Moral Hazard vs. Liquidity and Optimal Unemployment Insurance

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MOTIVATION

- Classic empirical result: Unemployment insurance (UI) increases unemployment durations

    - 10% inc. in UI → 4-8% increase in durations (Moffitt 1985, Meyer 1990)

- Traditional interpretation of this result: **moral hazard** caused by substitution effect: Agents perceive wage as *w-b,* not *w*

    - Krueger and Meyer (2002): Temporary benefits "lead to short-run variation in wages with mostly a substitution effect"

    - Feldstein (2005): "Existing programs have substantial undesirable effect on incentives….UI programs raise unemployment."

- This paper:

    1. Shows that 60% of the effect of UI benefits on durations is due to a "liquidity effect," *not* moral hazard using data from the U.S.

    2. Develops a new method of characterizing optimal UI benefit level using this evidence

CONSUMPTION SMOOTHING AND LIQUIDITY EFFECT

• Analysis motivated by evidence that many job losers cannot smooth consumption fully due to failures in credit and insurance markets

  • Gruber (1997), Browning and Crossley (2001): UI benefits raise consumption while unemployed, particularly for those without assets

  • Median liquid wealth net of unsecured debt for job losers is $163

  • Borrowing difficult for those without jobs

• When households cannot smooth perfectly, UI benefits also affect search behavior through a **liquidity** effect

  • Higher benefits → more consumption when unemployed → less pressure to find a job quickly → longer duration

  • This is independent of any moral hazard effect: *not* a response to distorted prices.

LIQUIDITY VS. MORAL HAZARD: WELFARE IMPLICATIONS

• Distinction between moral hazard and liquidity of interest because of implications for optimal policy to correct credit/insurance market failures

    • Substitution effect: socially suboptimal response to wedge between social and private marginal product of labor (w vs. w-b) → lower welfare

    • Liquidity effect: response to the correction of a market failure (imperfect credit and insurance markets) → higher welfare

"EXACT IDENTIFICATION" APPROACH TO WELFARE ANALYSIS

• I develop a new formula for the optimal level of UI benefits in terms of the magnitude of the liquidity effect relative to moral hazard

    • Formula is "exactly identified" and does not require estimation of primitives, in contrast with standard "structural" method

    → Less model-dependent and more empirically credible results

• I implement formula by estimating liquidity and moral hazard effects using variation in UI benefit levels and severance payments

OUTLINE

I)   Job search model and formula for optimal benefit level

II)   Evidence on the role of liquidity constraints in the UI-duration link

III)   Evidence on severance pay and durations

IV)   Calibration of welfare gain from UI

V)   Followup study: Card, Chetty, and Weber (2007)

SEARCH MODEL: SETUP

- Discrete time model with finite planning horizon T

- Interest rate and discount rate equal to 0

- Individual loses job in period $t = 0$

- Let $u(c_t)$ denote utility over consumption

- Dynamic budget constraint:

$$A_{t+1} = A_t + y_t - c_t$$

- Asset limit: $A_t \geq L$

- Assumptions in baseline case:

  1. Assets prior to job loss exogenous
  2. No heterogeneity
  3. Fixed wages: choose only search intensity, not reservation wage

JOB SEARCH

- If unemployed in period t, worker first chooses search intensity s_t

- Finds a job that begins *immediately* in period *t* with probability s_t

- If job found, consumes c_t^e. Jobs are permanent, pay wage $w_t - \tau$.

- If no job found: receives benefit b_t, consumes c_t^u, enters *t+1* unemployed

$$c_t^e = c_{t+1}^e = \dots$$

Period *t*

s_t

$1\text{-}s_t$

c_t^u

s_{t+1} — c_{t+1}^e

$1\text{-}s_{t+1}$ — c_{t+1}^u
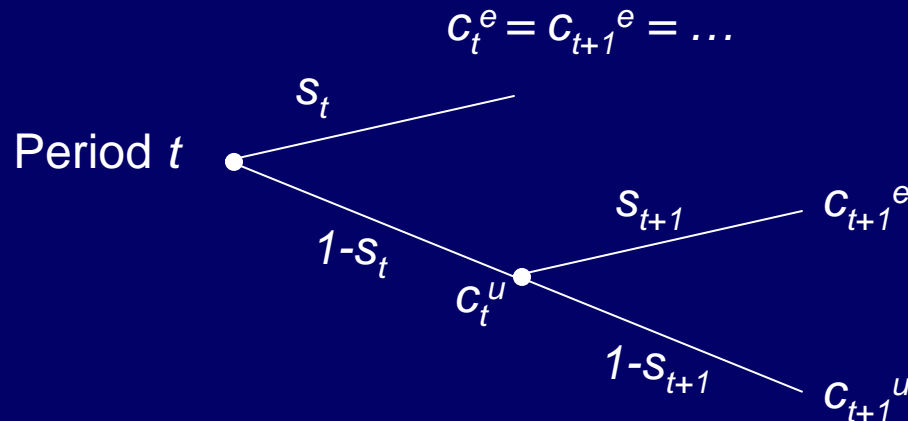
- Cost of job search: $\psi(s_t)$

- Value function for agent who finds a job in period t:

$$V_t(A_t) = \max_{A_{t+1} \geq L} v(A_t - A_{t+1} + w_t - \tau) + V_{t+1}(A_{t+1})$$

- Value function for agent who does not find a job in period t:

$$U_t(A_t) = \max_{A_{t+1} \geq L} u(A_t - A_{t+1} + b_t) + J_{t+1}(A_{t+1})$$

where $J(A_{t+1})$ is value of entering next period unemployed.

- Agent chooses s_t to maximize expected utility:

$$J(A_t) = \max_{s_t} s_t V_t(A_t) + (1 - s_t)U_t(A_t) - \psi(s_t)$$

- First order condition for optimal search intensity:

$$\psi'(s_t^*) = V_t(A_t) - U_t(A_t)$$

MORAL HAZARD VS. LIQUIDITY

- Effect of benefits on durations:

$$\partial s_t / \partial b_t = -u'(c_t^u)/\psi''(s_t)$$

- Benefit effect can be decomposed into two conceptually distinct terms:

$$\partial s_t / \partial A_t = \{v'(c_t^e) - u'(c_t^u)\}/\psi''(s_t) \leq 0$$

$$\partial s_t / \partial w_t = v'(c_t^e)/\psi''(s_t) > 0$$

$$\Rightarrow \quad \partial s_t / \partial b_t = \partial s_t / \partial A_t - \partial s_t / \partial w_t$$
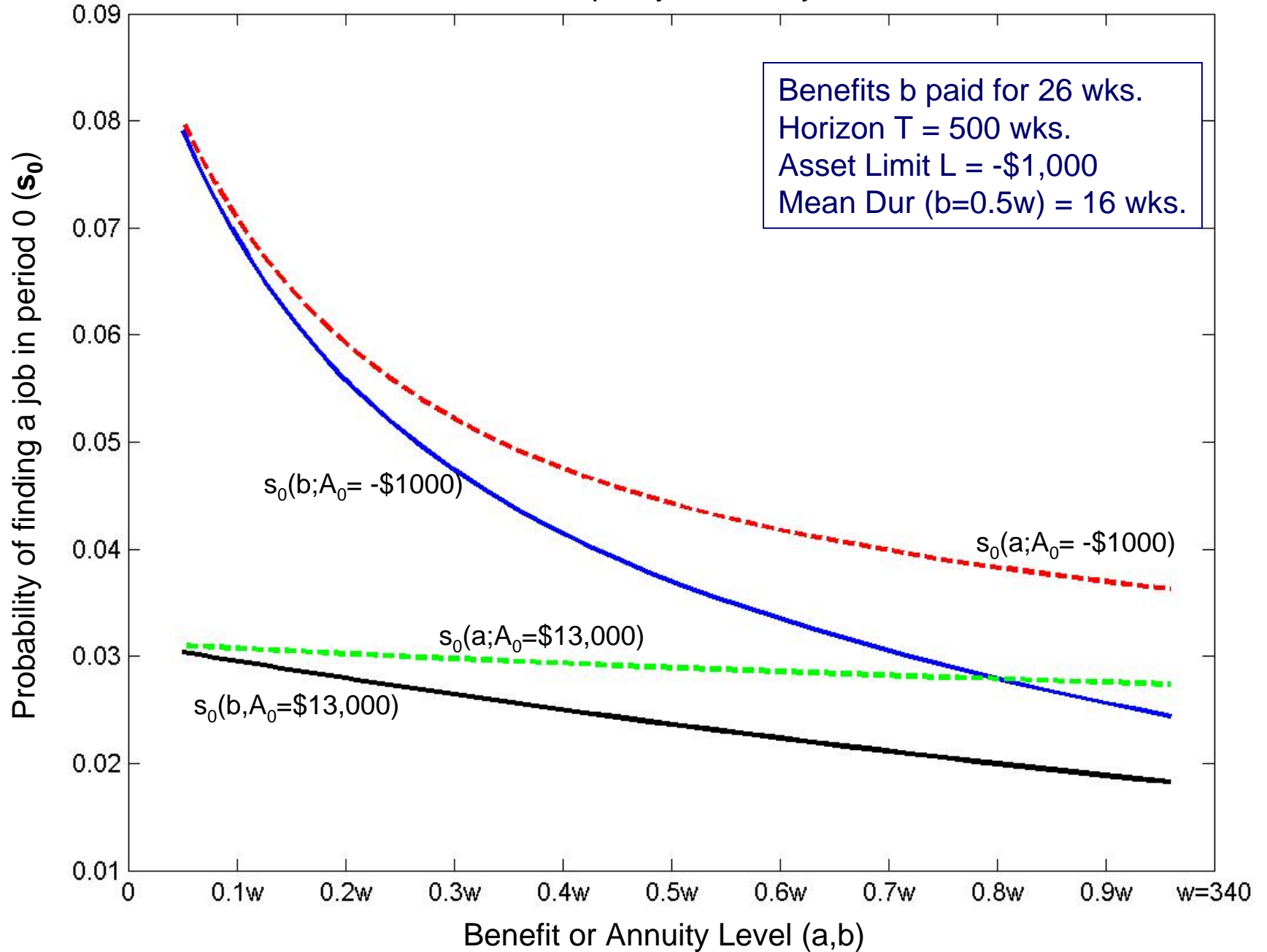
Liquidity   Moral Hazard (subst. effect)

- No liq. effect for agents who smooth perfectly; negligible liq. effect for those who are not credit constrained because unemp. shocks small

- Liquidity and total benefit effects large for agents who cannot smooth relative to permanent income (e.g. low asset, credit constrained)

Figure 1
UI Benefit and Liquidity Effects by Initial Assets

Benefits b paid for 26 wks.
Horizon T = 500 wks.
Asset Limit L = -$1,000
Mean Dur (b=0.5w) = 16 wks.

$s_0(b;A_0= -\$1000)$

$s_0(a;A_0= -\$1000)$

$s_0(a;A_0=\$13,000)$

$s_0(b,A_0=\$13,000)$

Probability of finding a job in period 0 (s_0)

Benefit or Annuity Level (a,b)

WELFARE ANALYSIS: OPTIMAL UI BENEFITS

- Social planner's problem: find policy that maximizes expected utility given failures in credit and insurance markets

- Restrict attention here to constant-benefit, fixed duration UI policies: pay a benefit b for B periods. Take B as exogenous (B = 26 in U.S.).

- Let D denote expected unemployment duration and D_B denote expected duration on UI system

- Planner solves:

$$\max_{b,\tau} J_0(b,\tau) \text{ s.t. } D_B b = (T - D)\tau$$

- I derive a formula for the optimal benefit level b* in terms of the liquidity and moral hazard effects

DERIVATION OF FORMULA IN STATIC MODEL (T = 1)

- Planner's objective when B = T = 1:

$$\max_{b_0} \widetilde{W}(b_0) = \{(1 - s_0(b_0))u(A_0 + b_0) + s_0(b_0)v(A_0 + w_0 - \tau) - \psi(s_0(b_0))$$

$$\text{s.t. } b_0(1 - s_0(b_0)) = s_0(b_0)\tau$$

- Welfare gain from increasing b by $1 is

$$\frac{d\widetilde{W}}{db_0} = (1 - s_0)u'(c_0^u) - s_0 v'(c_0^e)\frac{d\tau}{db_0}$$

- Lucas-type money metric: welfare gain relative to $1 increase in wage

$$\frac{dW}{db_0} = \frac{d\widetilde{W}}{db_0}/s_0 v'(c_0^e) = \frac{1 - s_0}{s_0}\{\frac{u'(c_0^u) - v'(c_0^e)}{v'(c_0^e)} - \frac{\varepsilon_{1-s,b}}{s_0}\}$$

$$= \frac{1 - s_0}{s_0}\{\frac{-\partial s_0/\partial A_0}{\partial s_0/\partial w_0} - \frac{\varepsilon_{1-s,b}}{s_0}\}$$

GENERAL FORMULA FOR OPTIMAL BENEFITS

- General case:

$$\frac{dW}{db} \simeq \frac{1-\sigma}{\sigma} \frac{D_B}{D} \left\{ R - \frac{\varepsilon_{D_B,b}}{\sigma} \right\}$$

where R is the liquidity/MH ratio and σ is fraction of time employed:

$$R = \frac{-B\frac{\partial s_0}{\partial A_0}}{B\frac{\partial s_0}{\partial A_0} - \frac{\partial s_0}{\partial b}} \text{ and } \sigma = \frac{T-D}{T}$$

- This formula gives *marginal* welfare gain at a point b.

  - To test whether a given level b is optimal, estimate moral hazard and liquidity effects around that level and check if dW(b)/db = 0

- Some implications:

  - Liquidity effect 0 → optimal benefit is 0.
  - Larger elasticity does not imply lower opt. ben.

<u>EXTENSIONS: THEORETICAL ROBUSTNESS</u>

- Same formula holds when we allow for:

    1. Endogenous asset choice prior to job loss: A_0 responds to b

    2. Endogenous private insurance: private/informal insurance contract chosen prior to job loss responds to b

    3. Stochastic wages (caveat about measurement of search intensity)

    4. Heterogeneity: formula yields mean per-capita welfare gain

- Reason for robustness: Envelope conditions eliminate first-order effects of other behaviors on marginal utilities that matter for welfare.

    - Changes in model affect dW/db only through the key parameters that enter the formula.

INTUITION FOR TEST

Formula is a "revealed preference" approach to valuing insurance

- Infer value of UI to agent by observing what he would do if money given as a cash-grant without distorted incentives

  - If agent would not use money to extend duration, infer that only takes longer because of price subsidy (moral hazard)

  - But if he uses cash grant to extend duration, indicates that UI facilitates a choice he would make if markets were complete

- Same strategy can be used in valuing other types of insurance, such as health, disability, etc.

  - Make inferences from agent's choices instead of directly computing costs and benefits of the policy

  - Key assumption: Agents optimize fully, so their actions when incentives are not distorted reveals social optimum

COMPARISON TO STRUCTURAL APPROACH

- Structural approach (Wolpin 1987, Hansen-Imrohoglu 1992, Hopenhayn and Nicolini 1997, Lentz 2008, etc.) involves two steps:

  - Estimate primitives (asset limit L, risk aversion, search cost, etc.)

  - Numerically simulate effect of policy changes to calculate dW/db

- Approach proposed here does *not* identify primitives

  - Instead identifies a set of "sufficient statistics" $(R, \varepsilon_{D,B}, D)$ for dW/db

  - Any set of primitives consistent with these sufficient statistics generates the same value of dW/db

  - Structural approach is overidentified for calculation of dW/db; formula here is "exactly identified"

EXACT IDENTIFICATION VS. STRUCTURAL APPROACH

- Advantages of exact identification:

  1. Simplicity: requires data on only unemployment durations

  2. More robust to model specification

     Structural models typically rely on strong assumptions about market completeness (e.g. no borrowing, no private insurance)

  3. More credible empirical identification because key parameters can be estimated using quasi-experimental reduced-form methods

- Disadvantages of exact identification:

  1. Scope of potential questions may be more limited; no script

  2. Can only make statements about *local* welfare gains because sufficient statistics are endogenous to policy

EMPIRICAL IMPLEMENTATION

Model suggests two approaches to estimating liquidity effects

1. Heterogeneity Analysis: Role of Constraints

   - Estimate *total* benefit elasticities of duration for (ex-ante) "unconstrained" ($\Delta c = 0$) and "constrained" ($\Delta c > 0$) agents

   - Sheds light on plausibility of liquidity effect, as in simulations
     - If liquidity effects important, would expect UI benefits to have larger effect on durations for constrained groups

2. Severance Payments

   - Decompose total elasticity into liquidity and subst. effect

   - How much do lump-sum severance payments affect duration?

EMPIRICAL STRATEGY I: THE ROLE OF CONSTRAINTS

• Divide households into constrained and unconstrained groups and estimate effect of UI benefit level on duration using hazard models

• Identification from variation in UI laws across states and time in the U.S.

　　• Essentially replicate classic diff-in-diff identification strategy (e.g. Meyer 1990) on subgroups of the data

• Since ability to smooth cons is unobserved, proxy by identifying households that are likely to be able to smooth intertemporally:

　　　　- Liquid wealth net of unsecured debt
　　　　- Spousal work status
　　　　- Mortgage status

• Validity of these proxies supported by studies of unemployment and consumption (Browning and Crossley (2001), Bloemen and Stancanelli (2005), etc.)

DATA

- SIPP spanning 1985-2000 (large sample short panels in U.S.)

- Four restrictions:
    - Prime-age males
    - Searching for a job
    - Not on temporary layoff
    - Take up UI in first month after job loss

- Sample size: 4,560

- Empirical evidence divided into two parts:

    A. Plot survival curves for constrained v. unconstrained groups and test whether effect of UI benefits on durations differs non-parametrically

    B. Check if results are robust to inclusion of covariates
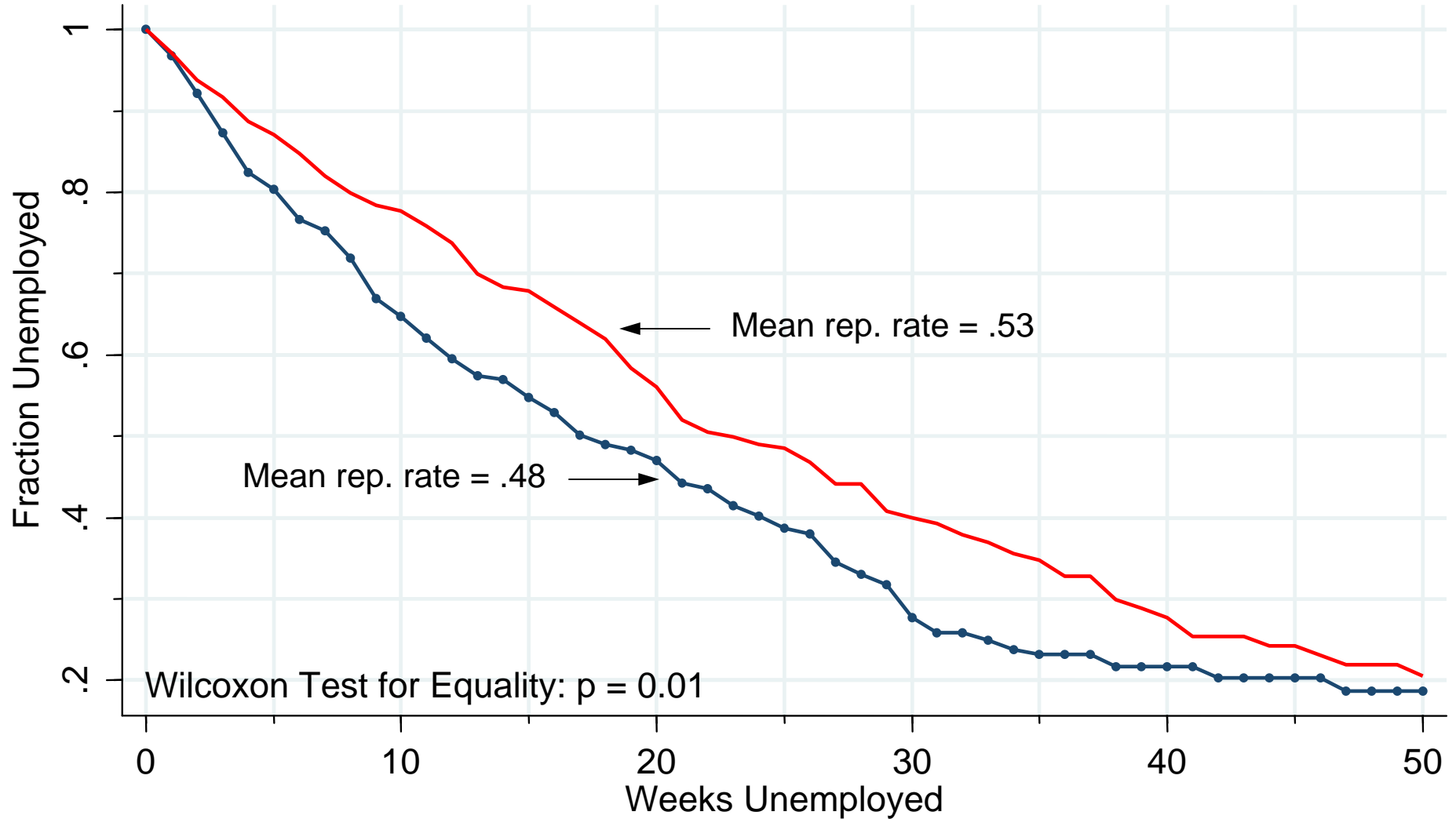
TABLE 1

Summary Statistics by Wealth Quartile for SIPP Sample

	Net Liquid Wealth Quartile			
	1 (< -$1,115)	2 (-$1,115-$128)	3 ($128-$13,430)	4 (>$13,430)
Median Liq. Wealth	$466	$0	$4,273	$53,009
Median Debt	$5,659	$0	$353	$835
Median Home Equity	$2,510	$0	$11,584	$48,900
Median Annual Wage	$17,188	$14,374	$18,573	$23,866
Mean Years of Education	12.21	11.23	12.17	13.12
Mean Age	35.48	35.18	36.64	41.74
Fraction Renters	0.43	0.61	0.35	0.16
Fraction Married	0.64	0.59	0.60	0.63

All monetary variables in real 1990 dollars

Figure 3a

Effect of UI Benefits on Durations: Lowest Quartile of Net Wealth

Mean rep. rate = .53

Mean rep. rate = .48

Wilcoxon Test for Equality: p = 0.01

Fraction Unemployed

Weeks Unemployed

Avg. UI benefit below mean   Avg. UI benefit above mean

Figure 3b

Effect of UI Benefits on Durations: Second Quartile of Net Wealth

Mean rep. rate = .53

Mean rep. rate = .48

Wilcoxon Test for Equality: p = 0.04

Fraction Unemployed

Weeks Unemployed
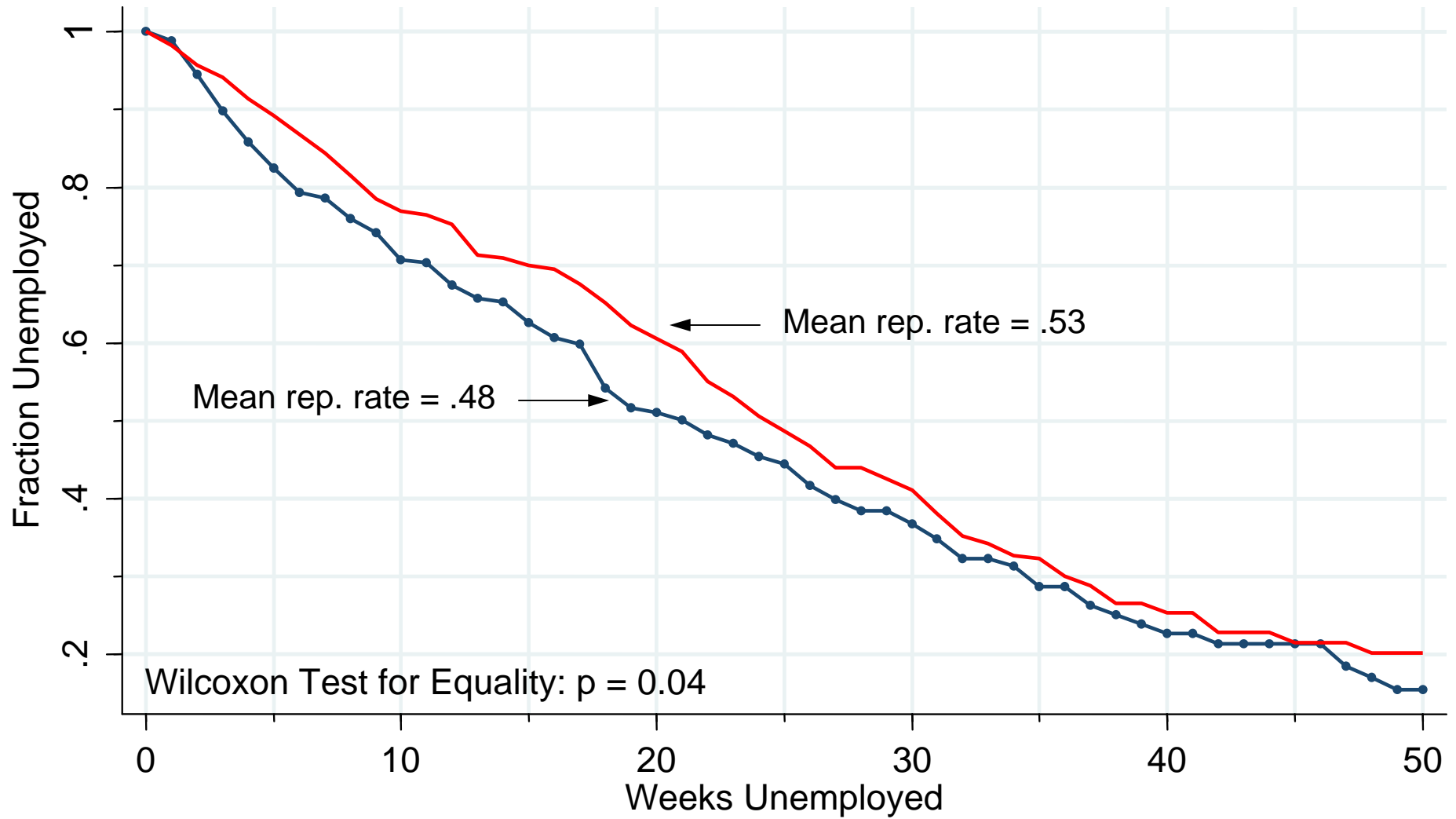
Avg. UI benefit below mean   Avg. UI benefit above mean

Figure 3c

Effect of UI Benefits on Durations: Third Quartile of Net Wealth

Mean rep. rate = .52

Mean rep. rate = .46

Wilcoxon Test for Equality: p = 0.69

Fraction Unemployed

Weeks Unemployed
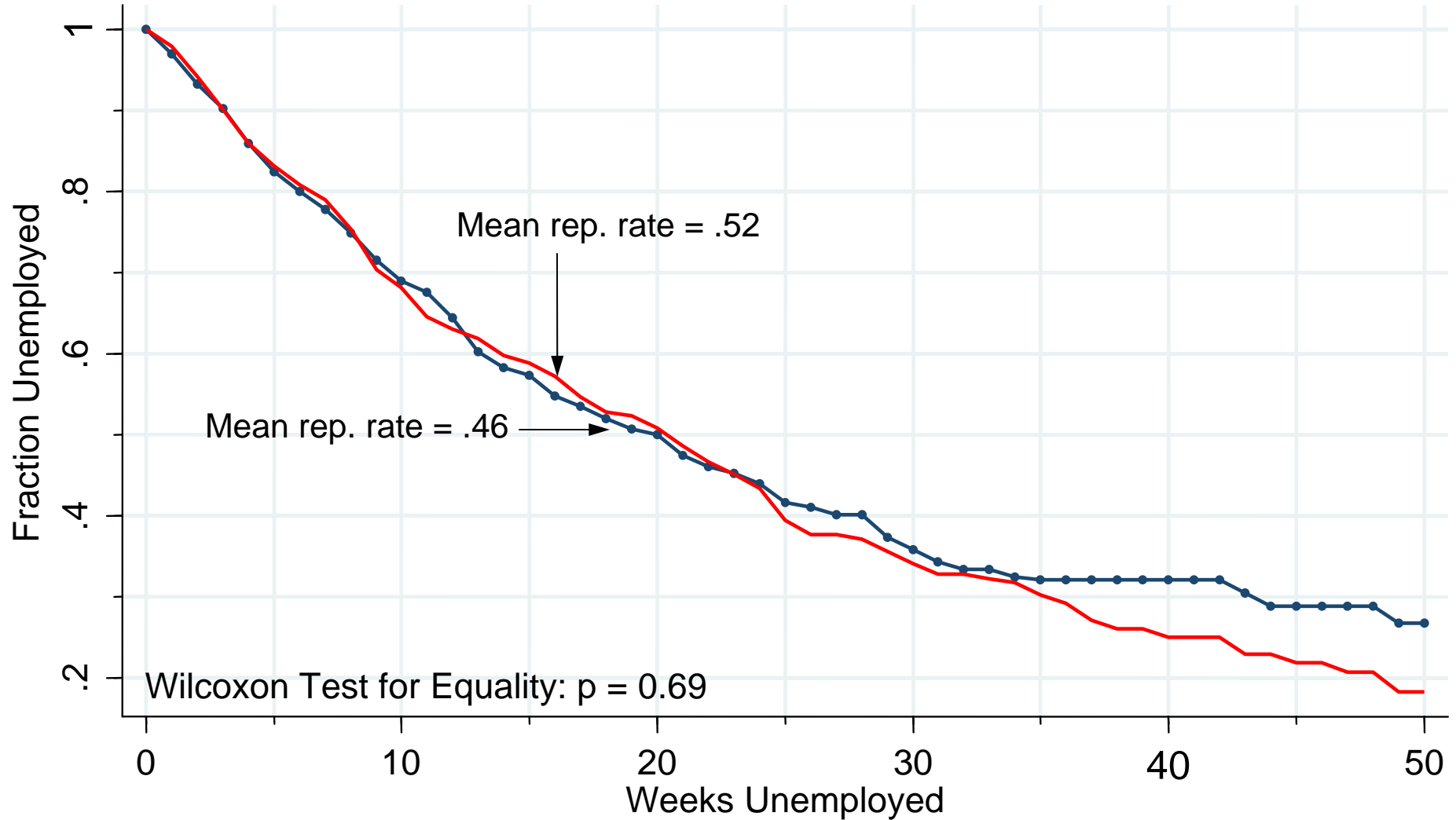
Avg. UI benefit below mean ——•—— Avg. UI benefit above mean ————

Figure 3d

Effect of UI Benefits on Durations: Highest Quartile of Net Wealth

Mean rep. rate = .52

Mean rep. rate = .43

Wilcoxon Test for Equality: p = 0.43

Fraction Unemployed

Weeks Unemployed
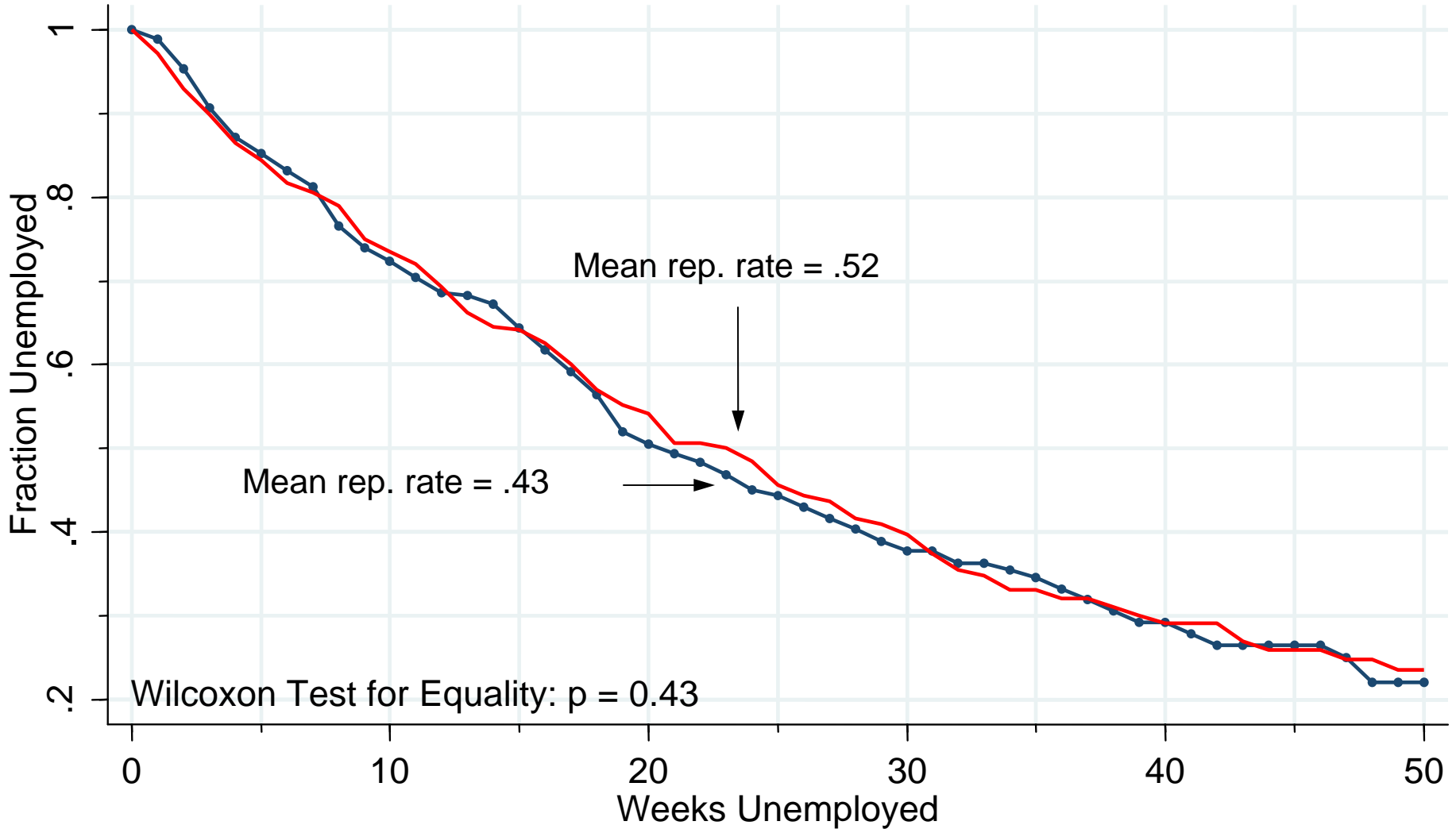
Avg. UI benefit below mean ——— Avg. UI benefit above mean

Figure 4a

Effect of UI Benefits on Durations: Households with Mortgages

Mean rep. rate = .52

Mean rep. rate = .45

Wilcoxon Test for Equality: p = 0.01

Fraction Unemployed

Weeks Unemployed

——•—— Avg. UI benefit below mean   ——— Avg. UI benefit above mean

Figure 4b

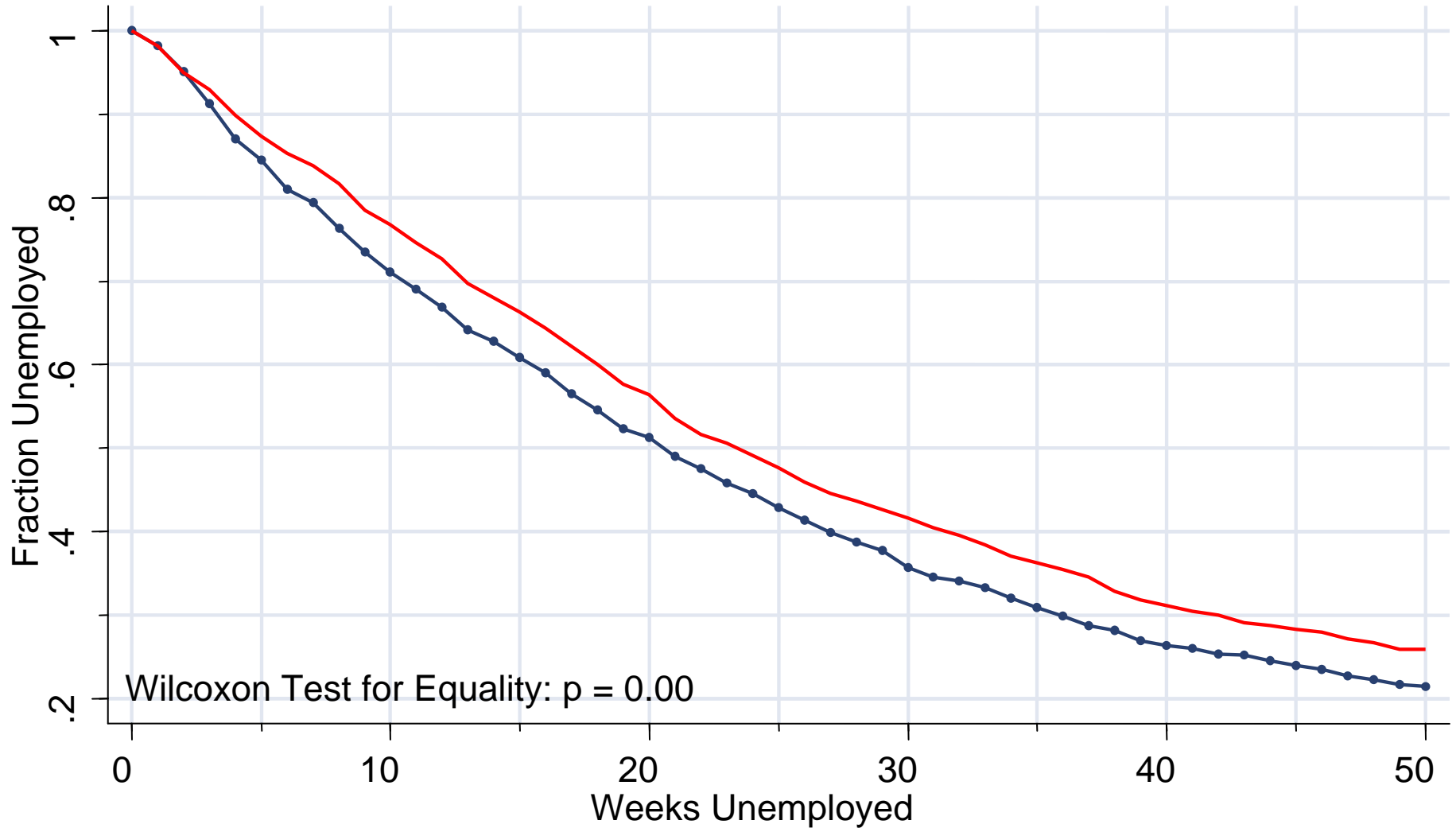## Effect of UI Benefits on Durations: Households without Mortgages

Mean rep. rate = .53

Mean rep. rate = .47

Wilcoxon Test for Equality: p = 0.31

Fraction Unemployed

Weeks Unemployed
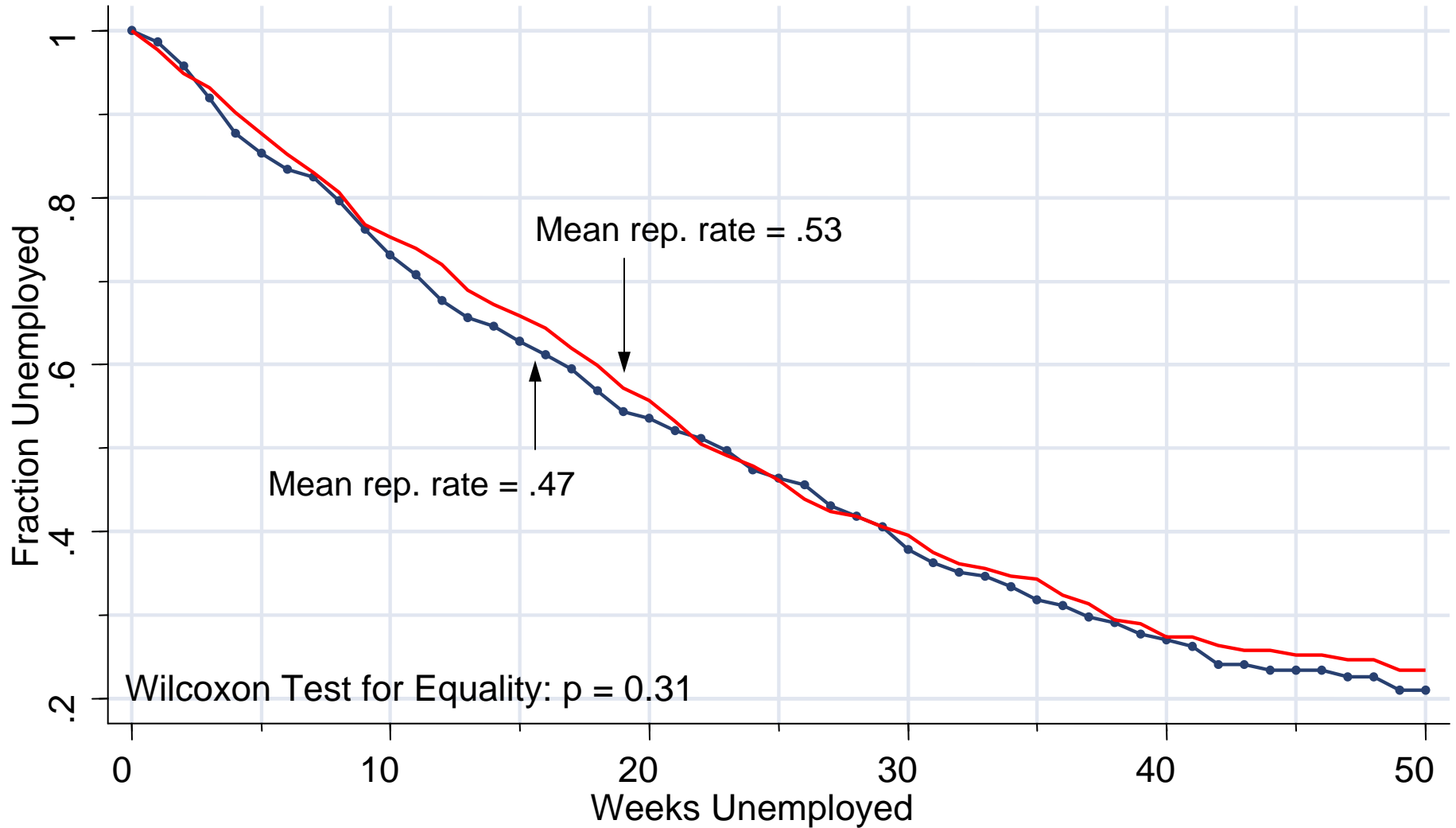
●— Avg. UI benefit below mean — Avg. UI benefit above mean

Figure 4c

Effect of UI Benefits on Durations: Single-Earner Households

Wilcoxon Test for Equality: p = 0.00

Fraction Unemployed

Weeks Unemployed

Avg. UI benefit below mean   Avg. UI benefit above mean

Figure 4d

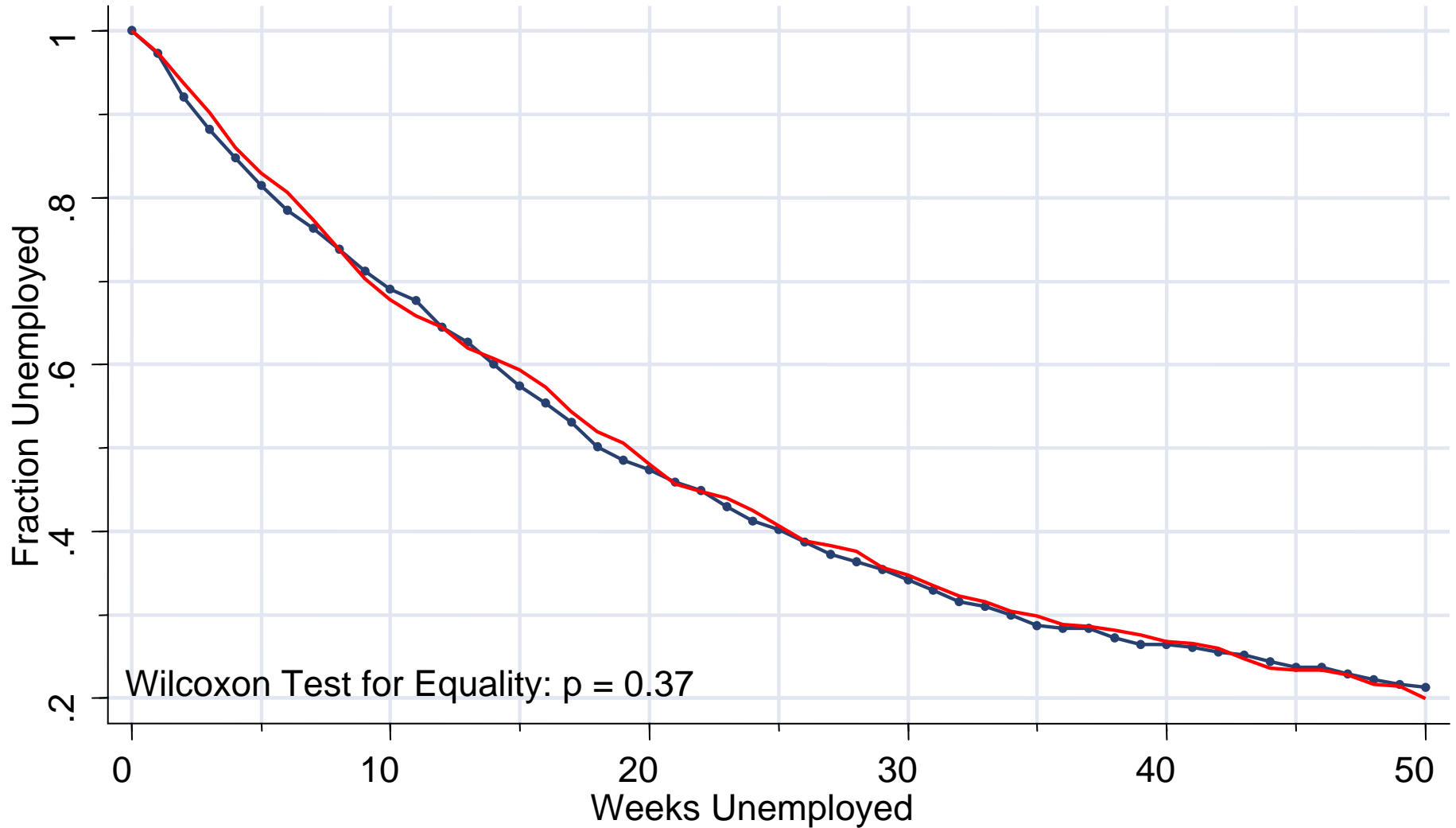Effect of UI Benefits on Durations: Dual-Earner Households

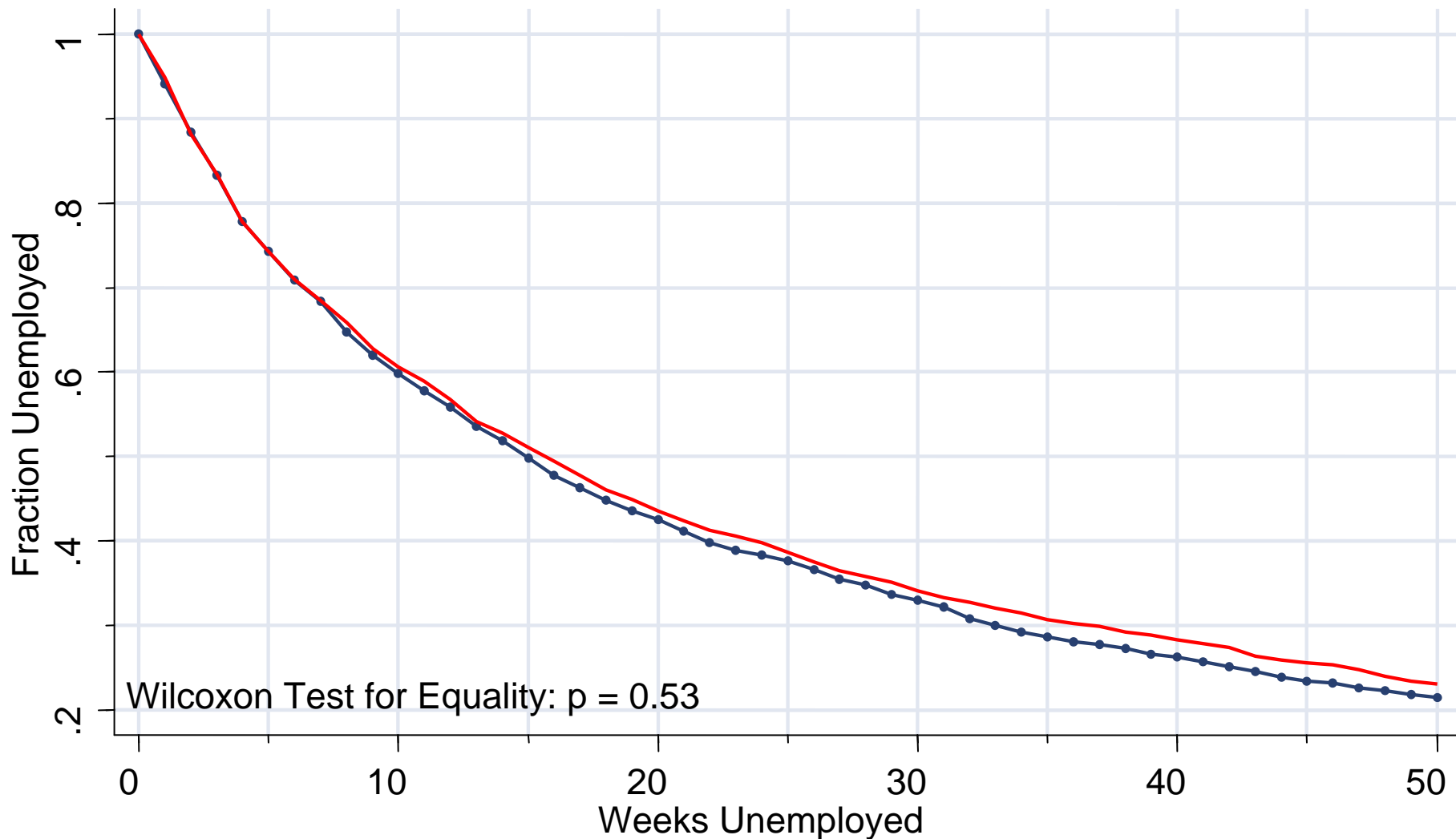Wilcoxon Test for Equality: p = 0.37

Weeks Unemployed

Fraction Unemployed

Avg. UI benefit below mean   Avg. UI benefit above mean

Figure 4e

Placebo Test: Effect of UI Benefits on Low-Wealth Non-Recipients

Wilcoxon Test for Equality: p = 0.53

Weeks Unemployed

Fraction Unemployed

Avg. UI benefit below mean   Avg. UI benefit above mean

HAZARD MODEL ESTIMATION

• Now examine whether these results are robust to controls

• Estimate Cox hazard models stratified by asset quartile (Q):

$$\log h_{itj} = \alpha_{t,j} + \beta_1^j Q_{i,j} \log b_i + \beta_3 X_{itj}$$

• β_1^j is elasticity of hazard rate. w.r.t. UI benefit in quartile j of asset distribn.

• Similar models estimated for spousal and mortgage proxies

• Covariate set (*X*)*:*

     - 10 piece log wage spline, log total wealth
     - industry, occupation, state, and year dummies
     - education, age, seam dummy, marital status, spouse work status

TABLE 2
Effect of UI Benefits: Cox Hazard Model Estimates

	(1)	(2)	(3)	(4)	(5)
	Pooled	Stratified	Stratified with Full Controls		
	Full cntrls	No cntrls	Avg WBA	Max WBA	Ind. WBA
log UI ben	**-0.527**				
	(0.267)				
Q1 x log UI ben		**-0.721**	**-0.978**	**-0.727**	**-0.642**
		(0.304)	(0.398)	(0.302)	(0.241)
Q2 x log UI ben		**-0.699**	**-0.725**	**-0.388**	**-0.765**
		(0.484)	(0.420)	(0.303)	(0.219)
Q3 x log UI ben		**-0.368**	**-0.476**	**-0.091**	**-0.561**
		(0.309)	(0.358)	(0.370)	(0.156)
Q4 x log UI ben		**0.234**	**0.103**	**0.304**	**0.016**
		(0.369)	(0.470)	(0.339)	(0.259)
Q1=Q4 p-val		0.039	0.013	0.001	0.090
Q1+Q2=Q3+Q4 p-val		0.012	0.008	0.002	0.062
Number of Spells	4529	4337	4054	4054	4054

EMPIRICAL STRATEGY II: SEVERANCE PAY AND DURATIONS

• Preceding evidence shows that effect of UI benefits on durations comes primarily from behavioral responses by constrained agents

• But does not tell us whether response in constrained group is due to a liquidity or substitution effect

  - unless one assumes that substitution effects are similar in constrained and unconstrained groups (i.e., identical preferences).

• Now estimate liquidity effect directly by using variation in severance payments, which are lump-sum grants at time of job loss

• Estimate hazard models analogous to those above; key independent var is now a dummy for receipt of severance pay

• Identification assumption: Receipt of severance pay orthogonal to other determinants of durations

  • I evaluate this assumption after showing basic results

SEVERANCE PAY: BACKGROUND AND DATA

• Approximately 20% of job losers in the U.S. receive severance pay

• Considerable cross-firm variation in packages, but little individual discretion

• Conditional on job tenure, receipt of severance pay is determined almost entirely by which firm you work for and not individual characteristics

• Since tenure is highly correlated with durations, I use only cross-firm variation in severance packages by controlling for tenure throughout

• Data from two Mathematica surveys matched to administrative data from UI system, with same sample restrictions as above
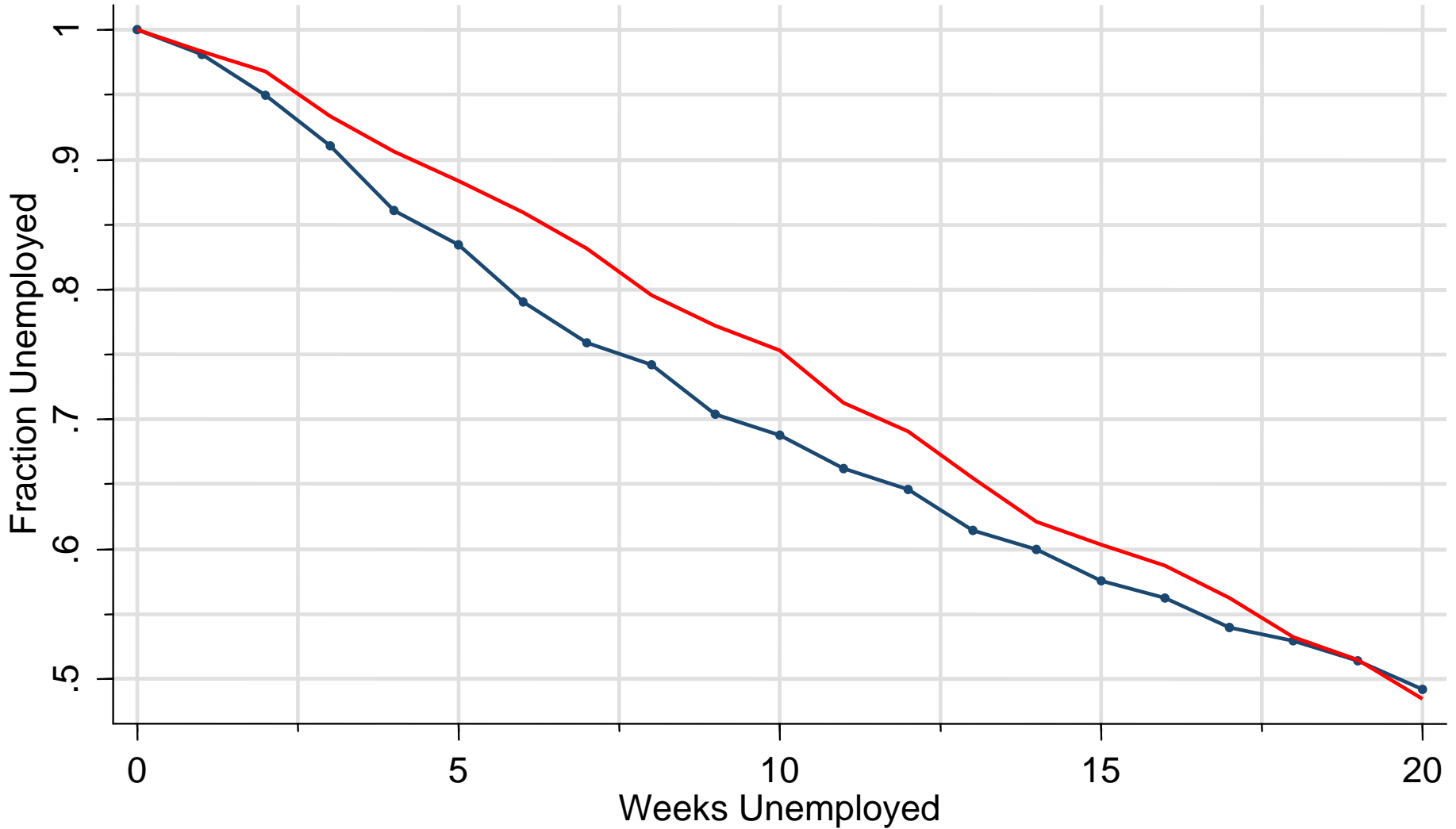
• Pooled sample size: 2,730

TABLE 3

Summary Statistics for Mathematica Data

	Pooled	No Severance	Severance
		(0.83)	(0.17)
Percent dropouts	14%	15%	6%
Percent college grads	17%	13%	34%
Percent married	58%	56%	68%
Mean age	36.2	35.2	40.6
Median pre-unemp annual wage	$20,848	$19,347	$30,693
Median job tenure (years)	1.9	1.5	4.8

Figure 5

Effect of Severance Pay on Durations

IS SEVERANCE PAY CAUSAL?

- Obvious concern: Receipt of severance pay correlated with other factors that affect durations

  - Ex: Firms where finding a new job is difficult may pay severance

- Three approaches to address this concern:

1. Test if severance pay affects durations more in constrained groups

   - Asset data unavailable here, so predict assets using age, income, education, and marital status (using SIPP data)

2. Check if inclusion of a rich set of controls affects key coefficient.

3. Do individuals who receive larger severance packages take longer to find a job (intensive margin test)?

   - Implement by testing whether effect of severance pay is larger among high-tenure individuals

Figure 6a

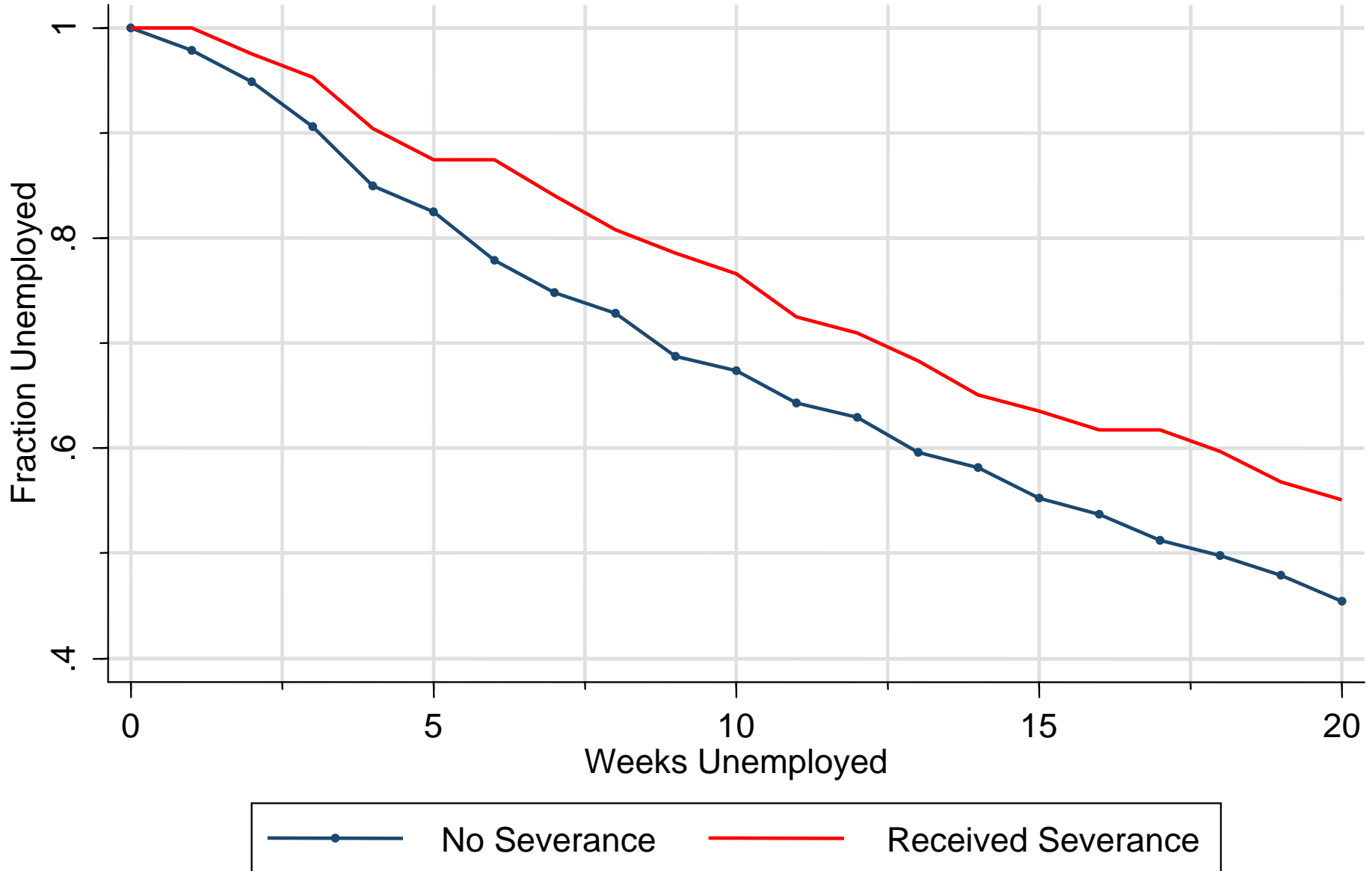## Effect of Severance Pay on Durations: Below Median Net Wealth

Figure 6b

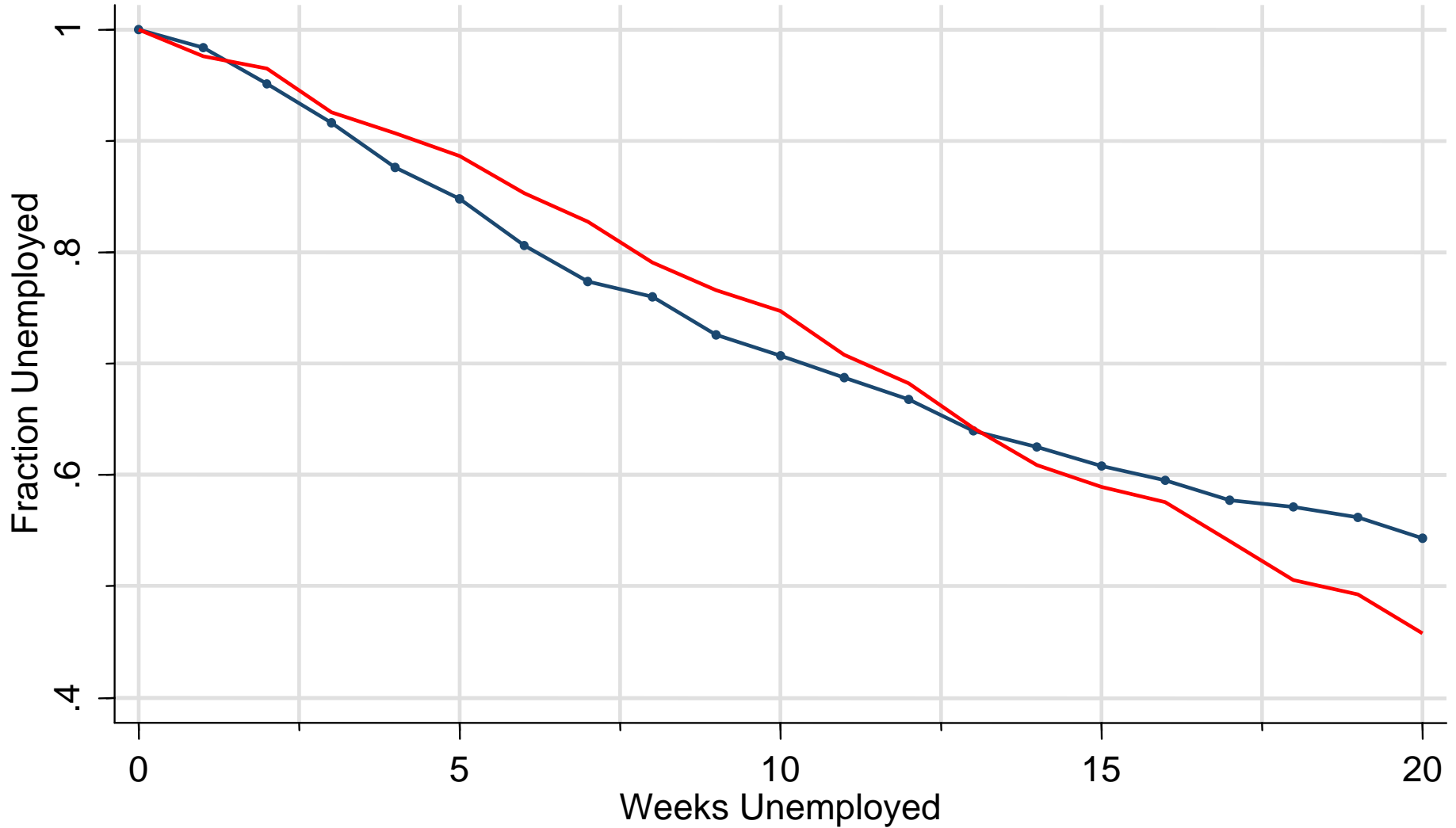## Effect of Severance Pay on Durations: Above Median Net Wealth

TABLE 4
Effect of Severance Pay: Cox Hazard Model Estimates

	Pooled	By Liquid Wealth	By Sev. Amt.
Severance Pay	**-0.233**		
	(0.071)		
(Netliq < Median) x Sev Pay		**-0.457**	
		(0.099)	
(Netliq > Median) x Sev Pay		**-0.088**	
		(0.081)	
(Tenure < Median) x Sev Pay			**-0.143**
			(0.055)
(Tenure > Median) x Sev Pay			**-0.340**
			(0.119)
Equality of coeffs p-val		<0.01	0.03

N=2428; all specs. include full controls.

MAGNITUDE OF MORAL HAZARD VS LIQUIDITY EFFECT

- Doubling UI benefit reduces hazard rate by approximately 41%.

- Severance pay estimated to reduce hazard by approximately 21%.

  - At mean spell length and mean job tenure, receipt of severance pay is equivalent to an 85% increase in UI benefit level

  - Cash grant equivalent to doubling UI benefit would reduce hazard by 21/0.85 = 25%

$$\Rightarrow B \frac{\partial s_0}{\partial A} / \frac{\partial s_0}{\partial b} = \frac{25}{41} = 0.6$$

- Roughly 60% of UI-duration link due to liquidity effect

  → Durations rise largely because job losers have more cash-on-hand; not purely "gaming the system" because of distorted wage

CALIBRATION: WELFARE IMPLICATIONS

- Plug this estimate into formula for dW/db, assuming that agent is unemployed for 5% of his life as in Shimer-Werning (2007):

$$\Rightarrow \frac{dW}{db}(b = 0.5w) = 0.04$$

- Welfare gain from raising weekly benefit level by $1 from current level in U.S. (50% wage replacement) is equivalent to a 4 cent weekly wage increase for all workers, or $2.00 per year.

- Aggregating over population of 135 million workers, total gain from a 10% increase in UI benefit level is $5.9 bil (0.05 percent of GDP)

→ Small but positive welfare gain from raising benefit level in U.S.

POLICY IMPLICATIONS FOR DESIGN OF UI

1. Replacement rate near 50% optimal given B = 26 (b* lower in Europe?)

   - Consistent with Hansen-Imrohoglu (1992) "low moral hazard" simulation; higher optimal rate than other existing studies

   - Caveats:

     - Assumes perfect experience rating for firms

     - Ignores general equilibrium effects (Acemoglu-Shimer 1999)

     - Liquidity need not be provided through government transfers; individual accounts or *long-term* loans may be better

2. Efforts to correct marginal incentives (e.g. search requirements, bonuses to return to work) less critical.

3. Means testing suboptimal because behavior of wealthy undistorted.

Figure 7
Welfare Gain from Loans vs. UI Benefits
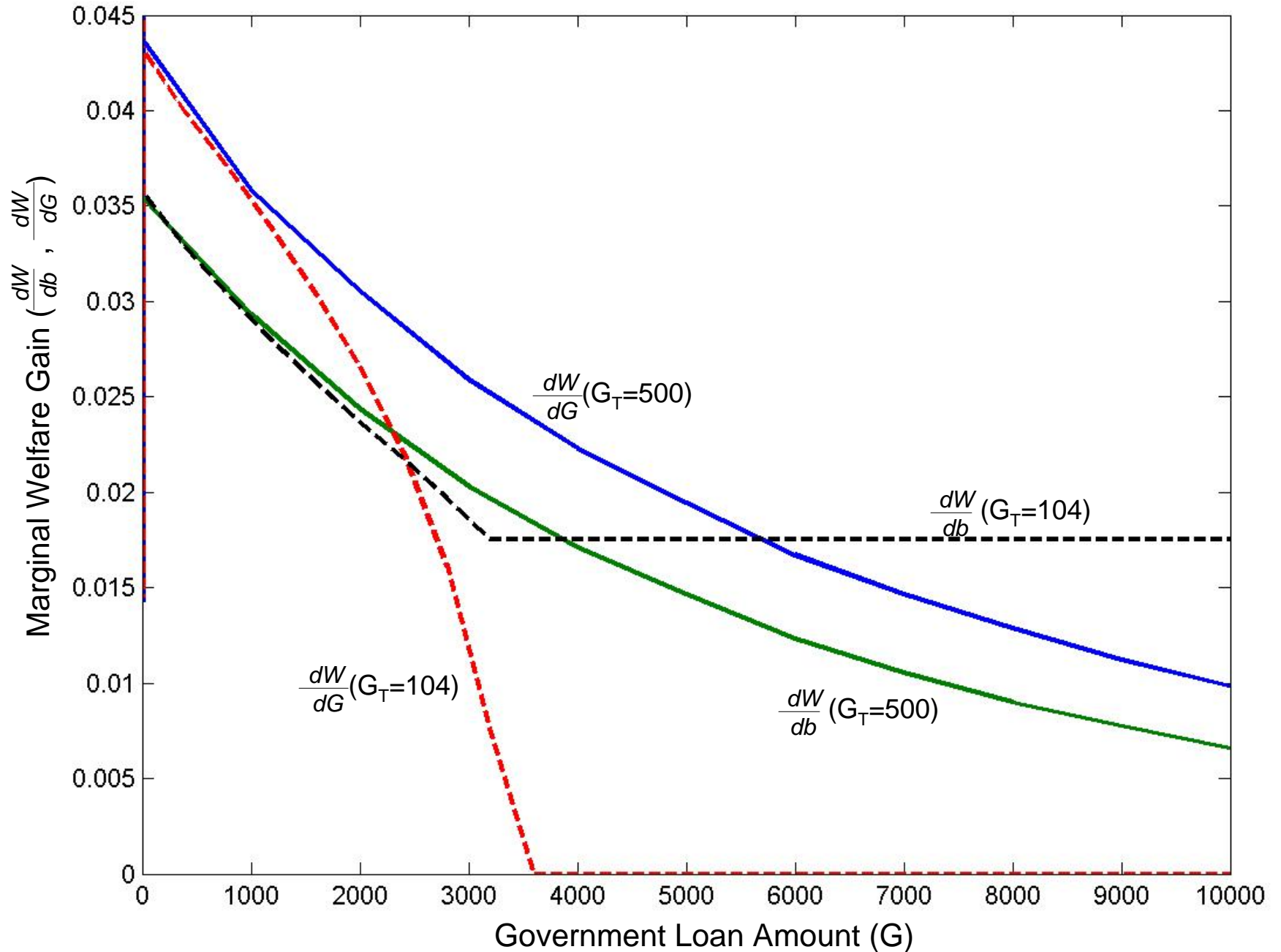
METHODOLOGICAL CONCLUSIONS

1. Liquidity effects as important as moral hazard in behavioral responses to social insurance (retirement, disability, health)

    *   Not all behavioral responses are welfare-reducing.

2. Exact identification offers a compromise between reduced-form and structural policy analysis

    *   Combine best feature of reduced-form empirical analysis (transparent, credible identification) with benefit of structural models (quantitative welfare statements)

    *   Similar "sufficient statistics" may exist for many policy questions

Card-Chetty-Weber 2007
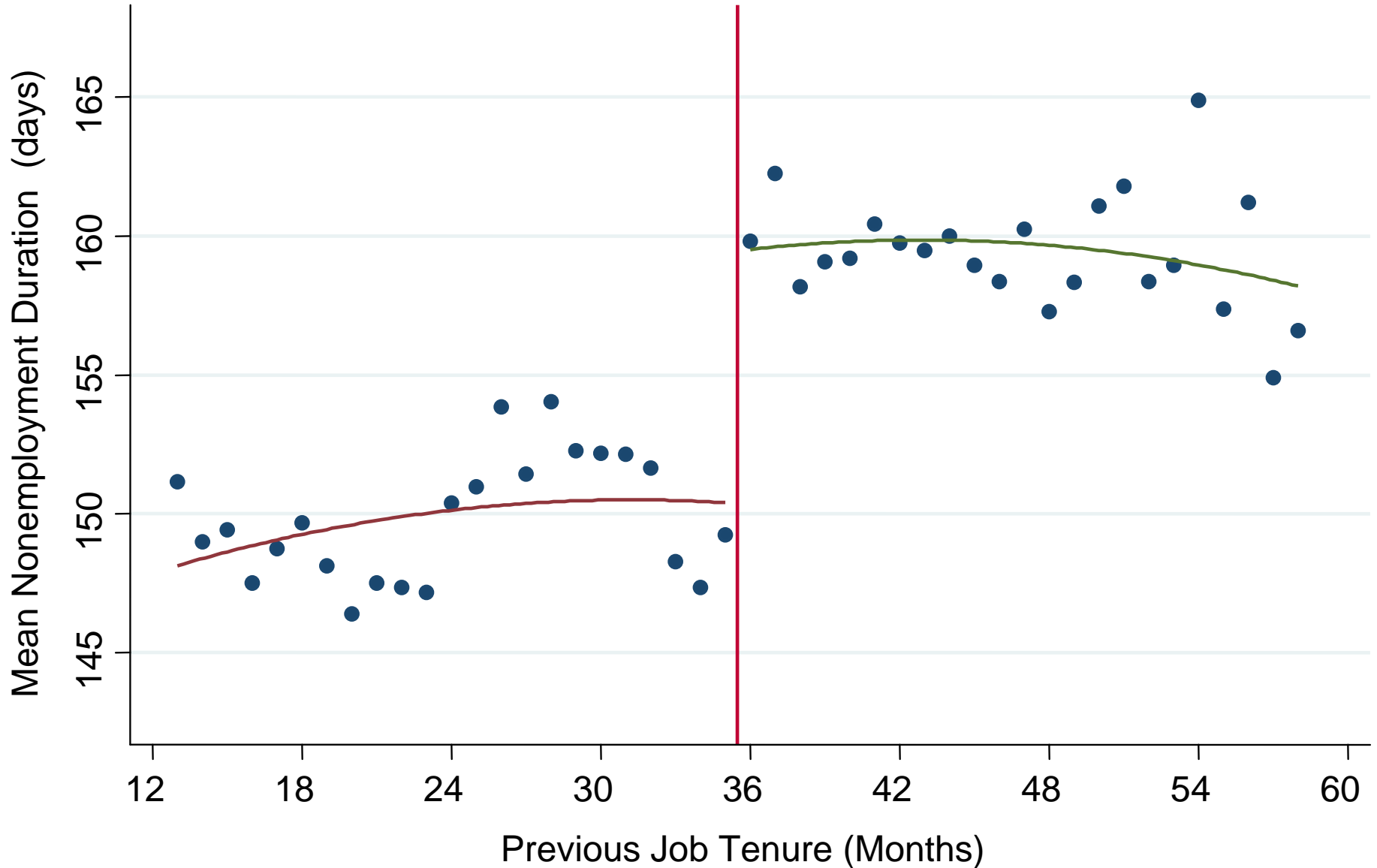
Effect of Severance Pay on Nonemployment Durations in Austria

Figure 2

Comparison of Approximate and Actual Welfare Measures