Public Economics: Lecture 7
Unemployment Insurance

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Unemployment insurance (UI)

- Program is mandated by the federal government, but implemented at the state level
- Controversial program because there is a clear trade-off
  - Benefit: helps people smooth consumption across good (employed) and bad (unemployed) states of the world
  - Cost: reduces incentive to search for work while unemployed and crowds-out self-insurance (moral hazard)
  - Key question – what is the optimal way to balance these costs and benefits of the program?
- Financed through a payroll tax on employers equal to $\approx$ 1-2% of workers' earnings on average
- UI is heavily studied because the policy parameters vary by state (useful for difference-in-differences designs)

UI eligibility requirements

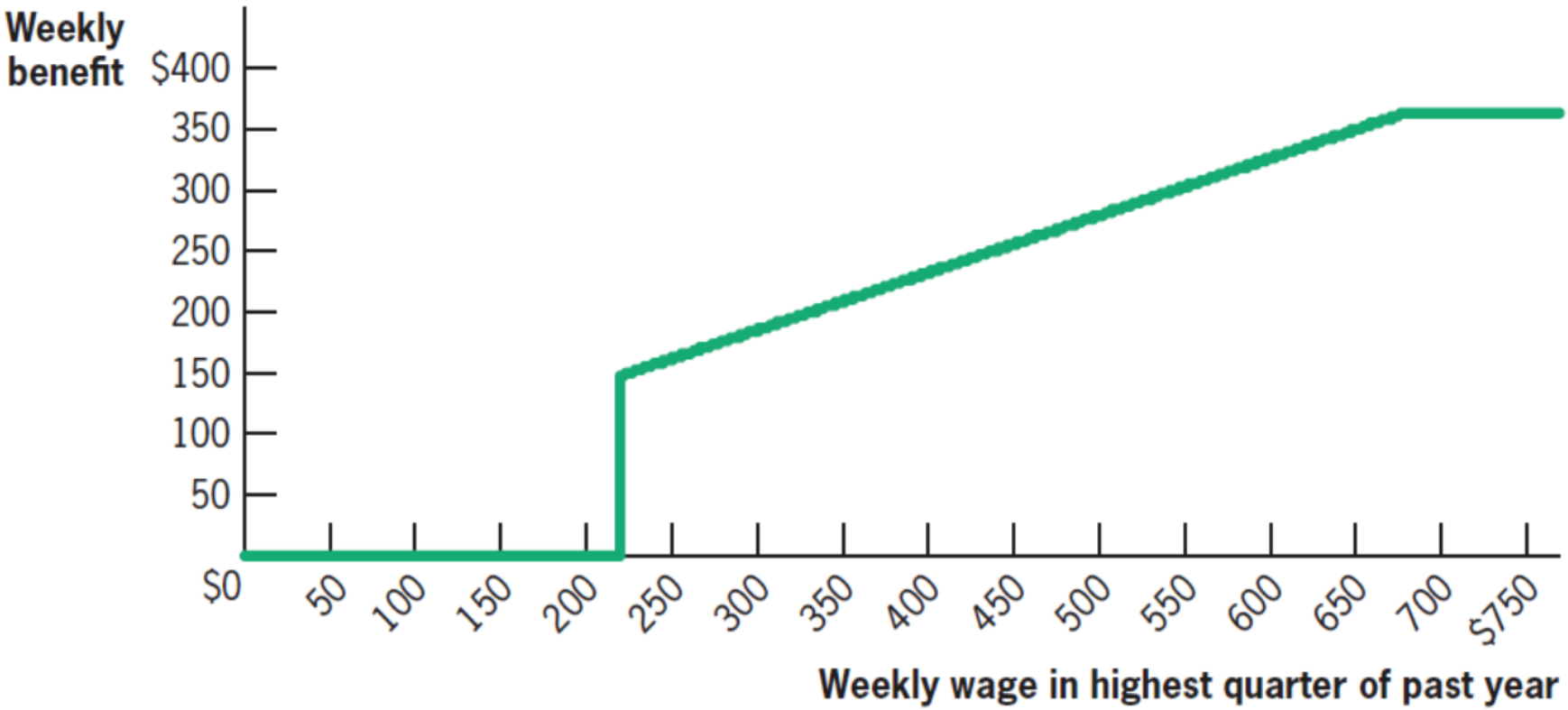
- Individuals must have earned a minimum amount over the previous year (or other base period)
- Unemployment spell must be the result of a layoff – ineligible if voluntarily quit or get fired for a specific reason
- Individual must be actively seeking work and willing to accept a job comparable to the one lost (impossible to verify)

- About 97% of all wage and salary workers are covered by UI (participation is compulsory)
- Imperfect take-up of benefits – only about 73-82% of those eligible actually claim UI benefits (Currie 2006)
  - Possible reasons: stigma/peer effects, transaction costs, lack of information about eligibility

Institutional features

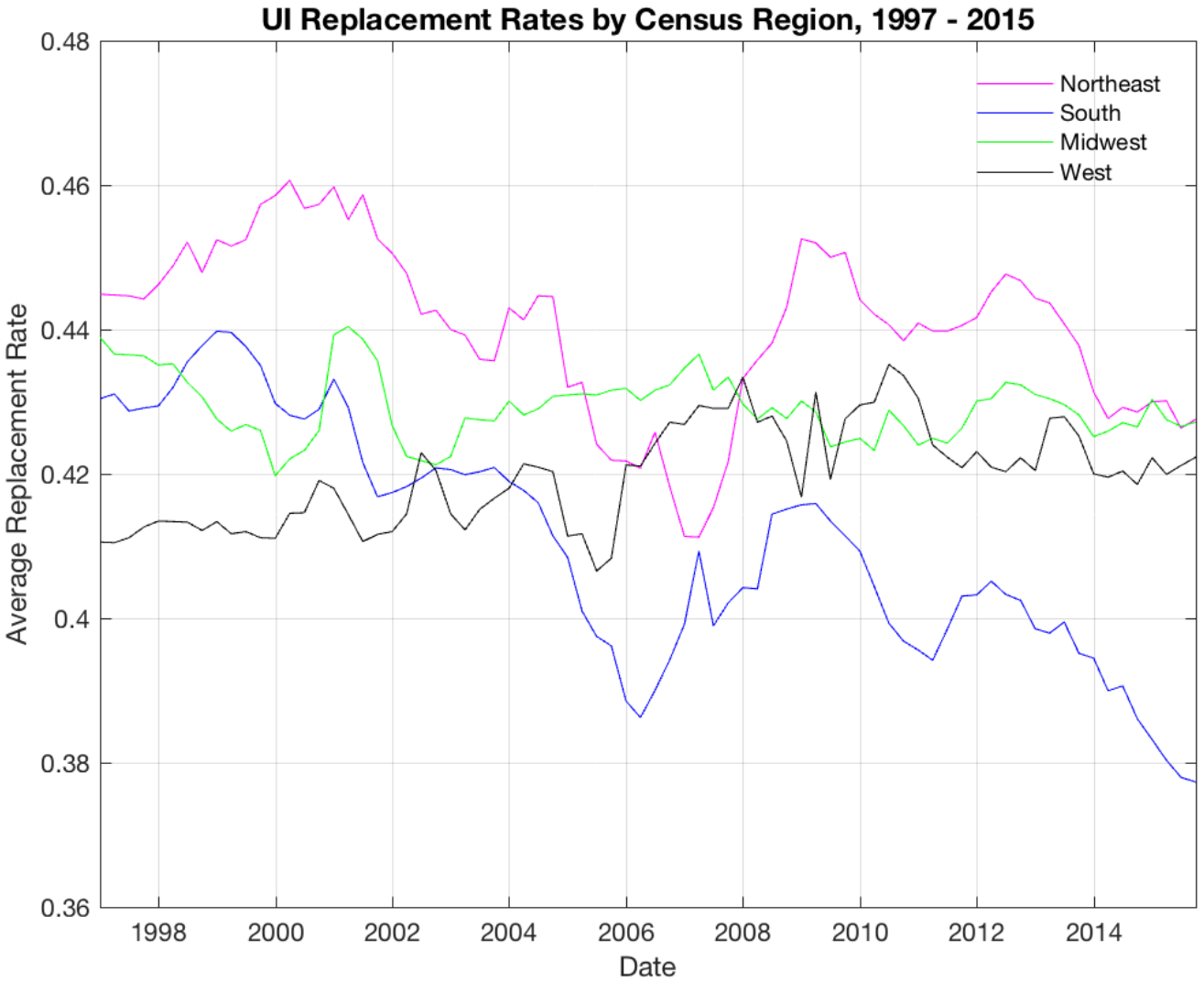
- UI benefits are a function of previous earnings – typically highest-quarter earnings in the base period
- Measure generosity of UI via the replacement rate – the amount of previous earnings that the UI program replaces
  - Average replacement rates vary from 35% to 55% across states, and UI is treated as taxable income
  - Average replacement rate across all states is about 45%
  - Maximum replacement rate often used as a measure of generosity because it is invariant to the claimant's wage
- Benefits are typically paid weekly and are treated as taxable income
- Standard UI benefits duration is 6 months (26 weeks)
  - Automatic extensions to 9 or 12 months during recessions
  - Further extensions passed during the recent Great Recession (maximum duration of 23 months in 2008-2012)

UI benefits in Michigan, 2015



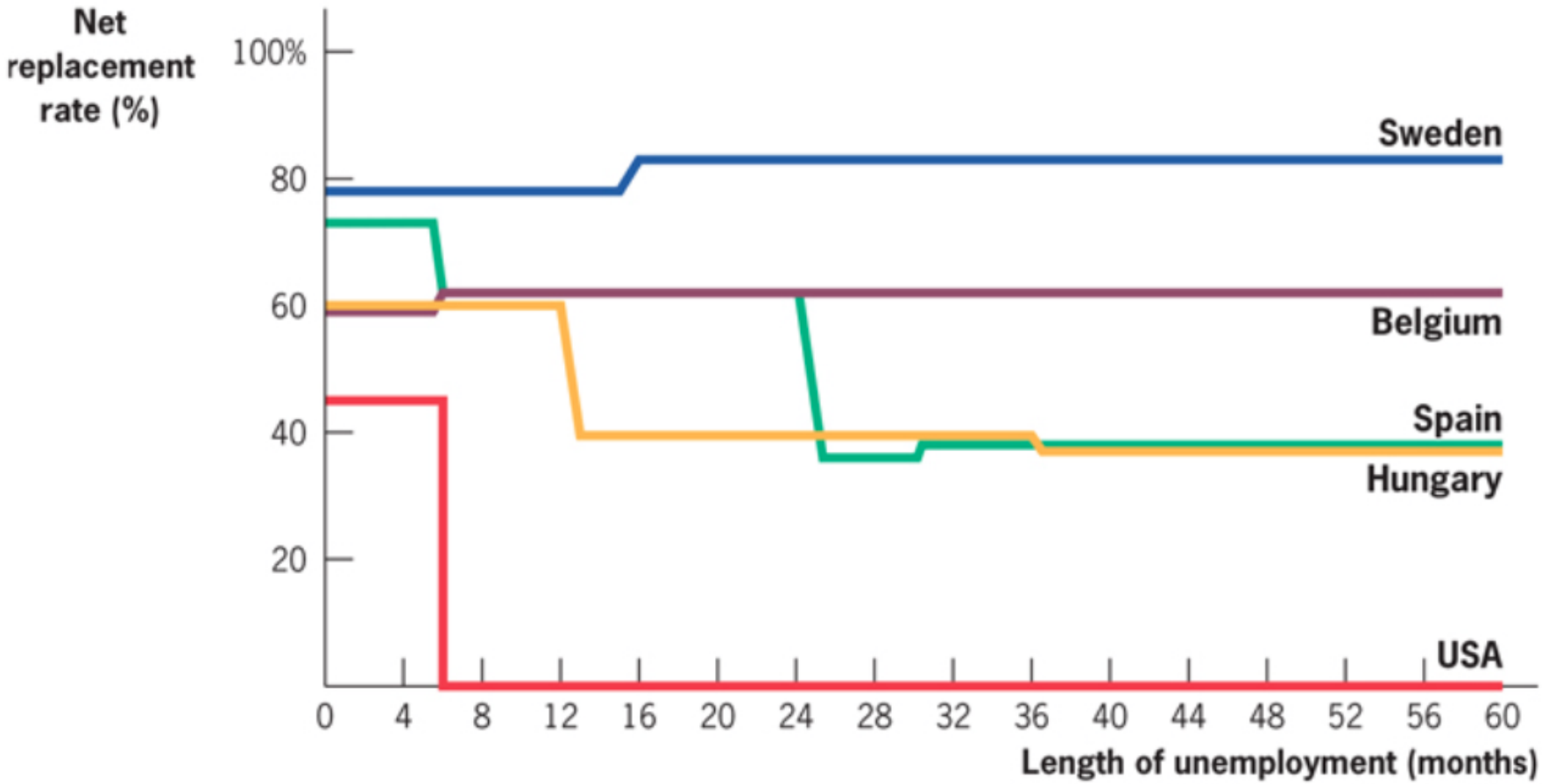
Source: Gruber, *Public Finance and Public Policy*, Figure 14.1

Average UI replacement rate across Census regions



Source: Department of Labor (DOL) Employment and Training Administration Reports, 1997 – 2015

Duration of UI benefits across countries, 2002



Source: Gruber, *Public Finance and Public Policy*, Figure 14.2

Optimal unemployment insurance

- Standard model consists of unemployed individuals who choose search effort e to maximize expected utility from consumption
- Government collects taxes on labor income from employed individuals and uses revenues to completely fund UI benefits
- When there is no moral hazard problem, the optimal UI benefit provides full insurance to the worker
  - Can interpret no moral hazard as the probability of finding a job p does not depend on the level of benefits
  - Or, government observes search effort and so can choose e as a policy parameter along with the benefit amount
- When there is moral hazard, job-finding probability depends on the generosity of benefits
  - The optimal benefit amount sets the marginal benefit of consumption smoothing equal to the marginal efficiency cost from moral hazard

Optimal UI model – setup

For simplicity, normalize the probability of finding employment to be equal to the search effort $p = e$.

Unemployed individuals pick e to solve the following expected utility maximization problem:

$$\max_e \left\{ e \cdot u(c^e) + (1 - e) \cdot u(c^u) - f(e) \right\}$$
$$\text{s.t. } c^e = w - t \quad \text{and } c^u = b$$

$f(e)$ represents the utility cost of expending search effort. We assume $f'(e) > 0$ and $f''(e) > 0$ so that expected utility is concave.

There are no savings, so when employed, the individual consumes after-tax wages, and when unemployed consumes the benefit b.

Government runs a balanced budget where tax revenues completely fund UI benefits:

$$e \cdot t = (1 - e) \cdot b$$

First best case – no moral hazard

No moral hazard here means that search effort e is not a function of UI benefits.

Government picks b to maximize the individual's expected utility subject to the budget constraints, *taking e as given*.

$$\max_b \Big\{ e \cdot u(w-t) + (1-e) \cdot u(b) - f(e) \Big\}$$
$$\text{s.t. } e \cdot t = (1-e) \cdot b$$

To solve, plug the government budget into expected utility for t and set the FOC with respect to b equal to zero

$$\text{FOC: } -(1-e) \cdot u'\Big(w - (1-e)b/e\Big) + (1-e) \cdot u'(b) = 0$$

$$\implies u'(c^e) = u'(c^u) \quad \textbf{(full insurance)}$$

Second best case – moral hazard

With moral hazard, the individual's chosen search effort e decreases with b since more generous benefits deter job search and increase the probability of remaining unemployed.

Government now has to pick b just as in the no MH case, but now takes into account that the unemployed individual's choice of effort depends on the government's choice of b.

$$\max_b \left\{ e(b) \cdot u(w-t) + (1-e(b)) \cdot u(b) - f(e(b)) \right\}$$
$$\text{s.t. } e(b) \cdot t = (1-e(b)) \cdot b$$

To solve this, apply the chain and product rules to set the FOC equal to zero as before.

Optimal UI benefit formula

Through some tedious algebra, we can rearrange the FOC into an intuitive formula that defines the optimal b:

$$\underbrace{\frac{u'(c^u) - u'(c^e)}{u'(c^e)}}_{\text{consumption smoothing benefit}} = \underbrace{\frac{\varepsilon_{1-e,b}}{e}}_{\text{moral hazard cost}}$$

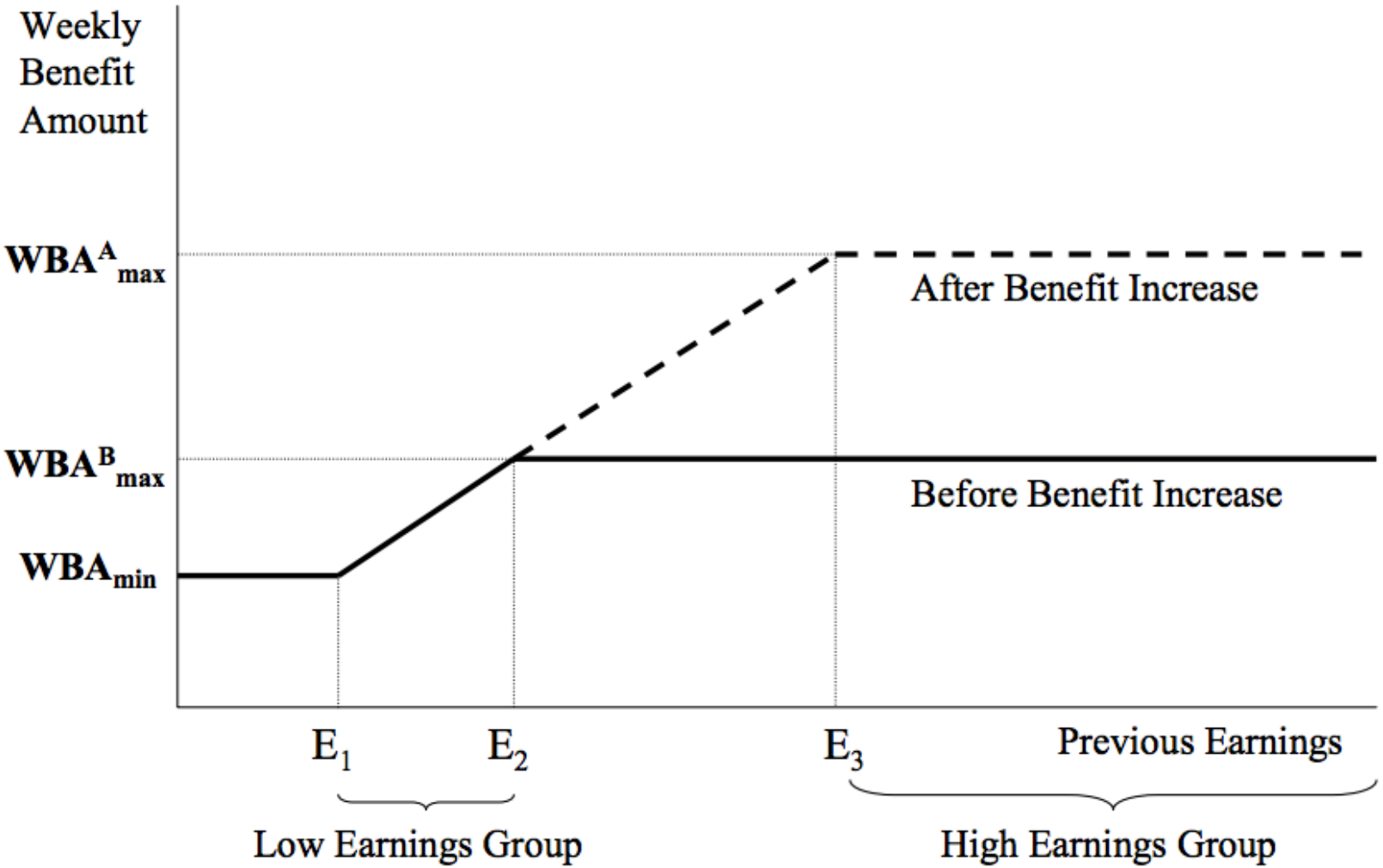
$$\text{where } \varepsilon_{1-e,b} = \frac{b}{1-e} \cdot \frac{d(1-e)}{db} > 0$$

- LHS: consumption smoothing benefit characterized by difference in marginal utilities across the two states
- The optimal benefit is higher the more concave is $u(\cdot)$ – why?
- Only **partial insurance**: $0 < c^u < c^e$
- Optimal benefit level decreases with the elasticity of unemployment rate with respect to benefits (moral hazard)

Estimating the costs and benefits of UI

- Ultimately need to empirically estimate the consumption smoothing benefits of UI and the moral hazard costs to calibrate the optimal b
- Key statistic that captures MH costs is the duration elasticity $\varepsilon_{1-e,b}$
- Duration elasticity tells us how sensitive the unemployed individual's search effort decision is to changes in the generosity of UI benefits
- Standard approach to estimate $\varepsilon_{1-e,b}$: exploit state-level reforms and compare length of unemployment spells across states
- Classic study of Meyer (1990) looks at changes in the probability of exiting unemployment right before benefits exhaustion
  - Difference-in-differences (DD) approach finds a benefit elasticity of 0.53 (other studies find similar estimates in the 0.4-0.6 range)

DD designs in UI studies



Source: Krueger & Meyer (2002), "Labor Supply and Social Insurance," *Handbook of Public Economics*

Job finding and unemployment exit rates

Source: Card, Chetty, & Weber (2007), "The Spike at Benefit Exhaustion: Leaving the Unemployment System and tarting a New Job?" *American Economic Review Papers & Proceedings*

Estimating consumption smoothing benefits

- The marginal benefit of providing UI is tricky to estimate since it depends on the assumed utility function
- Difficult to find natural experiments where consumption moves while other variables correlated with consumption do not move
- We will focus on two approaches in the literature:
  1. Consumption-based formula of Gruber (1997)
  2. Chetty (2008): decomposition into income and substitution effects

Approximating the consumption smoothing benefit

Assume individuals have a power utility function over consumption:

$$u(c) = \frac{c^{1-\gamma}}{1-\gamma}$$

where $\gamma > 0$ is the coefficient of relative risk aversion. A higher γ indicates a more concave utility function and a greater preference for insurance.

Taking a Taylor approximation of $u'(c^u)$ around c^e, we can rewrite the consumption-smoothing benefit side of the optimal UI formula:

$$\frac{u'(c^u) - u'(c^e)}{u'(c^e)} \simeq \gamma \cdot \frac{\Delta c}{c}$$

where $\Delta c = c^e - c^u$ is the change in consumption across the employed and unemployed states.

Consumption-based formula for optimal UI

- Under this approximation we can write the optimal UI formula as

$$\gamma \cdot \frac{\Delta c}{c} \simeq \frac{\varepsilon_{1-e,b}}{e}$$

- With this consumption-based formula, all we need to measure the smoothing benefits from UI is data on the consumption drop at unemployment and risk aversion

- When γ is high UI benefits have a higher insurance value because individuals really dislike disparities in consumption across states
- A higher percentage drop in consumption at unemployment indicates a higher insurance value of providing UI

How does the optimal benefit vary with γ?

- Gruber (1997) estimates the consumption drop and insurance value of UI benefits using panel survey data on food consumption
- Run regressions of the form:

$$\frac{\Delta c}{c} = \beta_1 + \beta_2 \frac{b}{w}$$

  where β_1 is the consumption drop without UI, and b/w is the UI replacement rate in each state

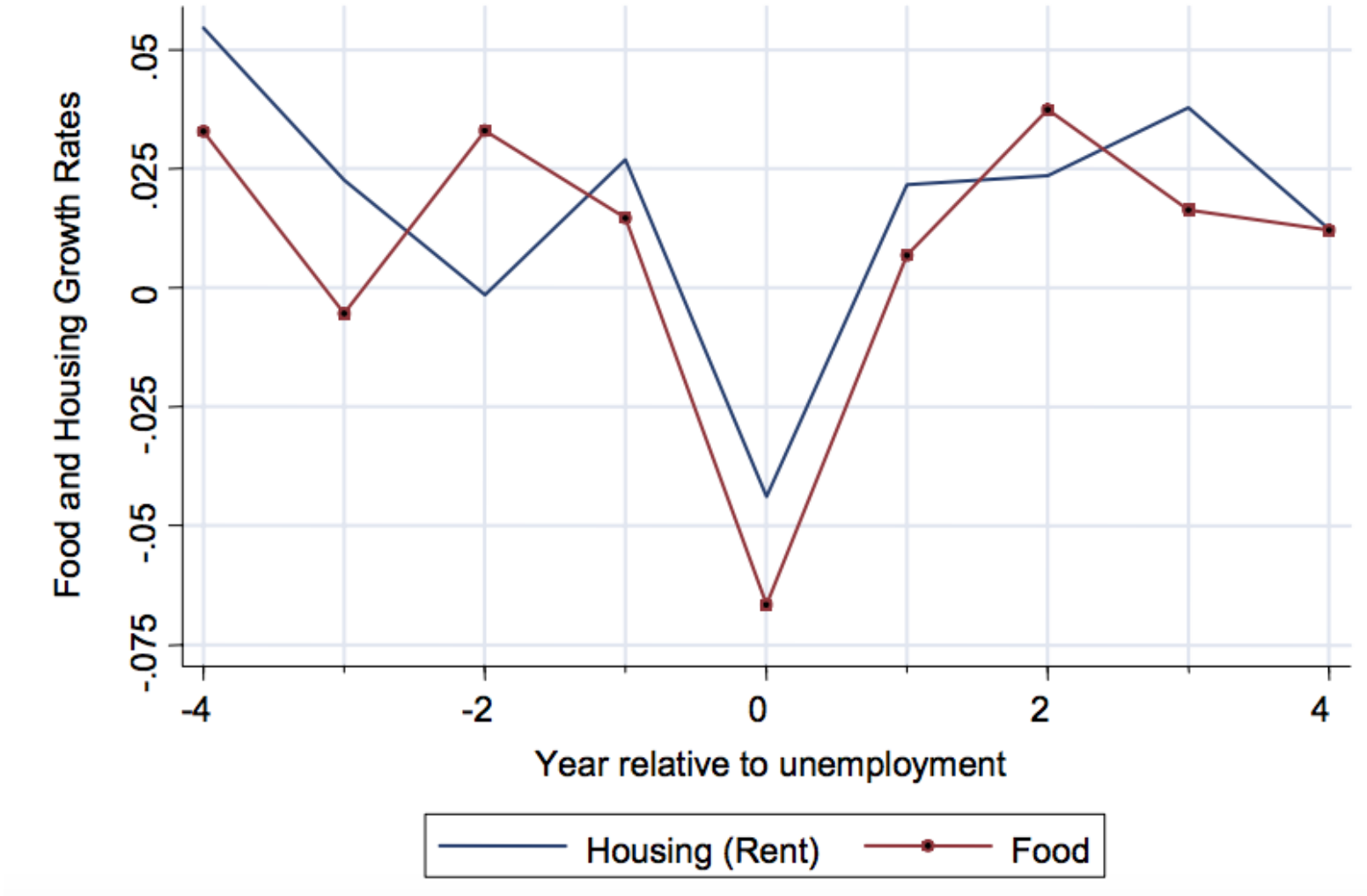
- Can substitute this regression equation into the consumption-based formula and see how the optimal benefit rate b^*/w varies with γ

γ	1	2	3	4	5	10
b^*/w	0	0.05	0.31	0.45	0.53	0.7

How do we know how risk averse people are?

- Large literature on estimating γ from choice experiments – Gruber (1997) claimed $\gamma < 2$ plausible
  - The consumption-based formula suggests the replacement rate should be close to zero for low levels of risk aversion
- But appropriate value of γ likely depends on the context – framing effects and consumption commitments
- Chetty & Szeidl (2007): not all consumption goods are equal
  - Some goods like housing payments are difficult to adjust in the short run due to lumpy adjustment costs (i.e. mortgage refinancing)
  - Implies that unemployed people might behave as if they are very risk averse when they face large enough adjustment costs
  - $\gamma > 4$ plausible in an unemployment context

Renters' consumption around unemployment shocks



Source: Chetty & Szeidl (2007), "Consumption Commitments and Risk Preferences," *Quarterly Journal of Economics*

Homeowners' consumption around unemployment shocks

Source: Chetty & Szeidl (2007), "Consumption Commitments and Risk Preferences," *Quarterly Journal of Economics*

Moral hazard or liquidity effects?

- Moral hazard in the optimal UI model occurs because $\partial e/\partial b < 0 \implies$ search effort declines with UI generosity
- Chetty (2008) shows that this relationship between search effort choice e and UI benefits can be due to both MH and liquidity effects:

$$\frac{\partial e}{\partial b} = \frac{\partial e}{\partial A} - \frac{\partial e}{\partial w} < 0$$

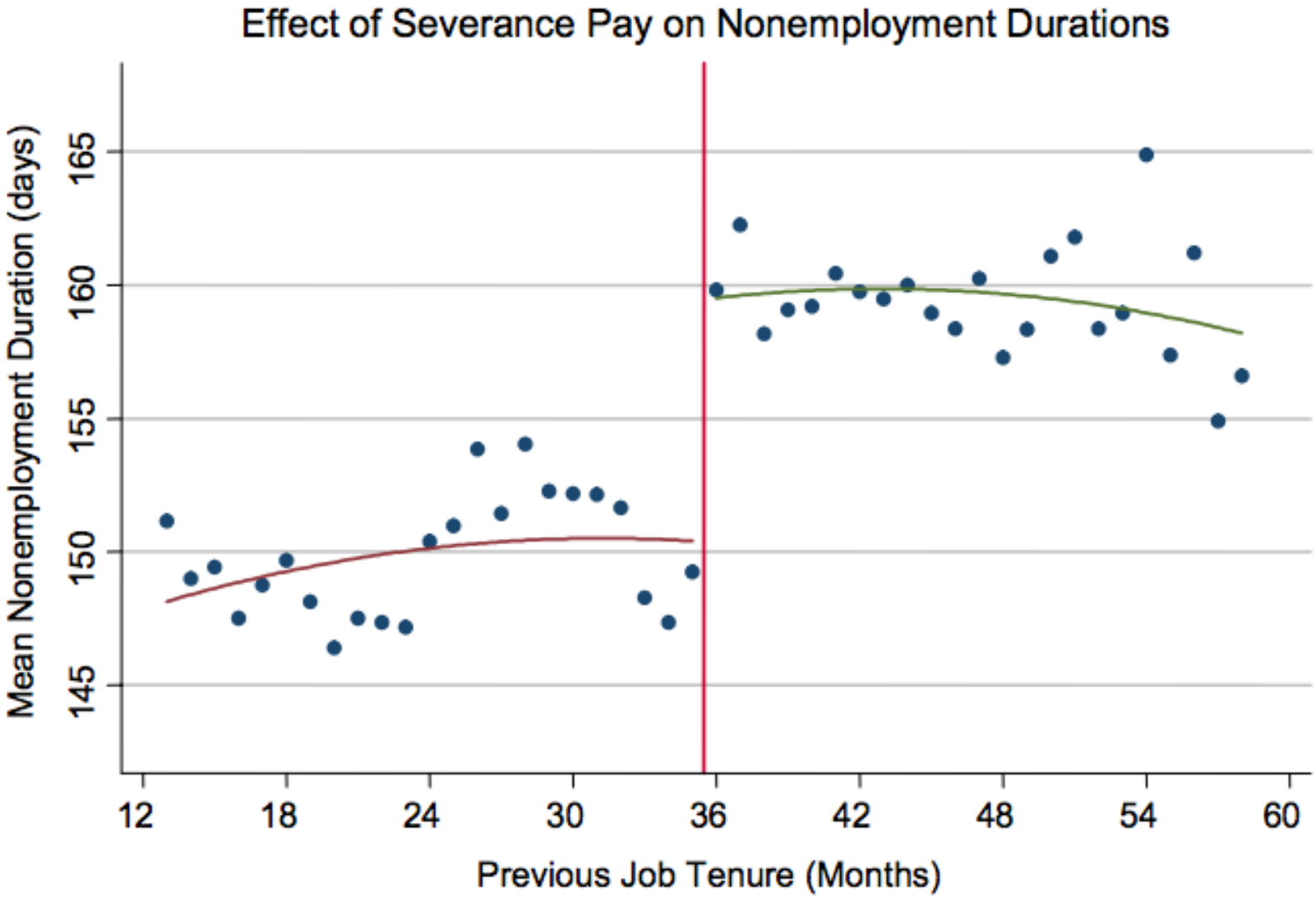
- A is the severance payment an unemployed individual receives from the employer upon job separation
- Substitution effect/moral hazard: $\partial e/\partial w > 0$
- Income/liquidity effect: $\partial e/\partial A < 0$
- Large observed response of search effort $\partial e/\partial b << 0$ can be due to a strong liquidity effect rather than moral hazard!

Empirical evidence for moral hazard vs. liquidity

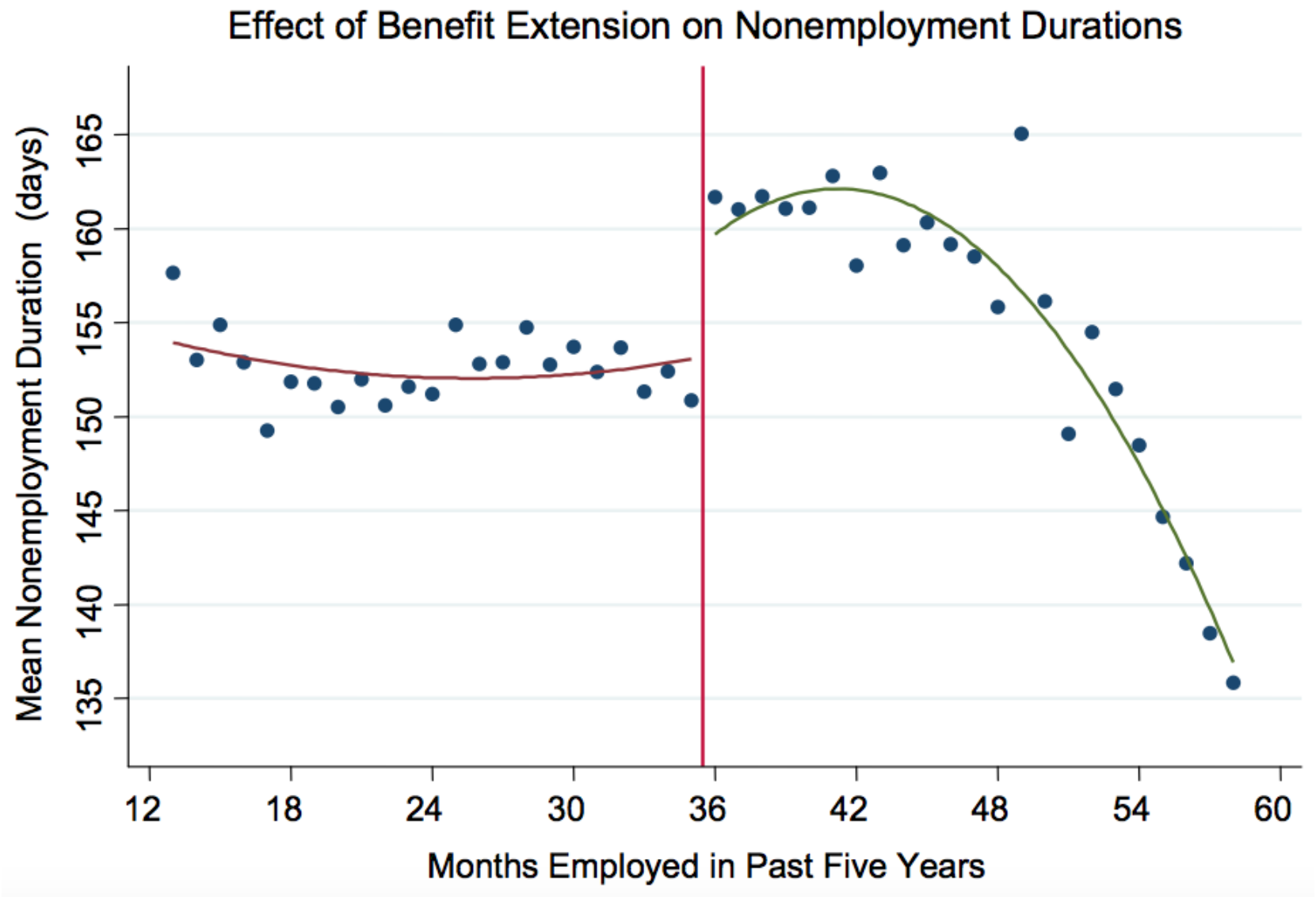
- Can rewrite the consumption smoothing benefit in the optimal UI formula as the ratio of the income to the substitution effect:

$$\frac{\partial e/\partial A}{\partial e/\partial w} = \frac{\varepsilon_{1-e,b}}{e}$$

- Card, Chetty, & Weber (2007): use regression discontinuity design in Austria to separately estimate the income and substitution effects
  - Income effect: unemployed workers receive severance of two months wages if their job tenure $\geq$ 36 months and nothing otherwise
  - Substitution effect: workers with $\geq$ 36 months of work in the past 5 years eligible for 30 weeks of UI vs. 20 weeks (extended benefits)
  - Income and substitution effects have similar impacts on mean unemployment spell duration



Source: Card, Chetty, & Weber (2007), "Cash-On-Hand and Competing Models of Intertemporal Behavior: New Evidence from the Labor Market," *Quarterly Journal of Economics*



Source: Card, Chetty, & Weber (2007), "Cash-On-Hand and Competing Models of Intertemporal Behavior: New Evidence from the Labor Market," *Quarterly Journal of Economics*

Search effort vs. reservation wages

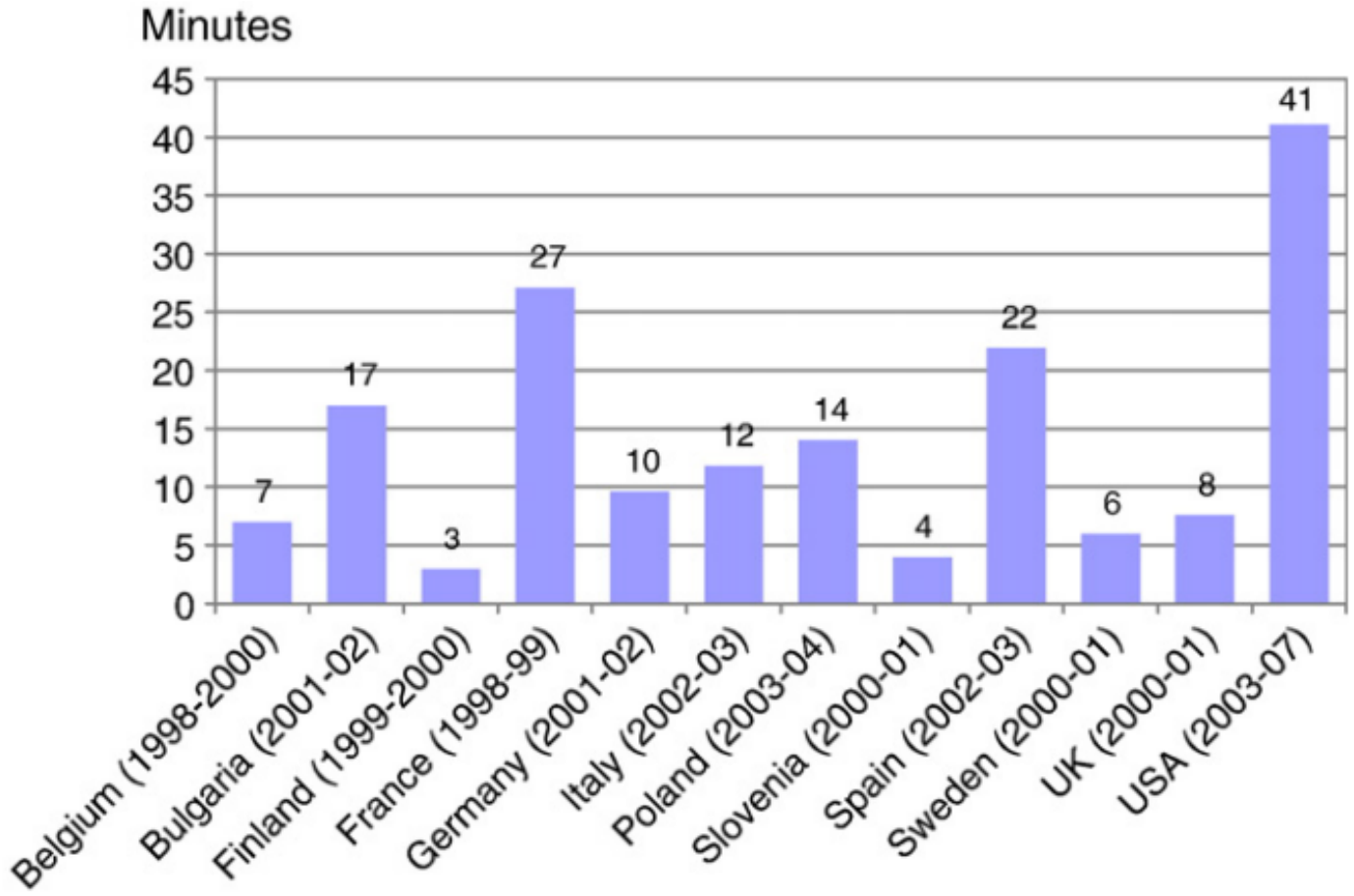
- What kind of behavior leads to the observed relationship between the generosity of benefits and the duration of unemployment?
- Two competing hypotheses for why MH occurs:
  1. The unemployed scale back their effort at searching for a job when $b \uparrow$ (as in the optimal UI model)
  2. $b \uparrow$ leads people to revise their reservation wage upward and hold out longer for a better job when unemployed
- The reservation wage is the lowest wage at which the unemployed individual would be willing to accept a job
- Empirical evidence skewed in favor of the job search narrative – difficult to collect data on reservation wages

5 facts about job search while unemployed

- Krueger & Mueller (2010) use time-use surveys to provide five facts about job search and UI eligibility

1. Average U.S. unemployed worker devotes about 41 minutes to job search on weekdays
2. Workers expecting to be recalled to the previous employer (temporary layoffs) search less than the average unemployed worker
3. Job search is inversely related to the generosity of unemployment benefits – estimated elasticity is about -2
4. Job search intensity increases right before benefit exhaustion
5. Time devoted to job search is constant during unemployment for those who are ineligible to receive UI

Cross-country evidence on job search

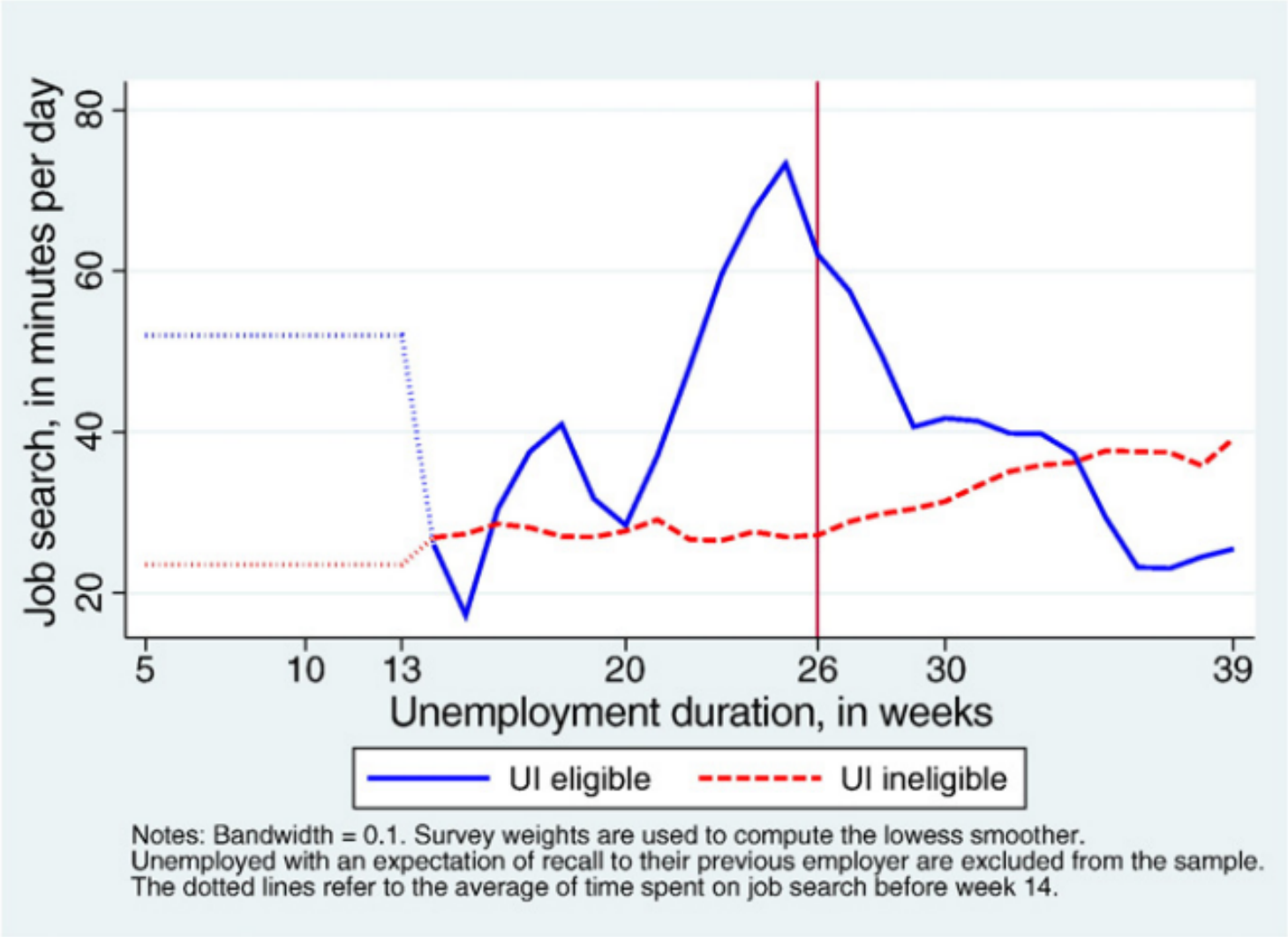


Notes : See Krueger and Mueller (2008a) for details about the underlying time use data.

Fig. 1. Average number of minutes devoted to job search per day on weekdays by unemployed workers in various countries.

Source: Krueger & Mueller (2010), "Job Search and Unemployment Insurance: New Evidence from Time Use Data," *Journal of Public Economics*

Moral hazard in search effort



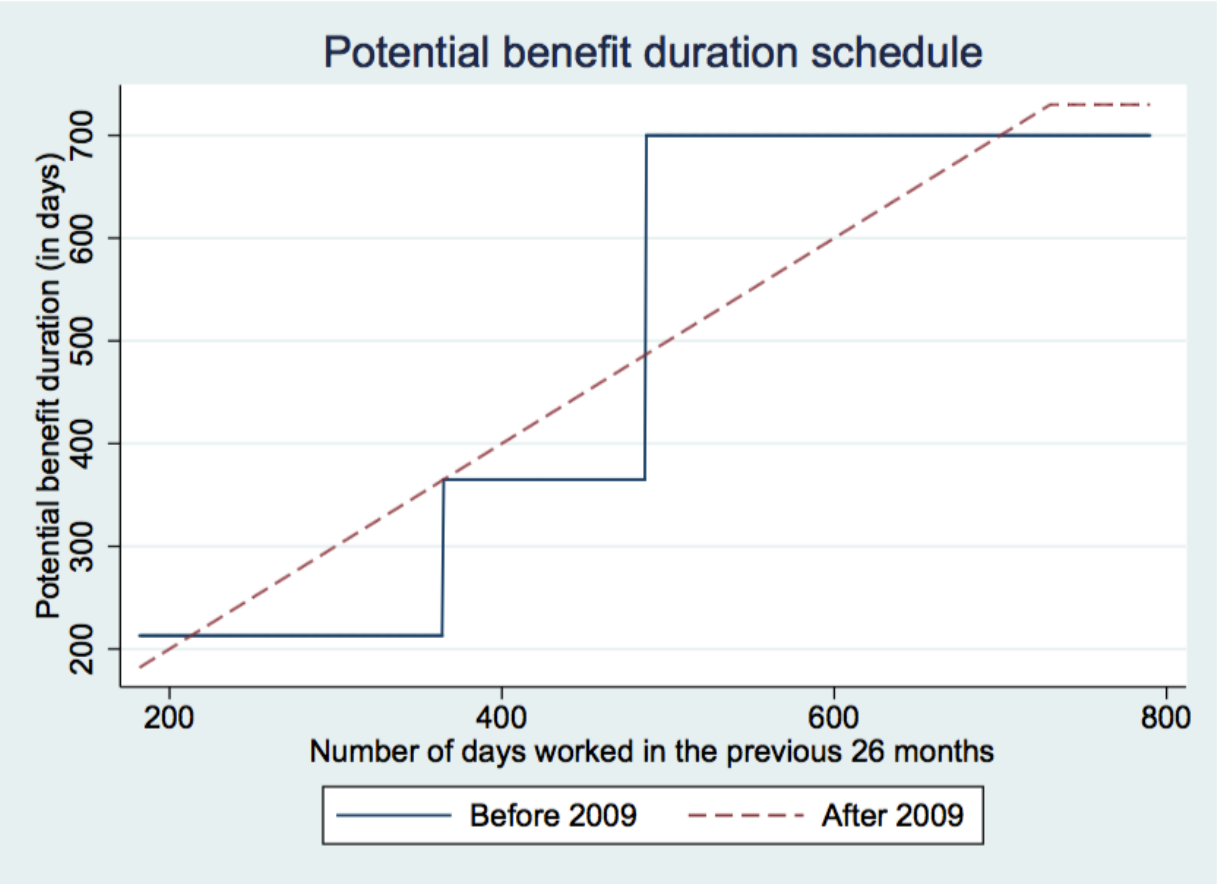
Source: Krueger & Mueller (2010), "Job Search and Unemployment Insurance: New Evidence from Time Use Data," *Journal of Public Economics*

UI and reservation wages

- Recent paper by Le Barbanchon et al. (2017): what is the effect of potential benefit duration (PBD) on job selectivity?
- Unemployed people in France must report their reservation wage to the government when they register to claim UI benefits
- Natural experiment from a 2009 reform of UI rules in France
  - Reform simplified rules determining PBD
  - Maximum number of days for receiving benefits tied to the number of days worked during base period (up to a cap of 730)
- Combination of DD and RD methods finds an elasticity of zero – no effect on job selectivity from increasing PBD

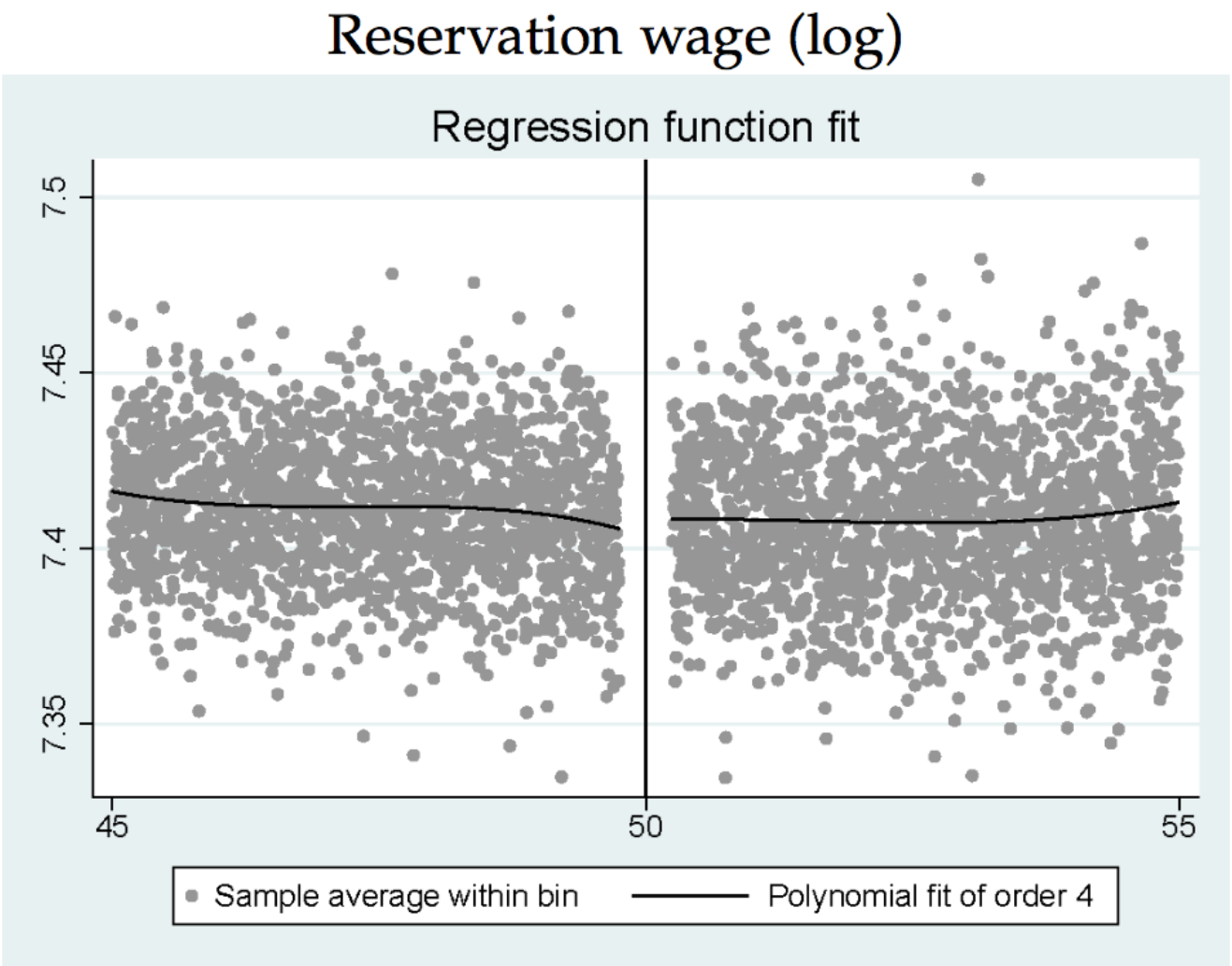
A reform to potential UI benefit duration in France

Figure 1: Schedules of PBD, before and after the 2009 reform



Source: Le Barbanchon et al. (2017), "Unemployment Insurance and Reservation Wages: Evidence from Administrative Data," *NBER Working Paper* No. 23406

No effect of PBD reform on reservation wages

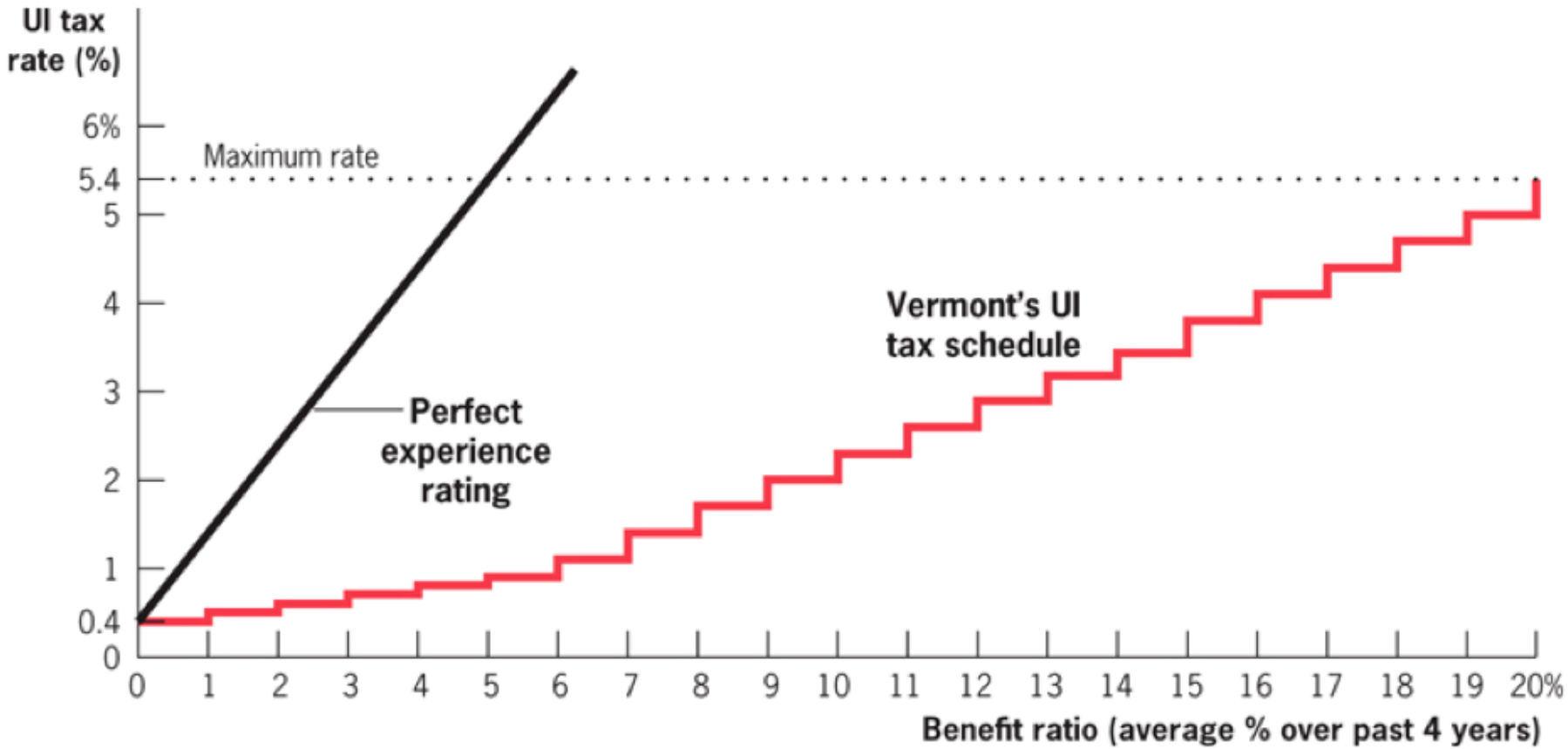


Source: Le Barbanchon et al. (2017), "Unemployment Insurance and Reservation Wages: Evidence from Administrative Data," *NBER Working Paper* No. 23406

UI experience ratings

- The UI program is experience rated: firms pay a tax for each worker they lay off
- Like most aspects of the UI system in the U.S. the experience rating varies across states and also varies by industry
- In all states the system is *imperfectly* experience rated: payroll taxes rise less than one-for-one with layoffs due to caps on the tax rate
- The tax rate per layoff is a function of the benefit ratio – total UI benefits paid to laid off workers divided by firm payroll
- In most European countries there is no experience rating at all

Imperfect experience rating in Vermont, 2015



Source: Gruber, *Public Finance and Public Policy*, Figure 14.9

Moral hazard in layoff decisions

- A fully experience-rated UI system hits firms when they are down – mass layoffs typically occur during recessions when firm profits are low
  - Similar to consumption smoothing aspect of UI for workers
  - But firms already have the ability to put up collateral to get a loan in difficult economic times $\Longrightarrow$ the smoothing benefits for firms are lower
- Partial experience ratings generate subsidies from industries/firms with low job turnover to those with high turnover
- Example of moral hazard in layoff rates from Feldstein (1976)
  - Firms and workers make a joint decision to place the worker on temporary layoff
  - UI system makes this a partially paid vacation
  - With a partial experience rating, the government pays for the vacation

Evidence of moral hazard in layoffs

- Difference-in-differences style methods comparing states and industries with different degrees of experience ratings
- Feldstein (1978): a 10% increase in the average UI replacement ratio leads to a 7% increase in temporary layoffs
  - More than half of firms have no marginal incentive to reduce layoffs
  - Effects twice as large for union members $\Longrightarrow$ workers and firms coordinate on layoffs
- Topel (1983): imperfect experience rating accounts for 31% of temporary layoffs
- Anderson & Meyer (2000): a decline in the experience rating increases turnover and the number of UI claims filed

Crowd-out effects of UI

- Social insurance provision might also "crowd-out" sources of self-insurance that would otherwise be accumulated
- Engen & Gruber (1995, 2001): reducing the UI benefit replacement rate by 50% would increase gross financial asset holdings by 14%
- Cullen & Gruber (2000): crowd-out of family self-insurance in the form of spousal labor supply
  - In the absence of UI, wives' total hours of work would rise by 30% during husbands' unemployment spells
- LaPoint (2017): a 1% increase in the average UI replacement rate is associated with a 0.5% increase paid vacation take-up
  - When an employee is laid off but they have unused paid vacation time, the employer includes payment for the unused days in the severance
  - Since $\approx 50\%$ of all workers in the U.S. can carryover their paid leave days year-to-year, not taking vacation is a form of self-insurance

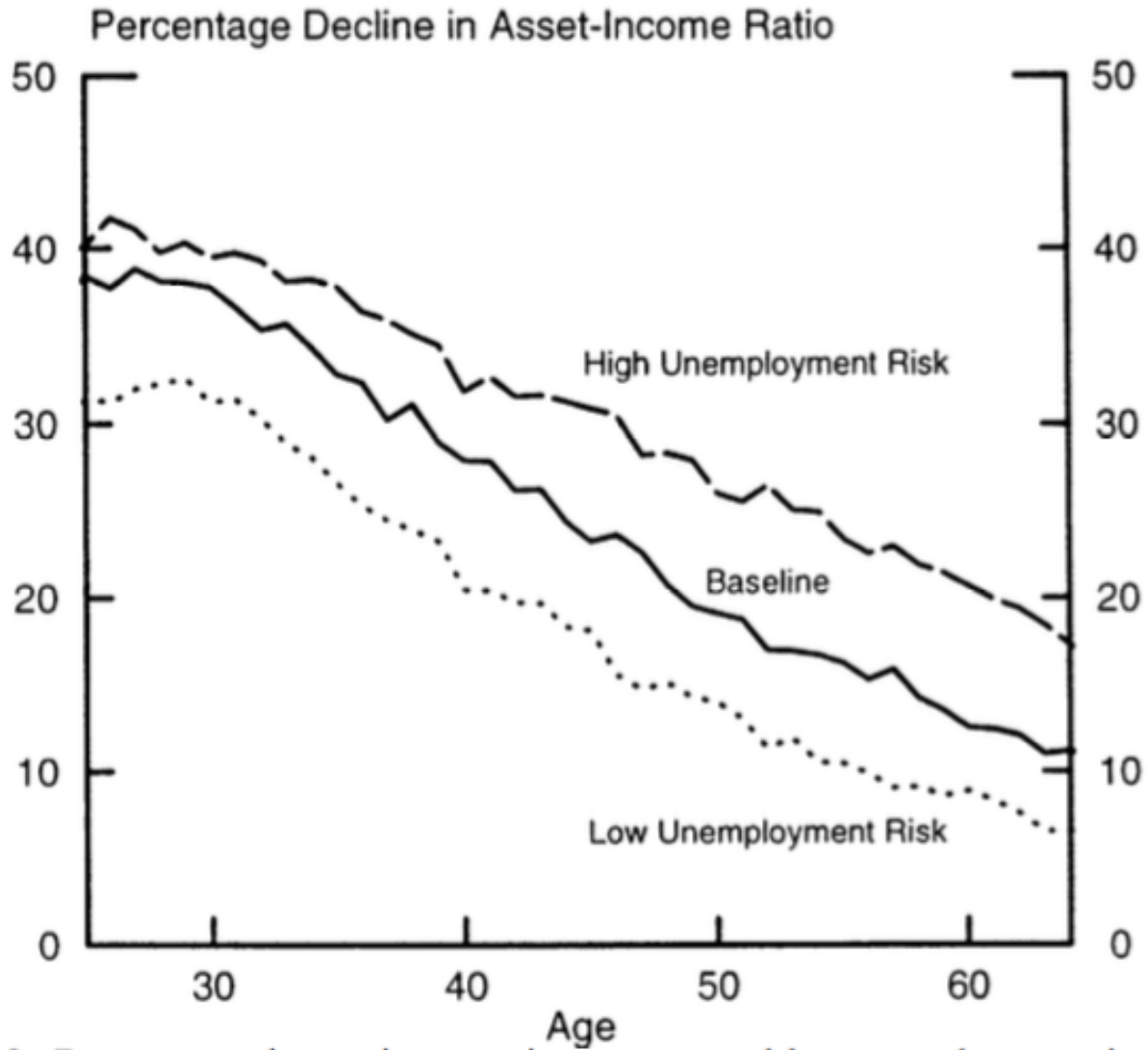


Fig. 2. Percentage change in asset–income caused by unemployment insurance.

Source: Engen & Gruber (2001), "Unemployment Insurance and Precautionary Saving," *Journal of Monetary Economics*

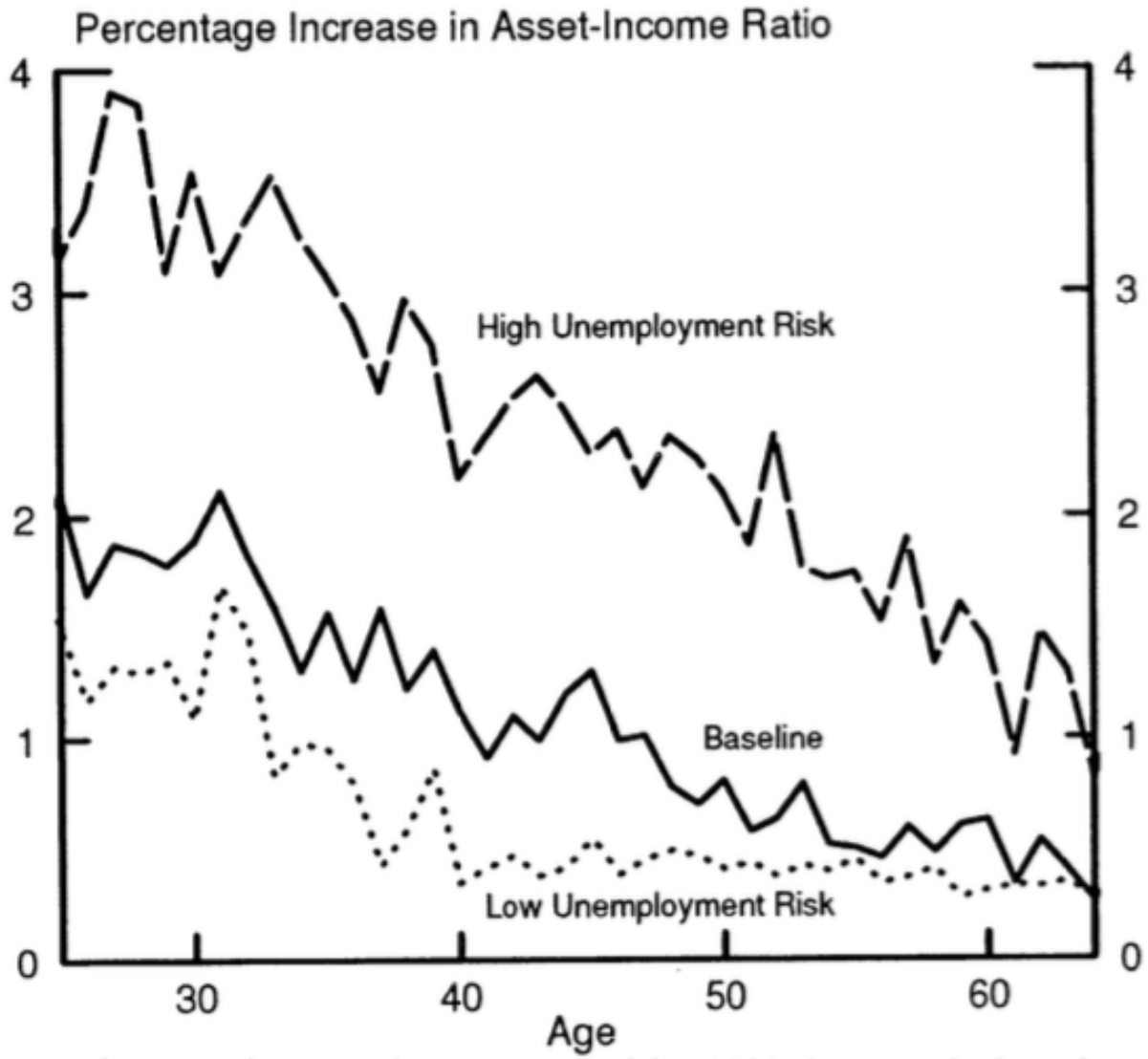


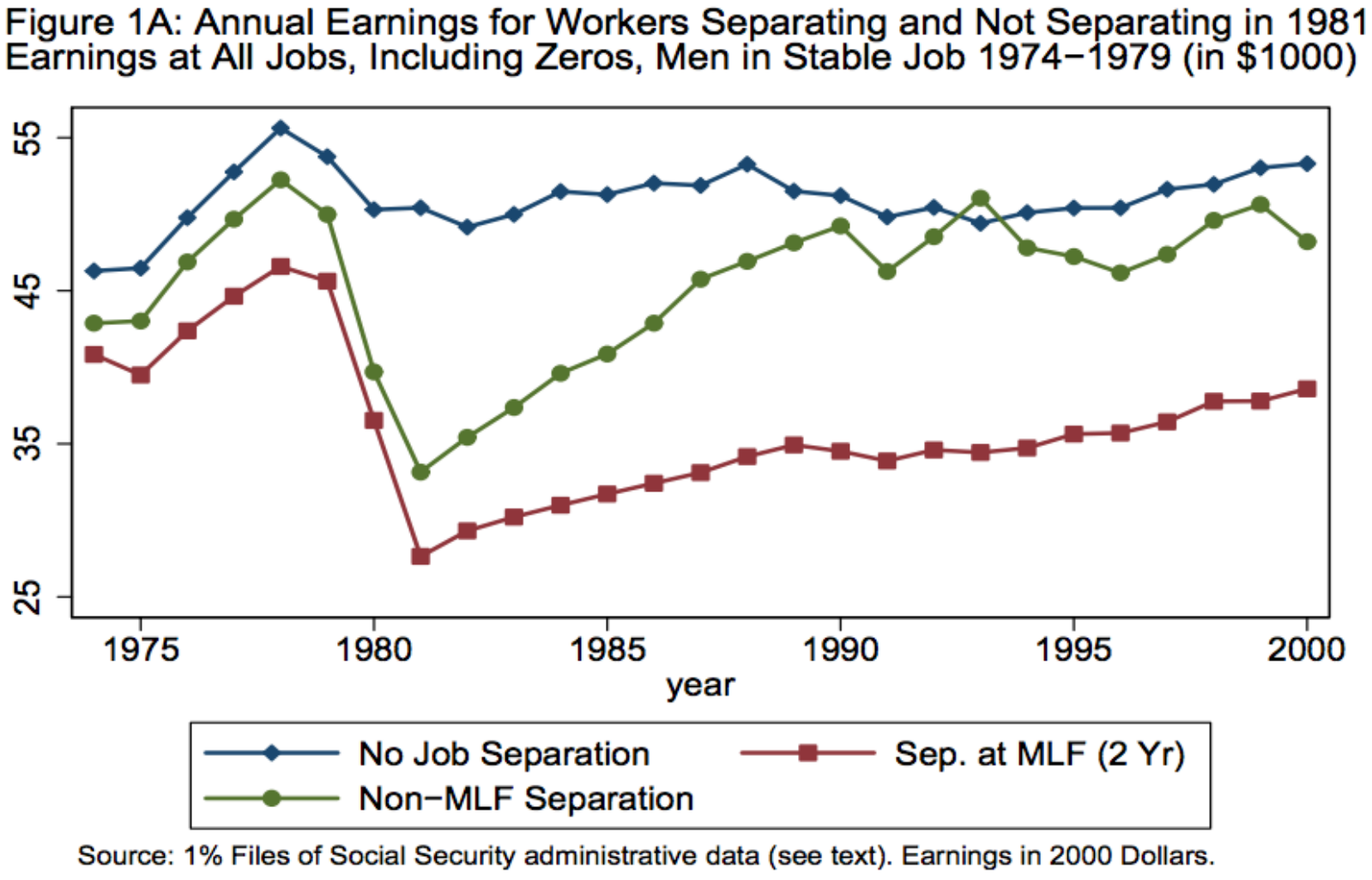
Fig. 3. Percentage increase in asset–income caused by 10% decrease in benefit replacement rate.

Source: Engen & Gruber (2001), "Unemployment Insurance and Precautionary Saving," *Journal of Monetary Economics*

Long-term effects of job loss

- Consumption smoothing benefits of UI are limited due to persistent effects of losing a job
- von Wachter, Song, & Manchester (2009): use Social Security data with 30 years of workers' earnings history
  - Workers displaced during the 1982 recession suffer immediate losses in annual earnings of 30%
  - Earnings are still 20% less 15-20 years after the job loss episode
- Suggests that some unemployment episodes are permanent shocks that cause workers to "fall off the job ladder"
- Mechanisms are unclear – one possibility is that during recessions the least productive workers are the most likely to be fired
- Persistent earnings drop could then be due to information revealed about the true productivity of these workers

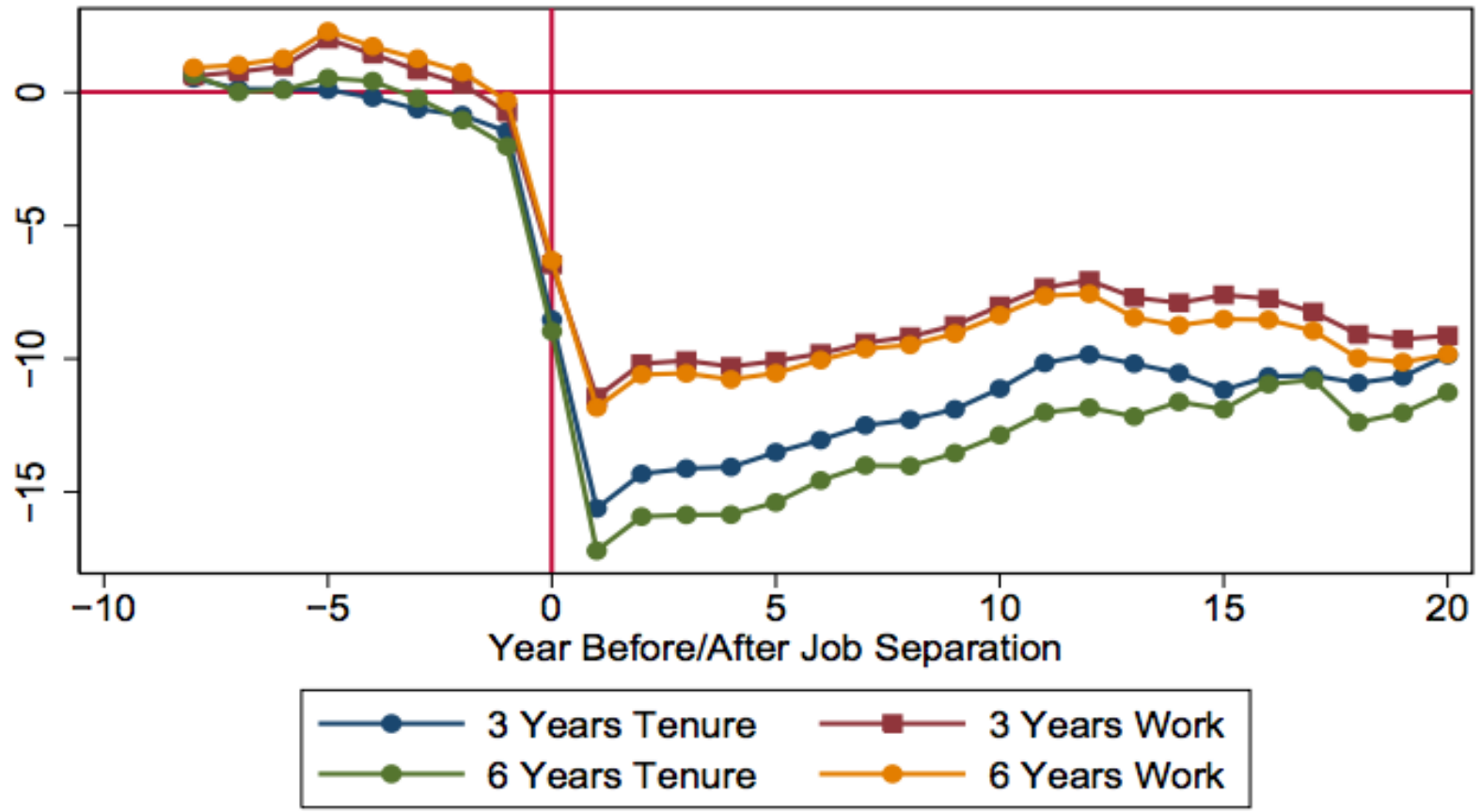
Falling off the job ladder



Source: von Wachter, Song, & Manchester (2009), "Long-Term Earnings Losses due to Mass Layoffs During the 1982 Recession," `http://www.econ.ucla.edu/tvwachter/papers/mass_layoffs_1982.pdf`

Persistent earnings effect not due to job tenure

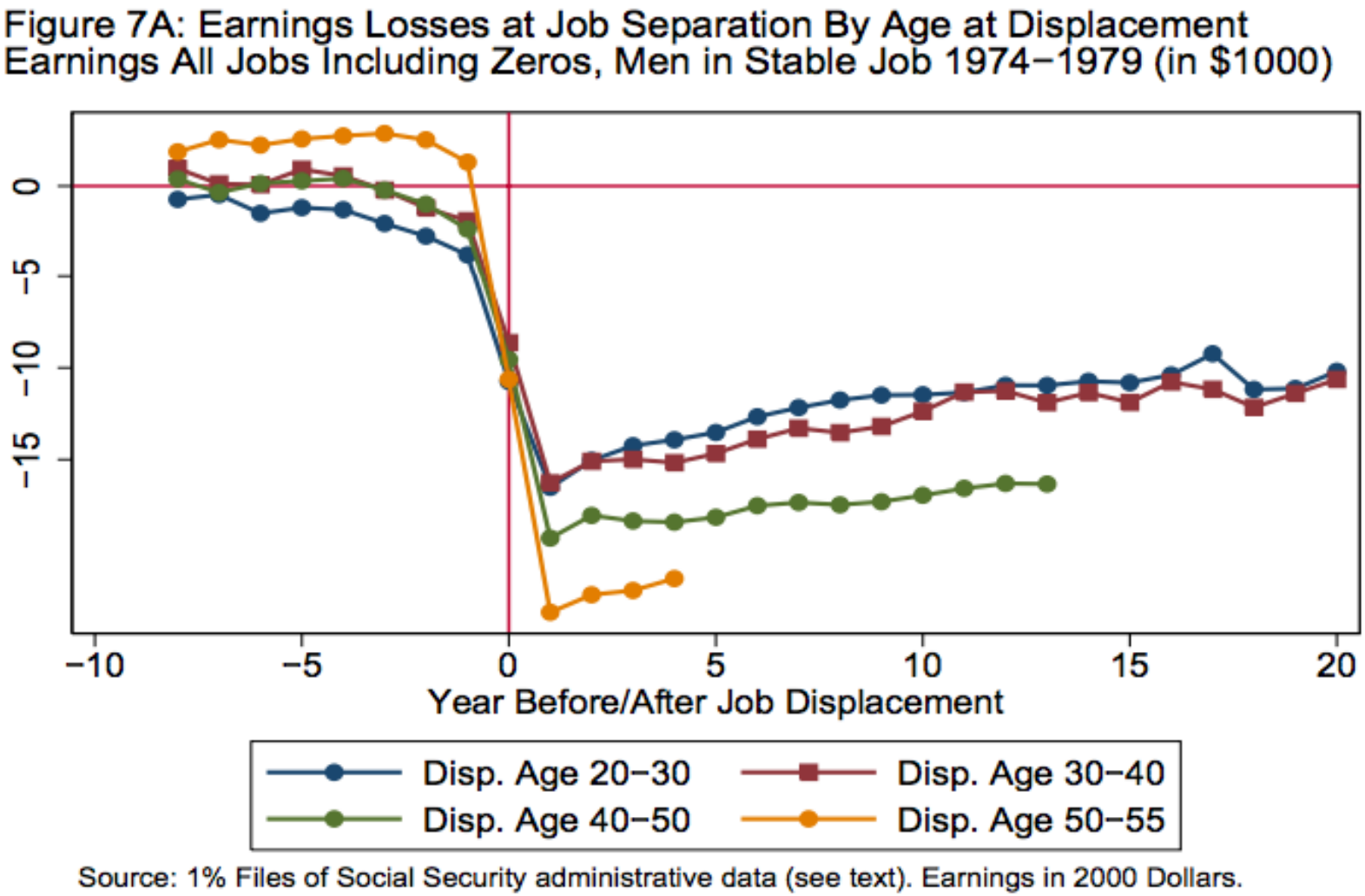
Figure 5: Earnings Losses at Job Separation 1980–1986 vs. Non–Separators
Earnings Including Zeros (in $1000), Men, Various Work Histories in 1979



Source: 1% Files of Social Security administrative data (see text). Earnings in 2000 Dollars.

Source: von Wachter, Song, & Manchester (2009), "Long-Term Earnings Losses due to Mass Layoffs During the 1982 Recession," `http://www.econ.ucla.edu/tvwachter/papers/mass_layoffs_1982.pdf`

Persistent earnings effect not due to age either



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Summary

- Social insurance programs like UI help individuals smooth consumption across adverse states and over time

- But there are efficiency costs to UI that manifest in several types of moral hazard problems
  - Increased unemployment duration: decreased effort to search for a new job while unemployed due to benefit receipt
  - On-the-job moral hazard: decreased effort at work due to being insured against job loss (see Problem 2 of Problem Set 3)
  - Imperfect experience rating of UI distorts firms' layoff decisions
  - Crowd-out: less likely to accumulate savings and have a working spouse

- Lots of empirical evidence on the moral hazard costs of providing benefits, but more difficult to quantify the benefits from consumption smoothing (depends on the utility function)