentage of disabled-worker beneficiaries increases with age for both men and women. In December 2010, the largest percentage of disabled-worker beneficiaries was aged 60–64. Disability benefits convert to retirement benefits when the worker reaches full retirement age, 65–67, depending on the year of birth.



SOURCE: Table 4.

NOTE: FRA = full retirement age.

Chart 10.
Disabled-worker awards, by selected diagnostic group, 2010

Source: SSA DI annual report

In 2010, 1,026,988 disabled workers were awarded benefits. Among those awardees, the most common impairment was diseases of the musculoskeletal system and connective tissue (32.5 percent), followed by mental disorders (21.4 percent), circulatory problems (10.2 percent), neoplasms (9.0 percent), and diseases of the nervous system and sense organs (8.2 percent). The remaining 18.7 percent of awardees had other impairments.

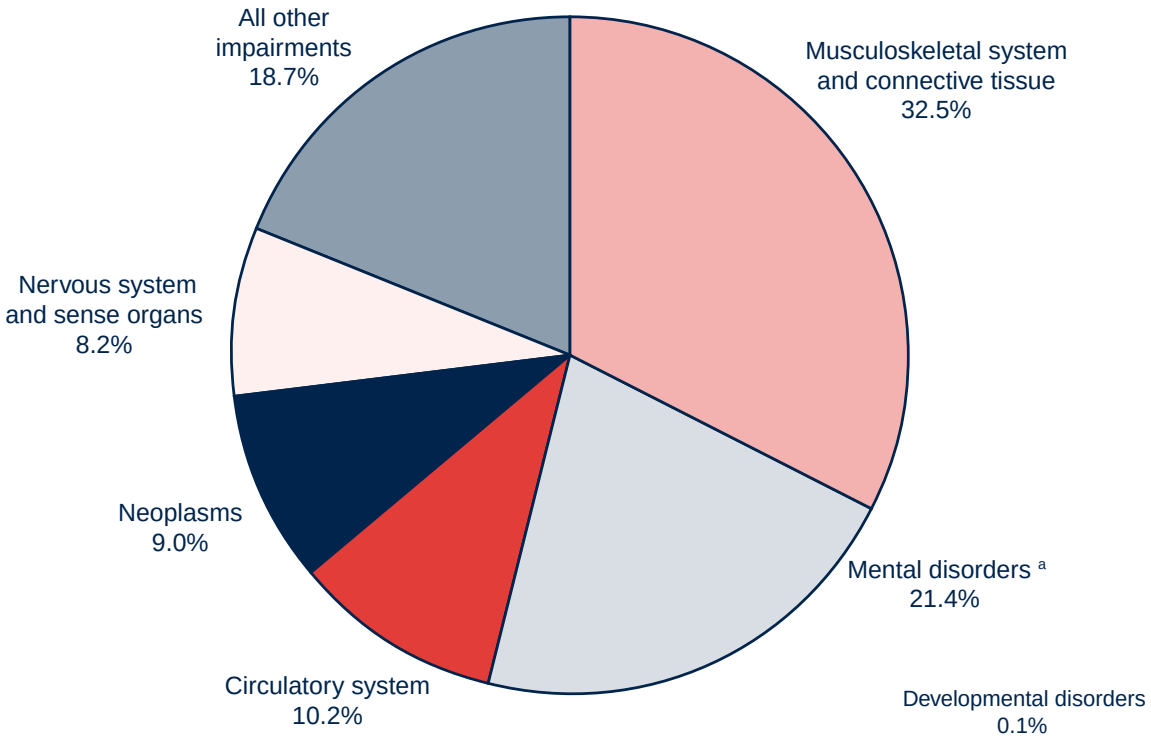


TABLE 1—REASSESSMENTS OF INITIAL SOCIAL SECURITY DETERMINATIONS

A. *Bureau of Disability Insurance Review One Year After Initial Determination (Percentages):*

BDI assessment	Initial determination	
	Allowance	Denial
Allowance	78.8	21.1
Denial	22.5	77.5

Note: The sample sizes are 250 initial allowances and 248 initial denials.

Source: Smith and Lilienfeld (1971 p. 195).

DI EMPIRICAL EFFECTS: REJECTED APPLICANTS

Bound AER'89 bounds effect of DI on labor force participation (LFP) rate using data on LFP on (small sample of) rejected applicants as a counterfactual (today 1/3 of applicants get it, 2/3 rejected)

Idea: If rejected applicants do not work, then surely DI recipients would not have worked absent DI $\Rightarrow$ Rejected applicants' LFP rate is an upper bound for LFP rate of DI recipients absent DI

Results: Only 1/3 of rejected applicants return to work and they earn less than half of the mean non-DI wage

$\Rightarrow$ at most 1/3 of the trend in male LFP decline can be explained by shift to DI

Von Waechter-Manchester-Song AER'11 replicate Bound using full pop SSA admin data and find similar results

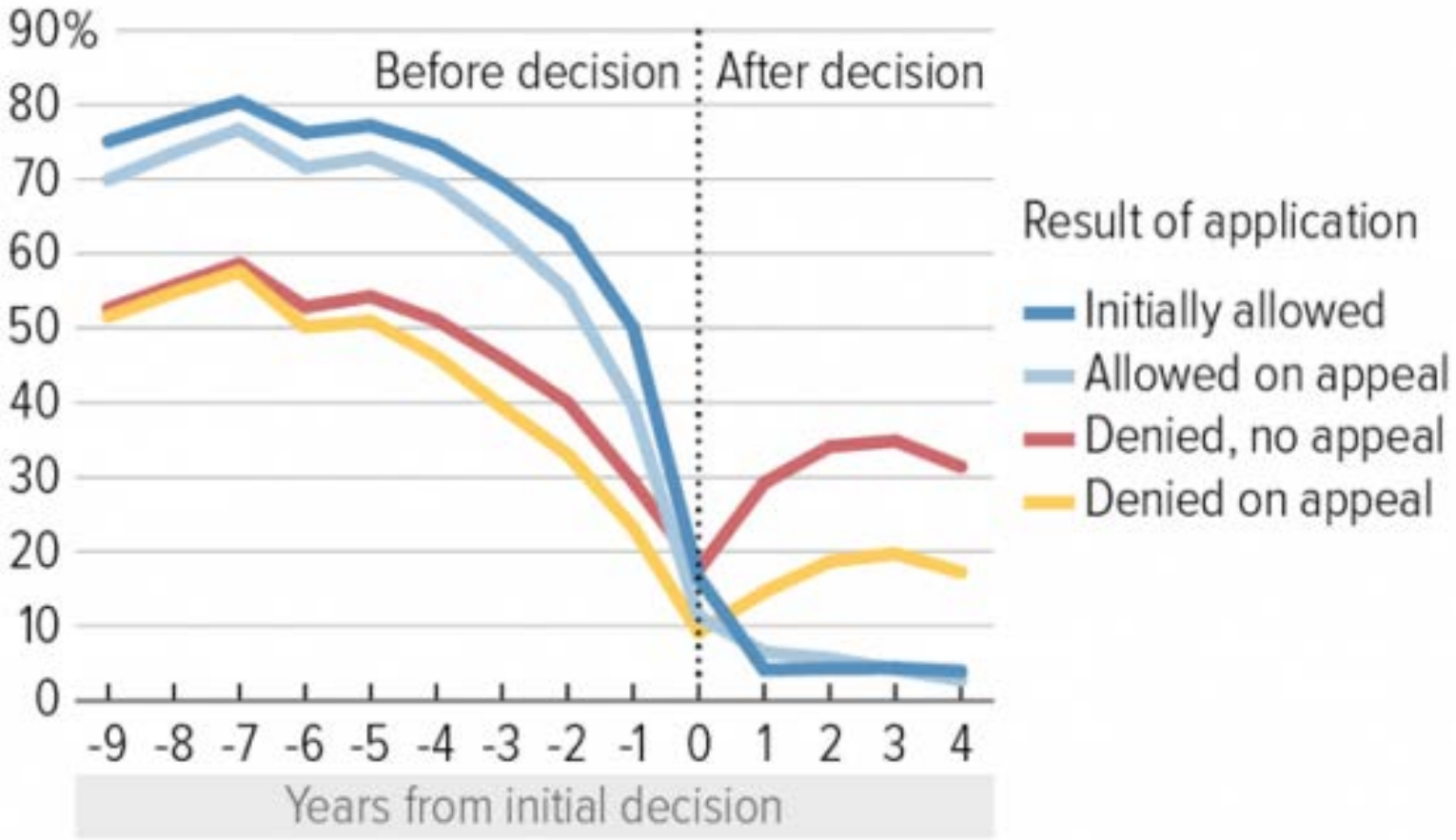
TABLE 2—EMPLOYMENT, EARNINGS, AND OTHER CHARACTERISTICS OF REJECTED DISABILITY INSURANCE APPLICANTS

	1972			1978		
	Population	Rejected Applicants	Beneficiaries	Population	Rejected Applicants	Beneficiaries
Labor Supply						
Percent Employed	77.7	32.6	3.2	69.3	28.7	2.3
Percent Worked 71/77	91.9	45.0	7.5	86.7	40.4	5.5
Percent Full Year ($\geq$ 50 Weeks)[a]	76.8	47.4	31.4	83.5	41.2	22.2
Percent Full Time ($\geq$ 35 Hours)[a]	95.4	75.9	25.0	92.4	79.6	38.3
Earnings Among Positive Earners						
Median Annual Earnings, 71/77[b]	$9000	$4000	$700	$14000	$5300	$1000

Source: Bound 1991

Disability Insurance Applicants Experience Sharp Drop in Earnings Before Application; Few Work Afterward

Percent of applicants performing substantial gainful activity before and after initial decision



Source: Nicole Maestas, Kathleen Mullen, and Alexander Strand, "Does Disability Insurance Receipt Discourage Work? Using Examiner Assignment to Estimate Causal Effects of SSDI Receipt," Michigan Retirement Research Center Working Paper 2010-241. Additional plot points, through 4 years after decision, courtesy of the authors.

DI WORK EFFECTS: EXAMINERS' STRINGENCY

Maestas-Mullen-Strand AER'13 obtain causal effect of DI on work using natural variation in DI examiners' stringency and large SSA admin data linking DI applicants and examiners

Idea: (a) Random assignment of DI appplicants to examiners and (b) examiners vary in the fraction of cases they reject $\Rightarrow$ Valid instrument of DI receipt

Result: DI benefits reduce work of applicants by 28 points $\Rightarrow$ DI has an impact but fairly small (consistent with Bound AER'89)

Note: This estimates the causal effects of DI on working behavior for marginal cases: applicants who are admitted with lenient examiner but rejected with tough examiner [Average effect on all DI recipients likely smaller]

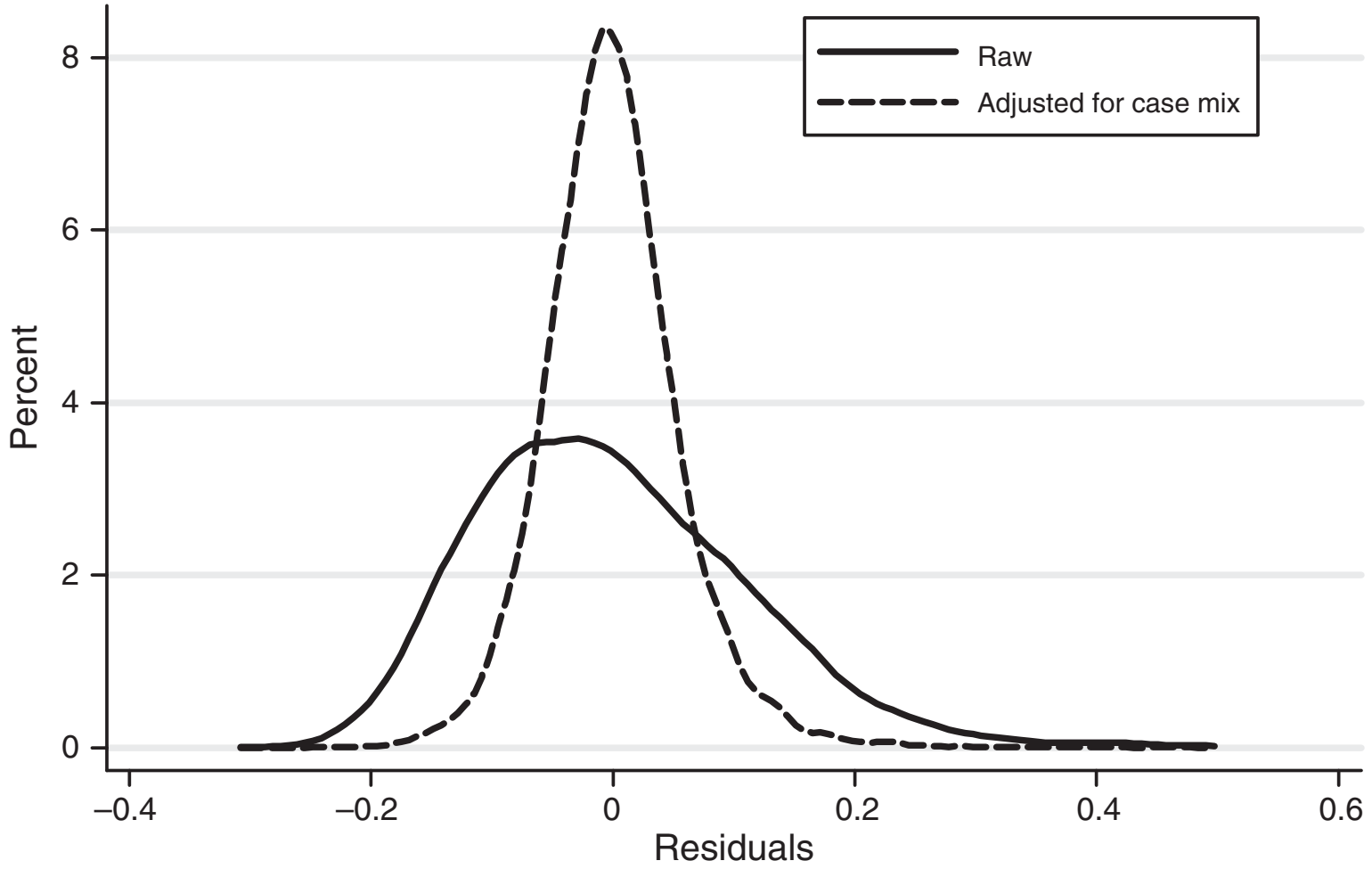


FIGURE 3. DISTRIBUTION OF EXAMINER DEVIATIONS FROM DDS MEAN INITIAL ALLOWANCE RATE

Note: Caseload characteristics include DDS office, age, preonset earnings, body code, three-digit zip code, terminal illness diagnosis, and decision month.

Source: 2005–2006 DIODS data.

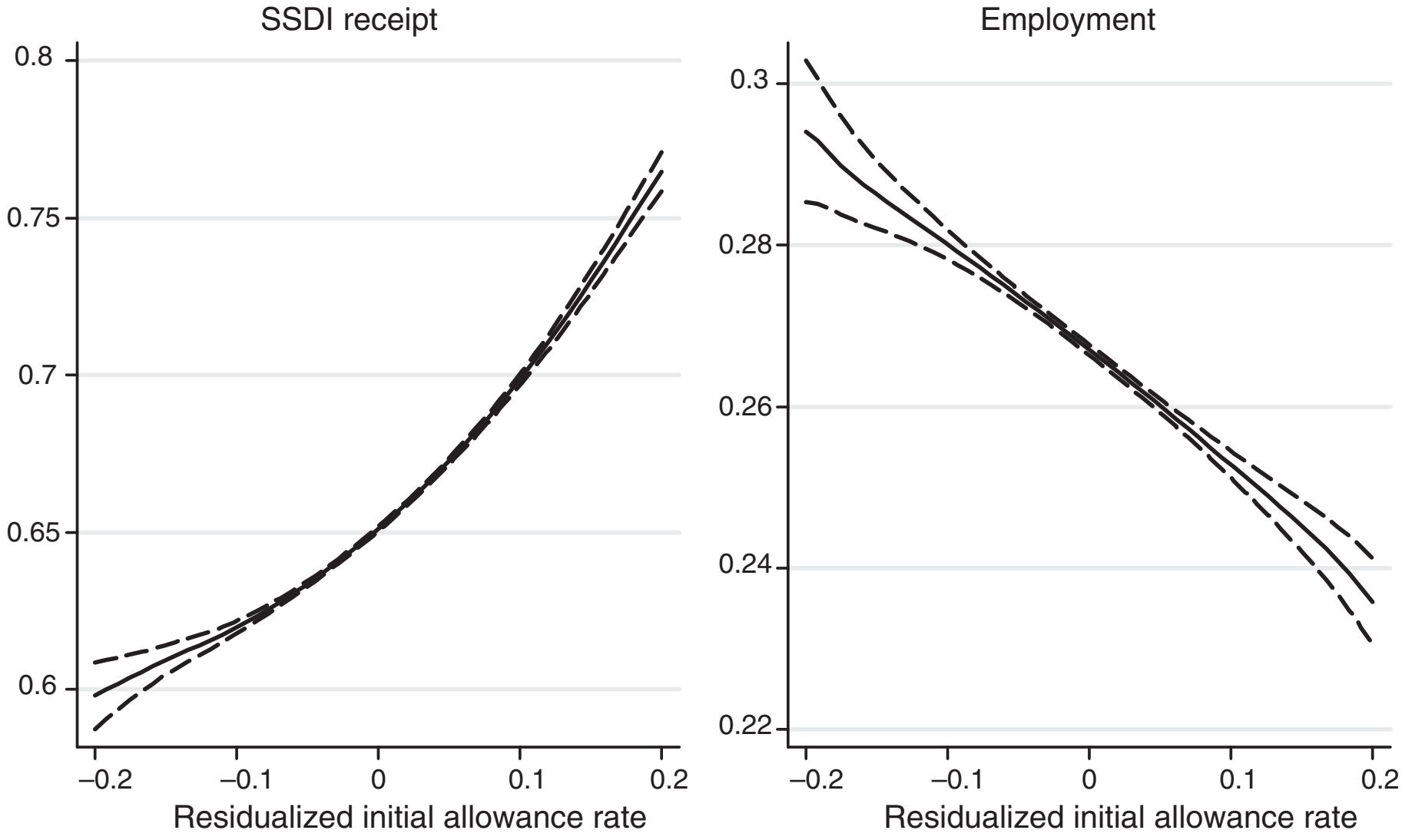


FIGURE 4. SSDI RECEIPT AND LABOR SUPPLY BY INITIAL ALLOWANCE RATE

Notes: Ninety-five percent confidence intervals shown with dashed lines. Employment measured in the second year after the initial decision. Bandwidth is 0.116 for DI and 0.130 for labor force participation.

Source: DIODS data for 2005 and 2006.

Effect of DI Processing Time: Autor et al. 2015

DI requires a lengthy application process and 5 months out of the labor force $\Rightarrow$ Process takes 10 months on average

Being out of the labor force for 10 months could hurt future job prospects $\Rightarrow$ Could partly explain why DI rejected applicants work so little $\Rightarrow$ DI could have higher negative effects

Autor et al. 2015 test this using (quasi-random) variation in DI applications processing time due to backlog

Find that 1 sd processing time delay (2.1 month) reduces employment rate by .36 points (3.5%) for denied applicants

Rejected applicants often appeal which reduces long-term labor supply (even if appeal not successful) $\Rightarrow$ Rejected applicants strategy underestimates DI effects

Accounting for the delay channel boosts negative DI effects by 50% (from 17 points to 25 points in year 6)

DI Generosity Effects: Regression Kink Design (RKD)

DI benefits calculated like SS benefits: AIME formula based on average life-time earnings creates a "kinked" relationship

Ideal setting for an RKD (Card et al. 2015): test whether outcome such as earnings or mortality is also "kinky"

1) Test first for no sorting of DI recipients around kink to validate RKD design [similar to RDD validation]

2) RKD estimate: Change in slope of outcome at kink / Change in slope of benefits at kink

a) Gelber et al. '17 analyze effects on earnings of DI generosity and find an income effect of -$0.2 per dollar of benefits

b) Gelber et al. 18 analyze effects on mortality: at lower bend point, $1K extra DI/year reduces annual mortality by .25 points (1 out of 400 lives saved)

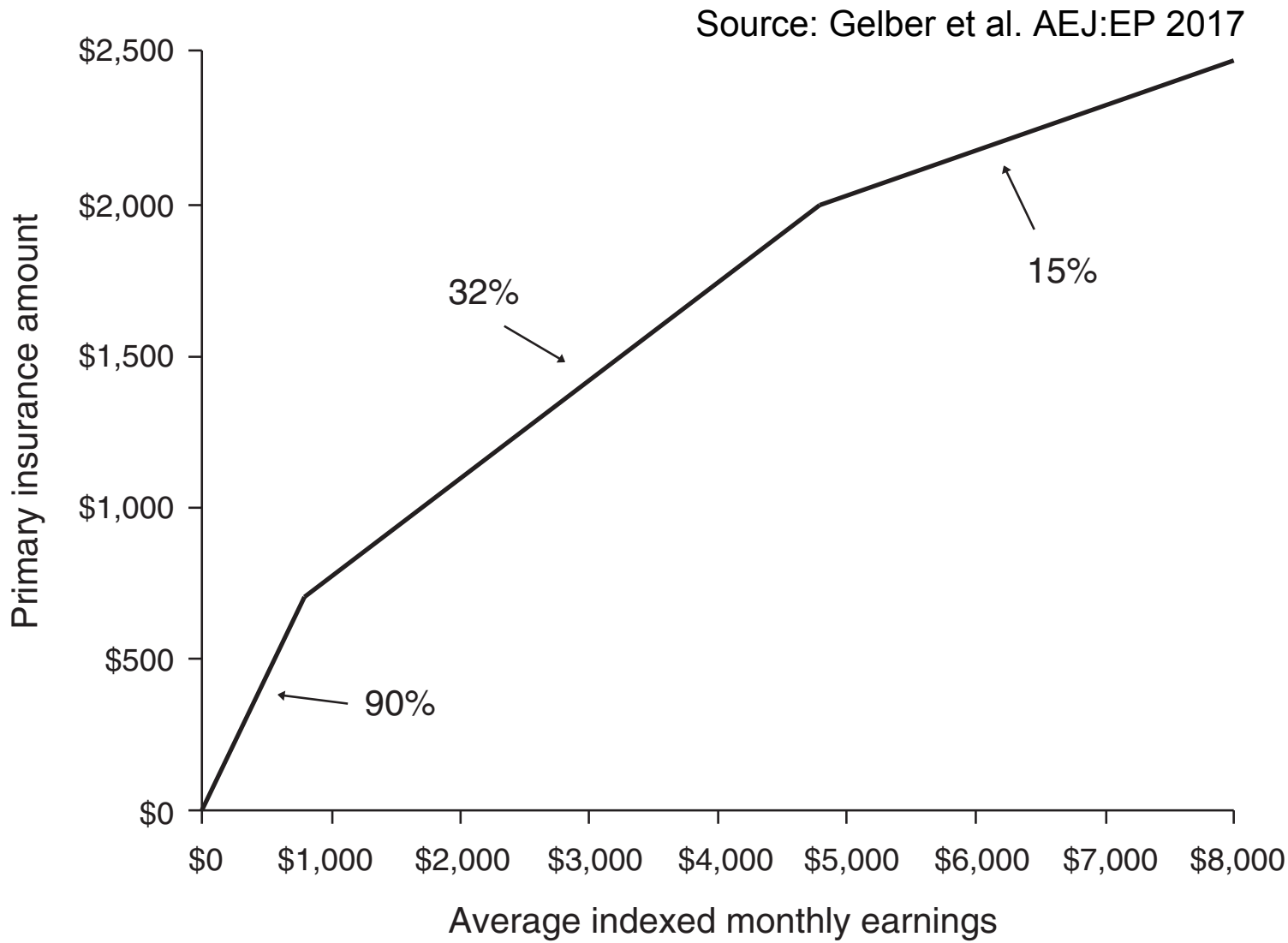


FIGURE 1. PRIMARY INSURANCE AMOUNT AS A FUNCTION OF AVERAGE INDEXED MONTHLY EARNINGS

Notes: The figure shows the primary insurance amount (PIA) as a function of average indexed monthly earnings (AIME) in 2013. The percentages are marginal replacement rates.

Source: SSA (2013)

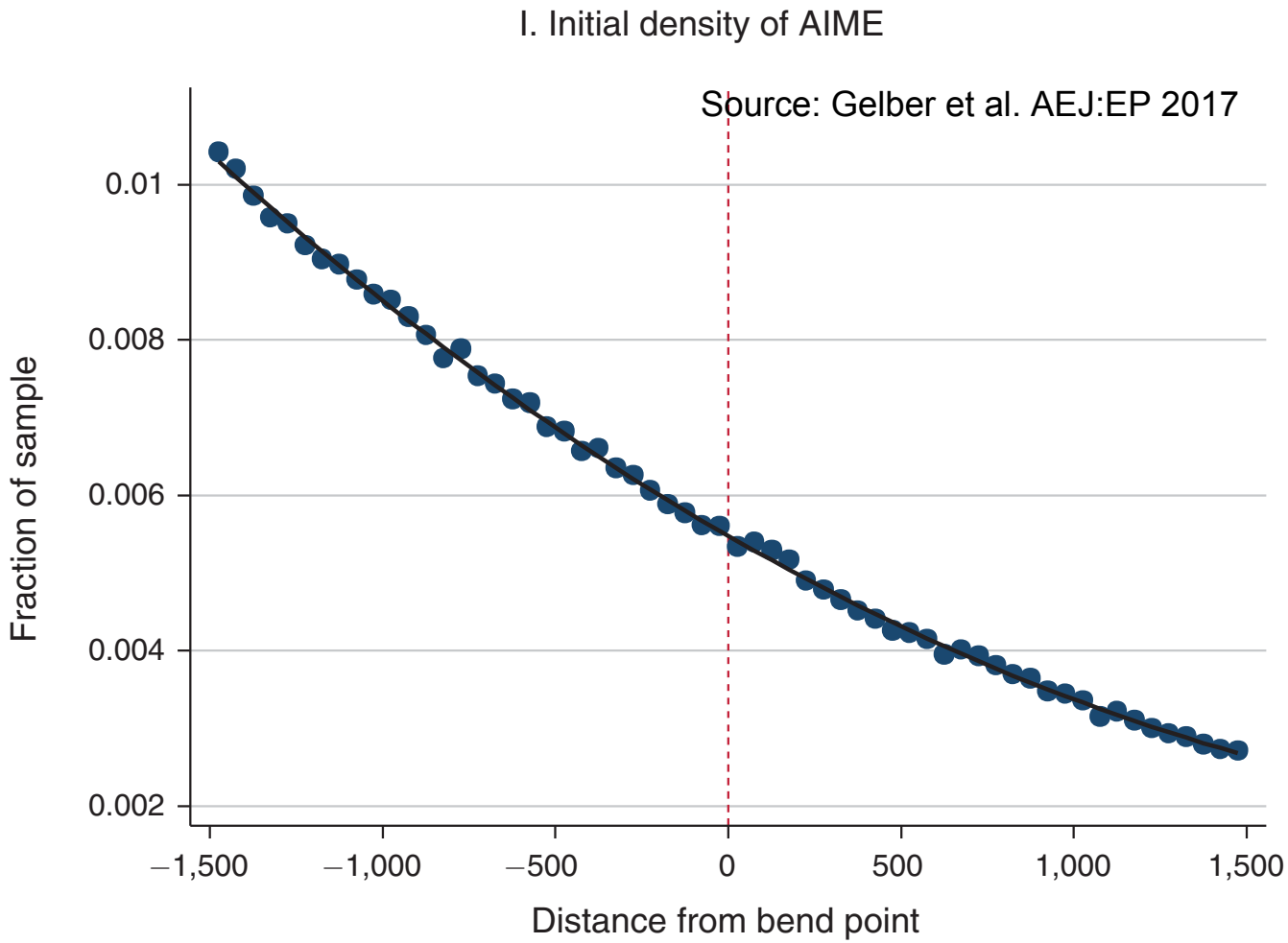


FIGURE 3. SMOOTHNESS OF DENSITY AND PREDETERMINED COVARIATES AROUND THE UPPER BEND POINT (*continued*)

Notes: The figure shows the density of initial AIME in $50 bins as a function of distance of initial AIME to the upper bend point. The number of observations appears smooth through this bend point, with no sharp change in slope or level. The upper bend point is where the marginal replacement rate in converting AIME to PIA changes from 32 percent to 15 percent. The sample includes DI beneficiaries within $1,500 of the upper bend point (see the text for other sample restrictions). The fraction of the sample in each bin is calculated by dividing the number of beneficiaries in each bin by the total number of beneficiaries in the sample. The best-fit line is a ninth-order polynomial that parallels the regression presented in Table 2 that minimizes the corrected Akaike Information Criterion (AICc).

Source: The data are from SSA administrative records.

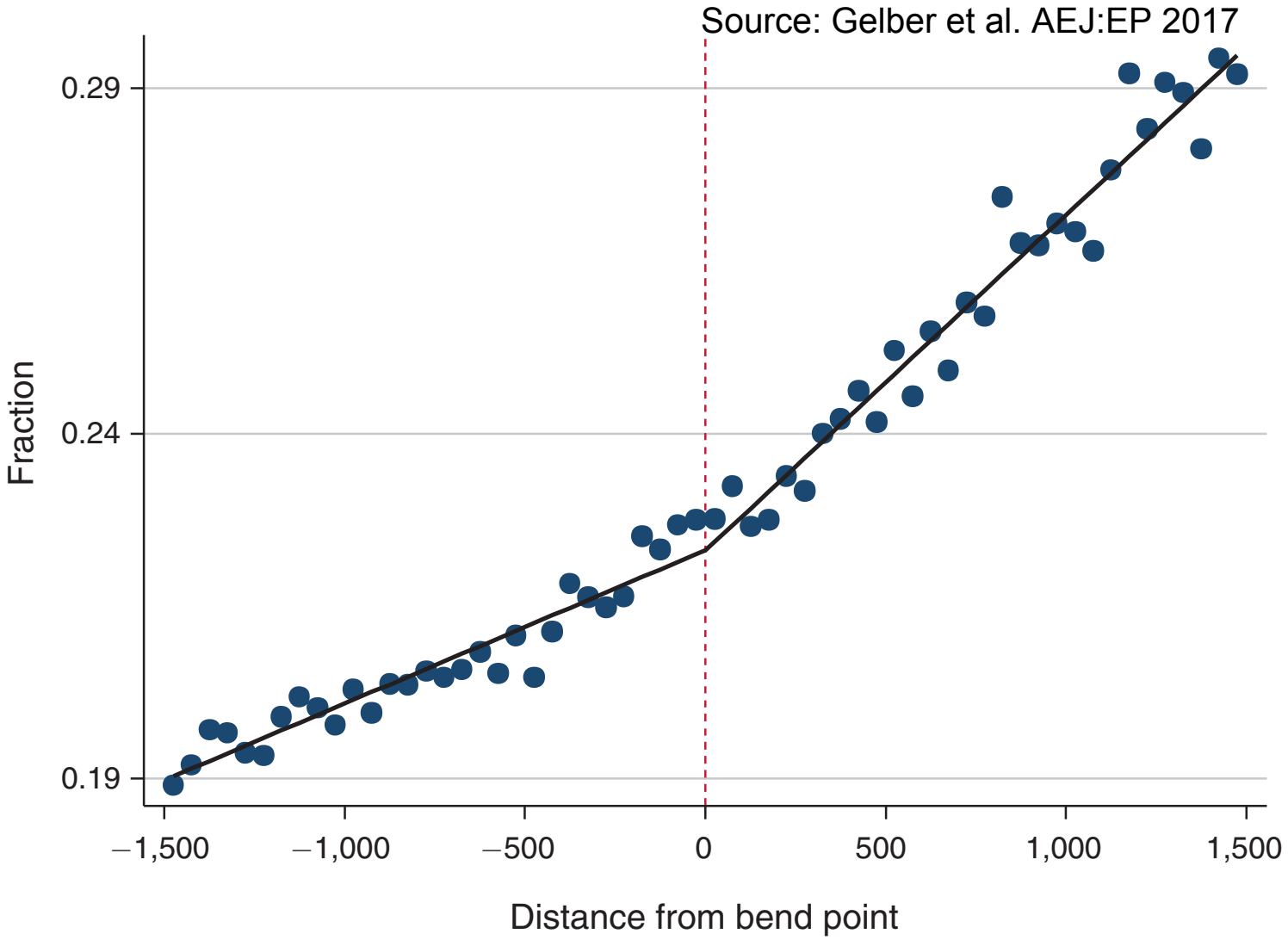


FIGURE 5. AVERAGE ANNUAL FRACTION EMPLOYED AFTER DI ALLOWANCE

Notes: The figure shows the mean fraction of years when a beneficiary has positive annual earnings, over the four years after going on DI (i.e., the mean yearly employment rate over these four years), in $50 bins, as a function of distance from the bend point. The figure shows that the probability of positive earnings appears to slope upward more steeply above the upper bend point than below it.

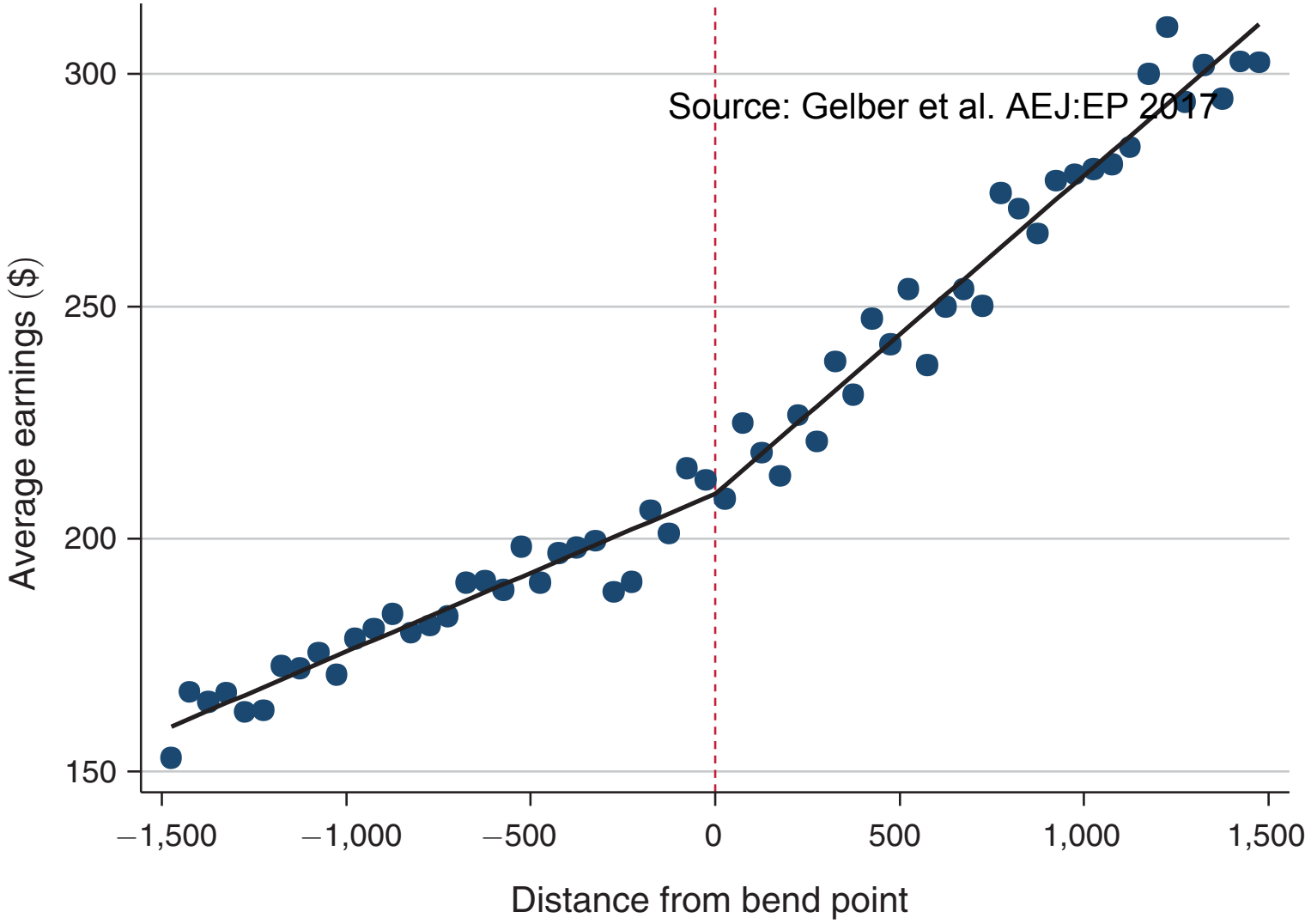
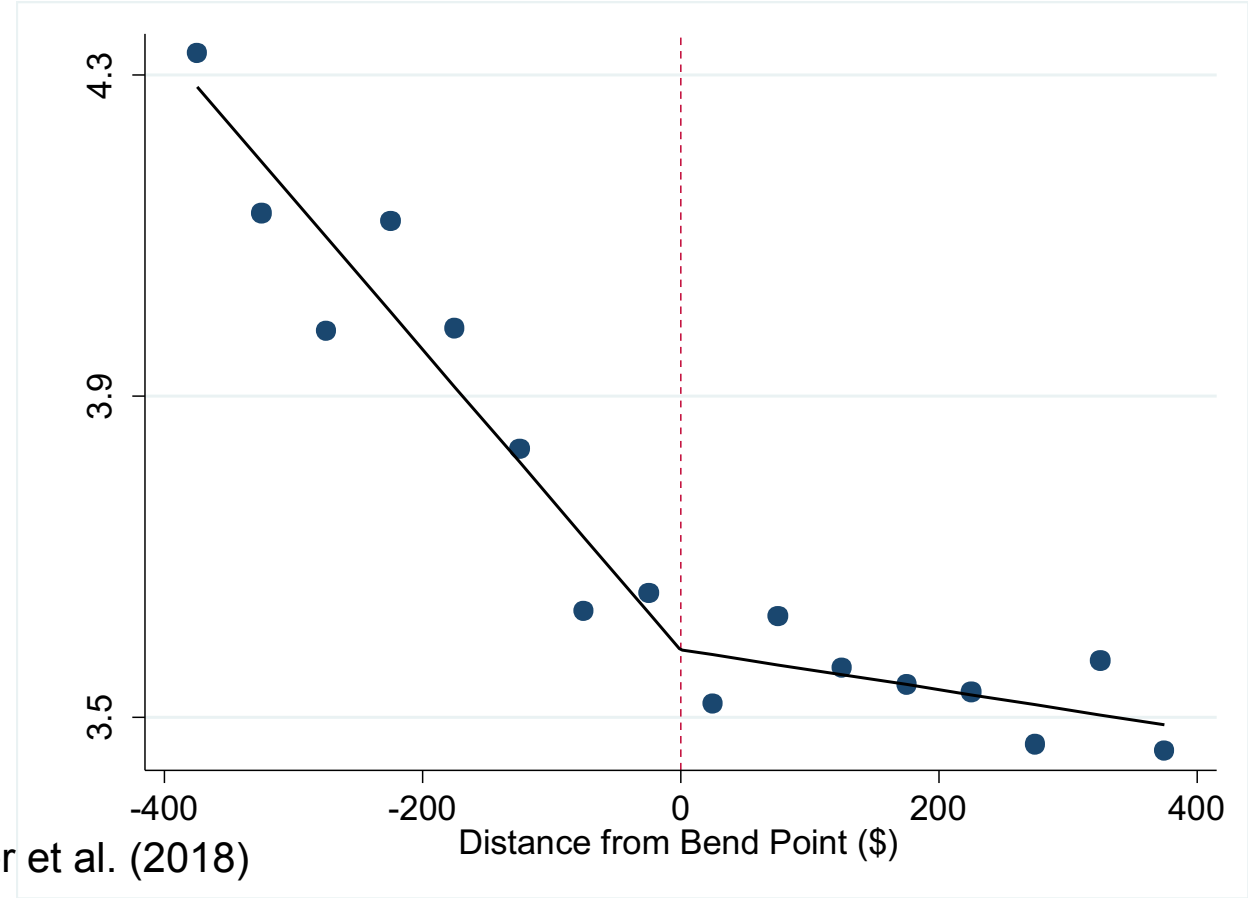


FIGURE 4. AVERAGE MONTHLY EARNINGS AFTER DI ALLOWANCE

Notes: The figure shows mean monthly earnings in the first four years after going on DI, in $50 bins, as a function of distance of AIME from the bend point, where AIME is measured when applying for DI. The figure shows that mean earnings slope upward more steeply above the upper bend point than below it, with fitted lines that lie close to the data.

Figure 3. Annual Percent Mortality Rates around the Bend Points

A: Lower bend point



Source: Gelber et al. (2018)

DI and Unemployment: Autor and Duggan QJE'03

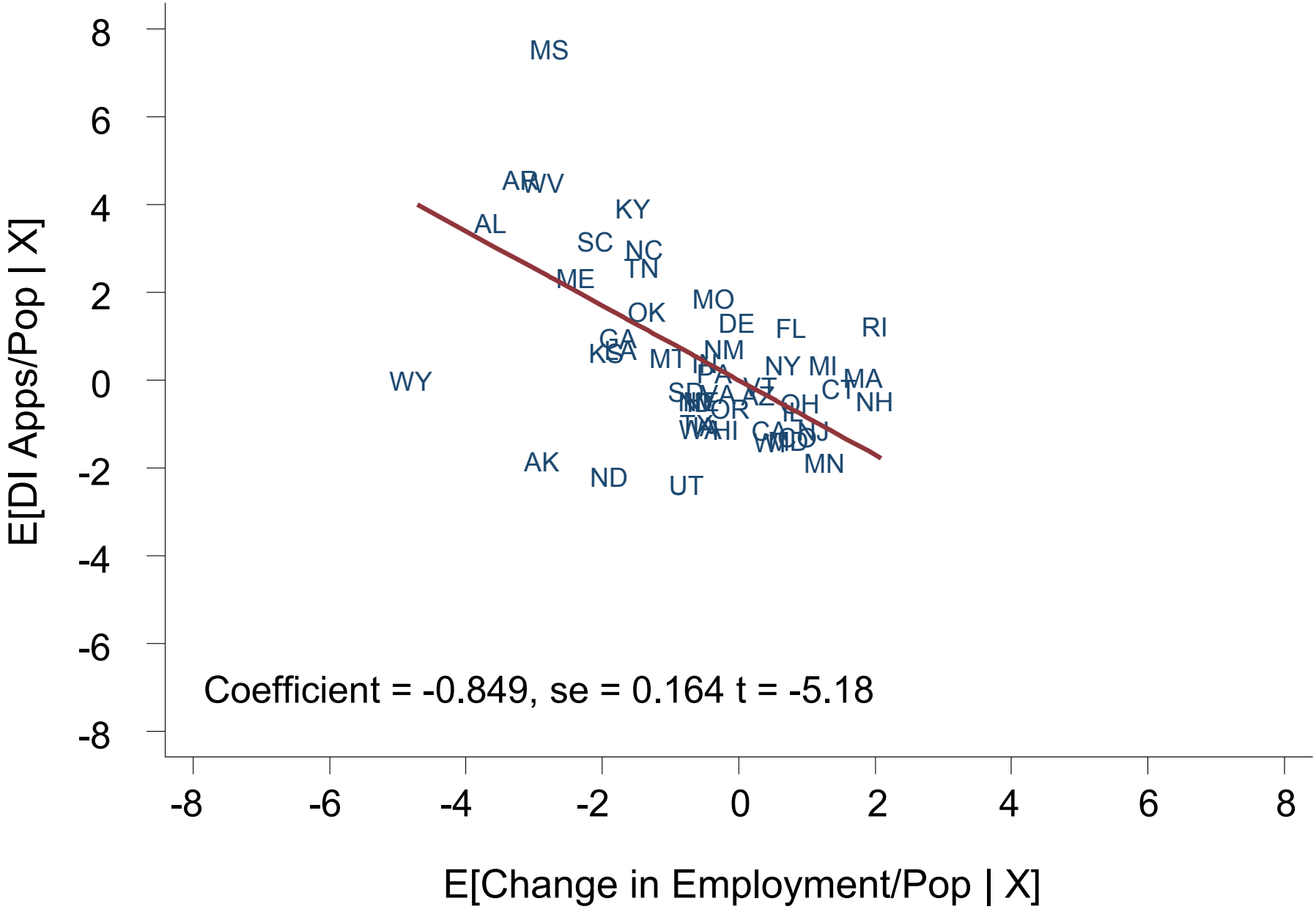
DI claims raise in recessions (as partly disabled workers have less working options) $\Rightarrow$ Reduces unemployment rate (DI recipients outside labor force) and labor force participation

Test this hypothesis using cross-state variation in employment shocks (using industry mix Bartik's instrument) [e.g., car industry shock creates employment shock in Michigan]

Negative employment shocks do increase DI applications and reduce the size of labor force (workers+job seekers)

DI keeps beneficiaries outside labor force permanently and is an inefficient substitute to temporary unemployment insurance benefits

Employment Shocks and DI Applications: 1993-1998



Source: Autor and Duggan 2003

Fall in male LFP and health

LFP (=workers+job seekers/population) of prime-age males (25-54) has fallen 10 pts from 98% in 1950s to 88% in 2010s (2 pts drop in 2007-10). Drop particularly large among least educated.

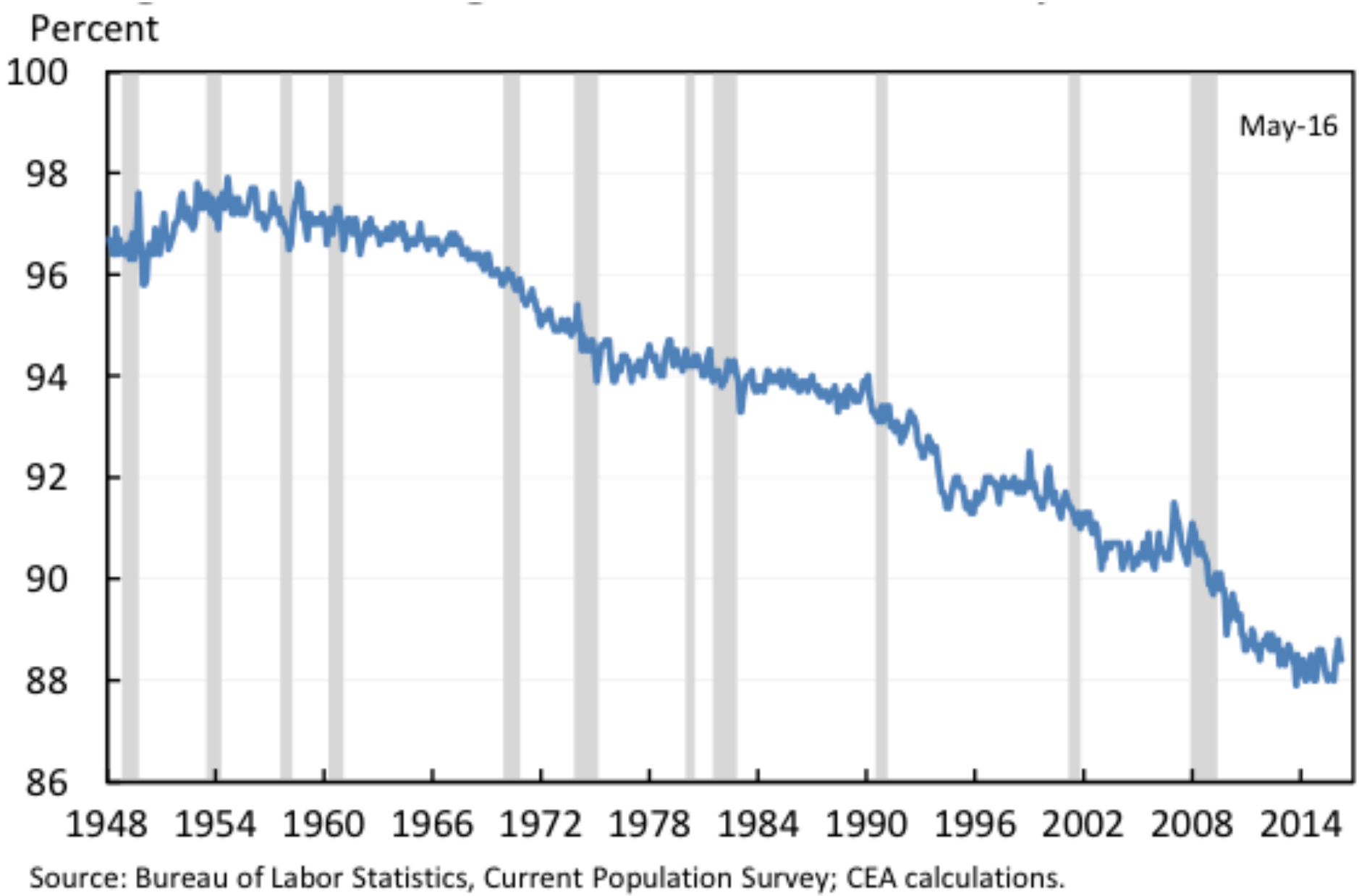
What can explain it? [Black et al. 2016 review potential explanations]

Generosity of govt programs (e.g. DI) or incarceration cannot explain it

Consistent with reduced work and pay opportunities (due to surge in inequality)

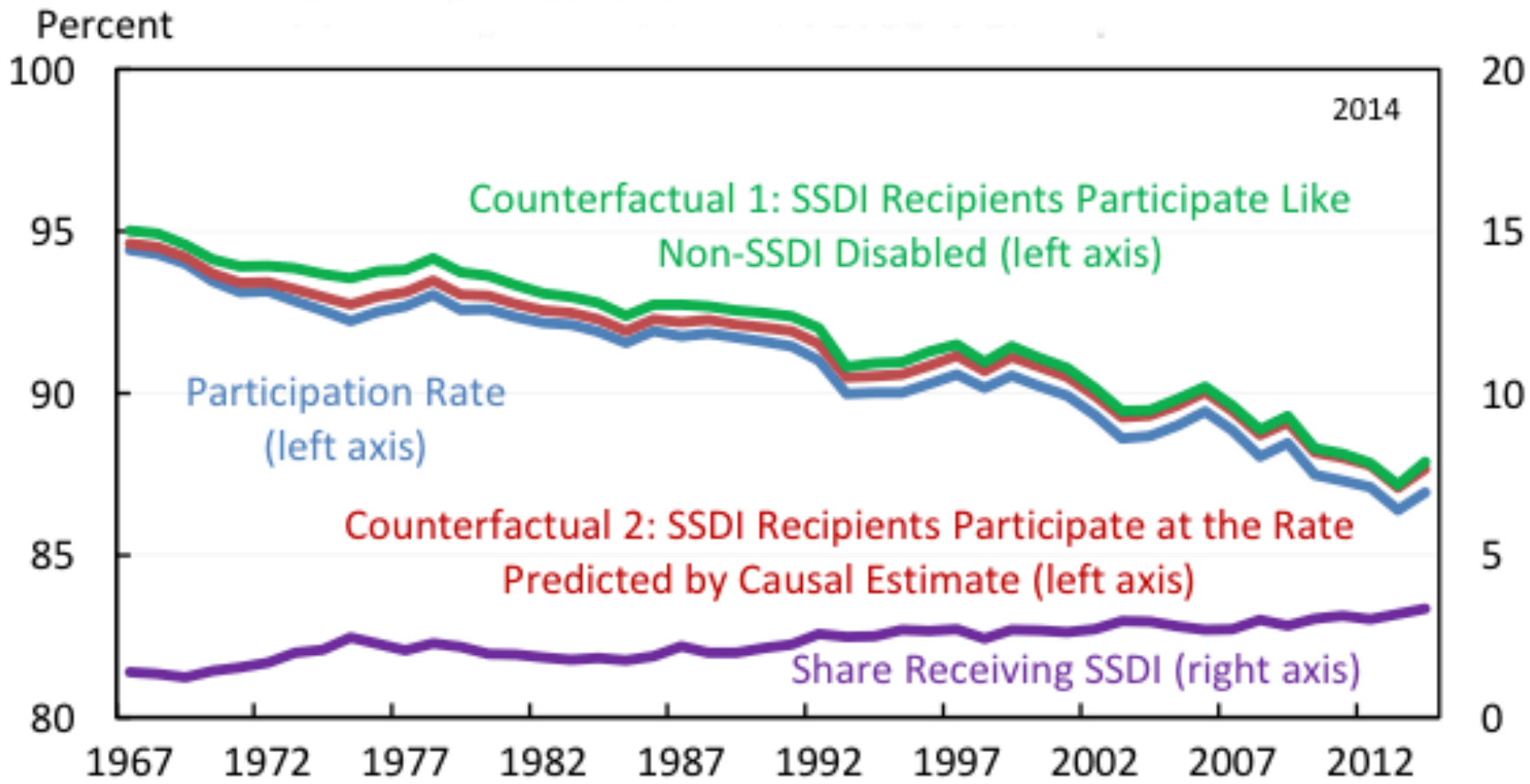
Possible that this is related to deteriorating health [see Case and Deaton 2015] in which case DI increase recipiency is a symptom of the problem (not the cause)

Figure 1. Prime-age male labour force participation rate



Source: Black, Furman, Rackstraw, Rao (2016)

Figure 6. Possible effects of disability on prime-age male labour force participation



Note: Green line participation rate pre-1988 is a linear projection based on the post-1988 series due to a lack of data identifying the disabled before 1988. Participation rates for non-SSDI recipient disabled are age-adjusted using a linear probability model. Red counterfactual based on French and Song (2014).
Source: Bureau of Labor Statistics, Current Population Survey (Annual Social and Economic Supplement); CEA calculations.

Source: Black, Furman, Rackstraw, Rao (2016)

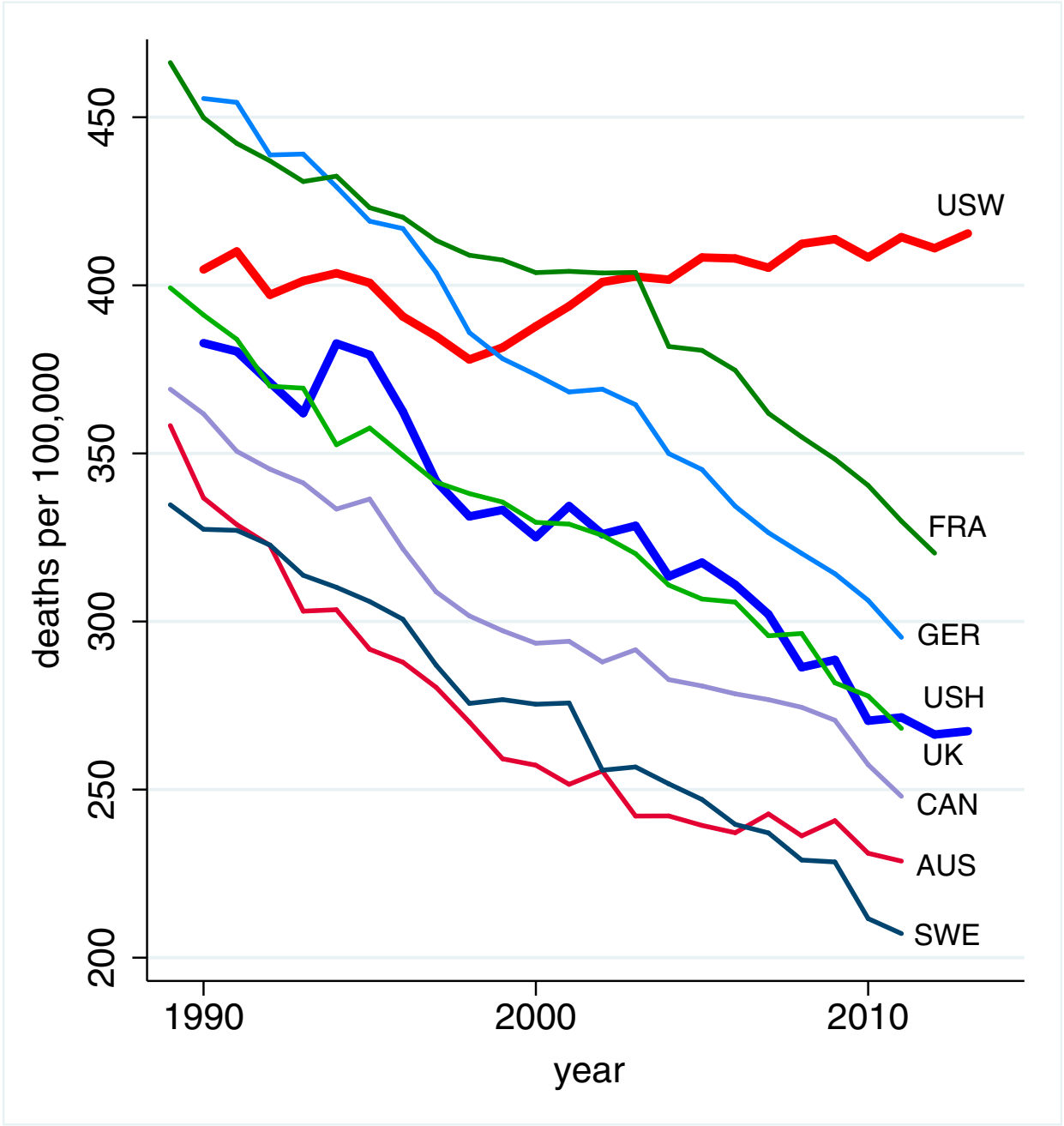


Fig. 1. All-cause mortality, ages 45–54 for US White non-Hispanics (USW), US Hispanics (USH), and six comparison countries: France (FRA), Germany (GER), the United Kingdom (UK), Canada (CAN), Australia (AUS), and Sweden (SWE). Source: Case and Deaton (2015)

Disability Insurance Privatization in Germany

DI is social insurance, i.e., mandatory and funded by taxation

In principle, rational individuals should value DI and be willing to purchase it privately absent govt provided DI

Usual economists' concern is adverse selection if private DI is not mandatory: only risky types would buy

Seibold, Seitz, Siegloch (2022) study DI privatization for younger workers in Germany

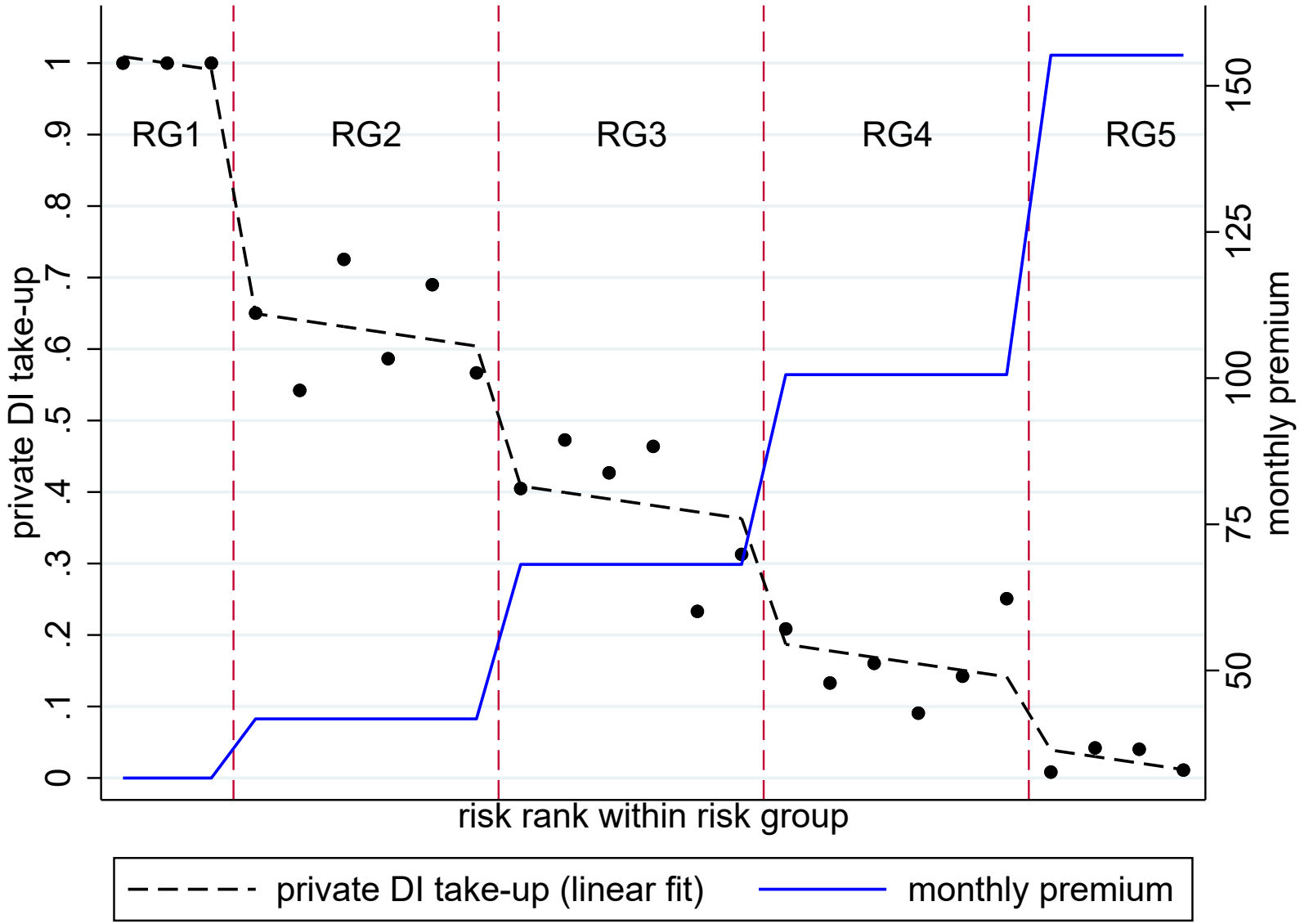
Private DI take-up modest especially for low earners $\Rightarrow$ low willingness to pay

Reverse adverse selection (high earners, high ed are low risk and high take-up)

$\Rightarrow$ Privatization=social insurance for the well-off only

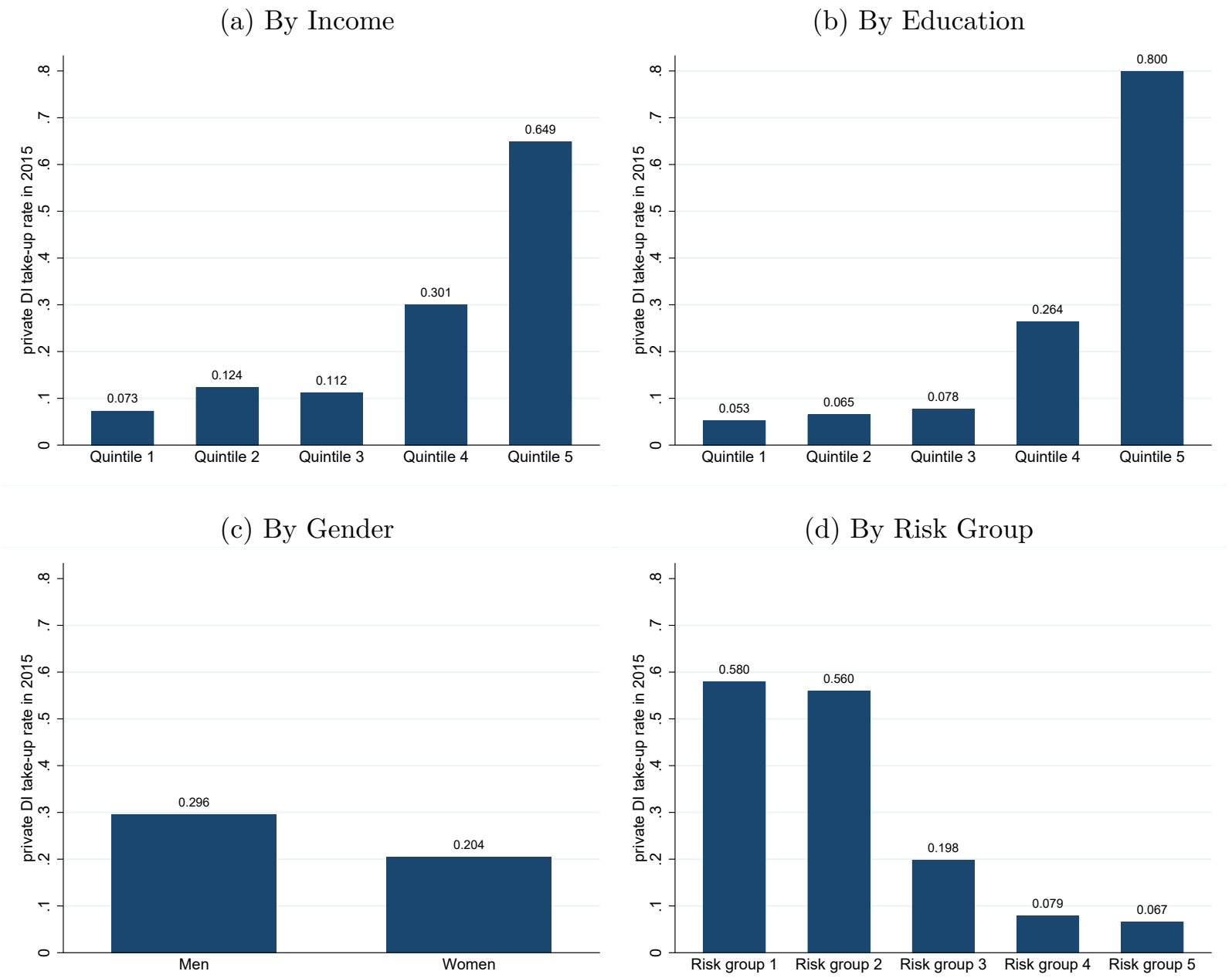
Figure 6: Demand Responses to Insurance Prices

(a) Take-Up vs. Price by Risk Ranks



Source: Seibold, Seitz, Siegloch (2022), private DI take-up in Germany

Figure 4: Private DI Take-Up by Observable Characteristics



Notes: The figure shows private DI take-up rates in 2015 by income quintile (Panel a), education quintile (Panel b), gender (Panel c) and risk group (Panel d). In Panel (b), education is defined as years of schooling. Take-up rates are calculated among all cohorts as shown in equation (2).

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