14.662 Recitation 2

Card and Hyslop (ECMA, 2005) "Estimating the Effects of a Time-limited Earnings Subsidy for Welfare-leavers"

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Background: Means-Tested Welfare and the SSP

- Canadian welfare ("IA"): implicit 100% tax rate on earnings
- Rising case loads in 1980s led to the Self Sufficiency Project (SSP)
- Sample of single parents on IA from BC and NB ($N = 5,684$)
  - Half randomly offered subsidies for for full-time work, whenever they chose to work, for up to three years after establishing SSP eligibility
  - Eligibility established by working full-time within one year of offer
  - NIT: subsidy half the gap of earnings to a benchmark ($\approx \$3k$/mo.)
  - Subsidy taxable; employers not informed of SSP status
- Michalopoulos et al. (2002): SSP offer had significant short-term impacts on welfare participation/work, but gains fade quickly
  - By 69 months (1.5 years after subsidies stopped) no T-C difference

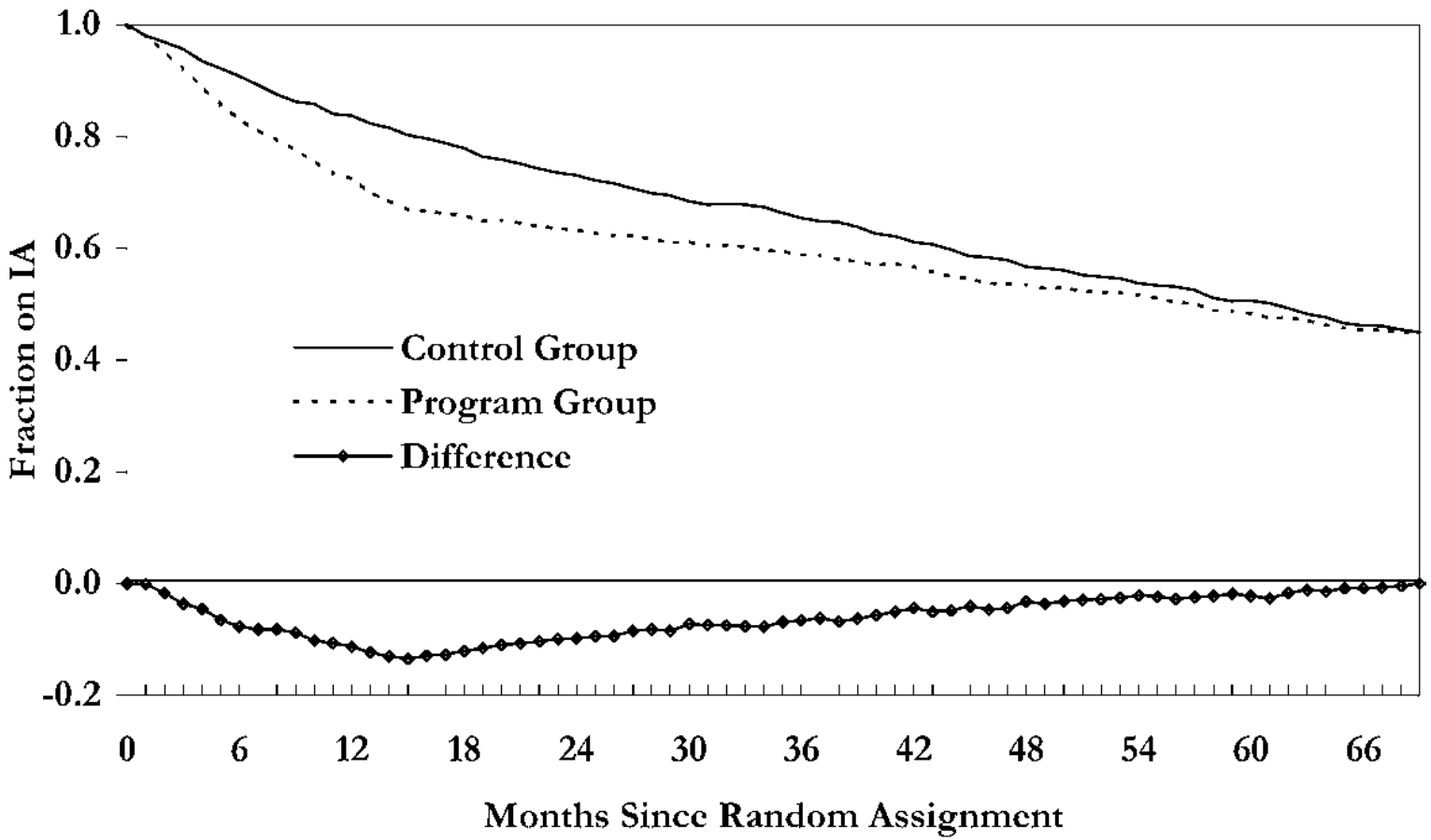
SSP Descriptive Statistics

CHARACTERISTICS OF SSP EXPERIMENTAL SAMPLE[a]

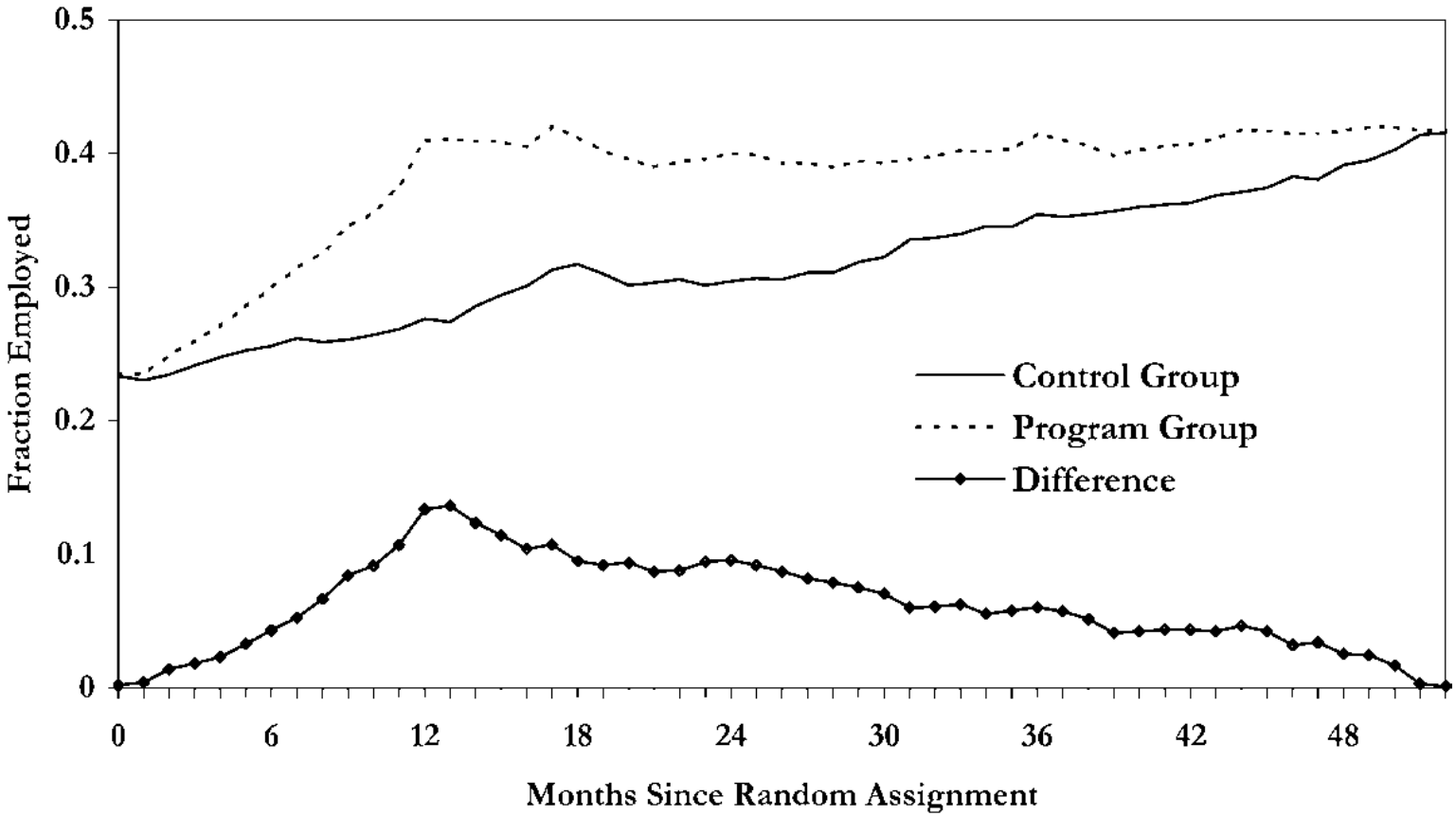
			Program Group, by SSP Eligibility Status	
	Controls	Programs	Eligible	Ineligible
In British Columbia (%)	52.6	53.2	50.9	54.4
Male (%)	4.7	5.2	4.6	5.5
Mean age	31.9	31.9	31.1	32.4
Age 25 or less (%)	17.8	17.1	18.5	16.3
Never married (%)	48.1	48.3	48.0	48.5
Average number kids <6	0.7	0.7	0.7	0.7
Average number kids 6–15	0.8	0.8	0.8	0.8
Immigrant (%)	13.8	13.3	12.2	13.9
Grew up with two parents (%)	59.7	59.4	62.1	58.1
High school graduate (%)	44.6	45.7	56.9	39.9
Means years work exp.	7.4	7.3	8.6	6.7
Working at random assignment (%)	19.0	18.2	31.5	11.4
Months on IA last 3 years	29.6	30.1	29.2	30.6
IA continuously last 3 years (%)	41.5	43.8	36.3	47.7
Percent on IA by months since random assignment				
Month 6	90.8	83.1	62.8	93.5
Month 12	83.7	72.4	39.1	89.4
Month 18	77.9	65.9	27.2	85.6
Month 24	73.0	63.3	26.5	82.1
Month 36	65.4	58.8	27.6	74.8
Month 48	56.7	53.5	29.3	65.9
Month 60	50.6	48.4	28.5	58.5
Month 69	45.0	45.0	25.4	55.0
Number of observations	2,786	2,831	957	1,874

[a]Sample includes observations in the SSP Recipient Experiment who were on IA in the month of random assignment and the previous month. Eligible program group is the subset who received at least one SSP subsidy payment.

Welfare Participation (Administrative Data)

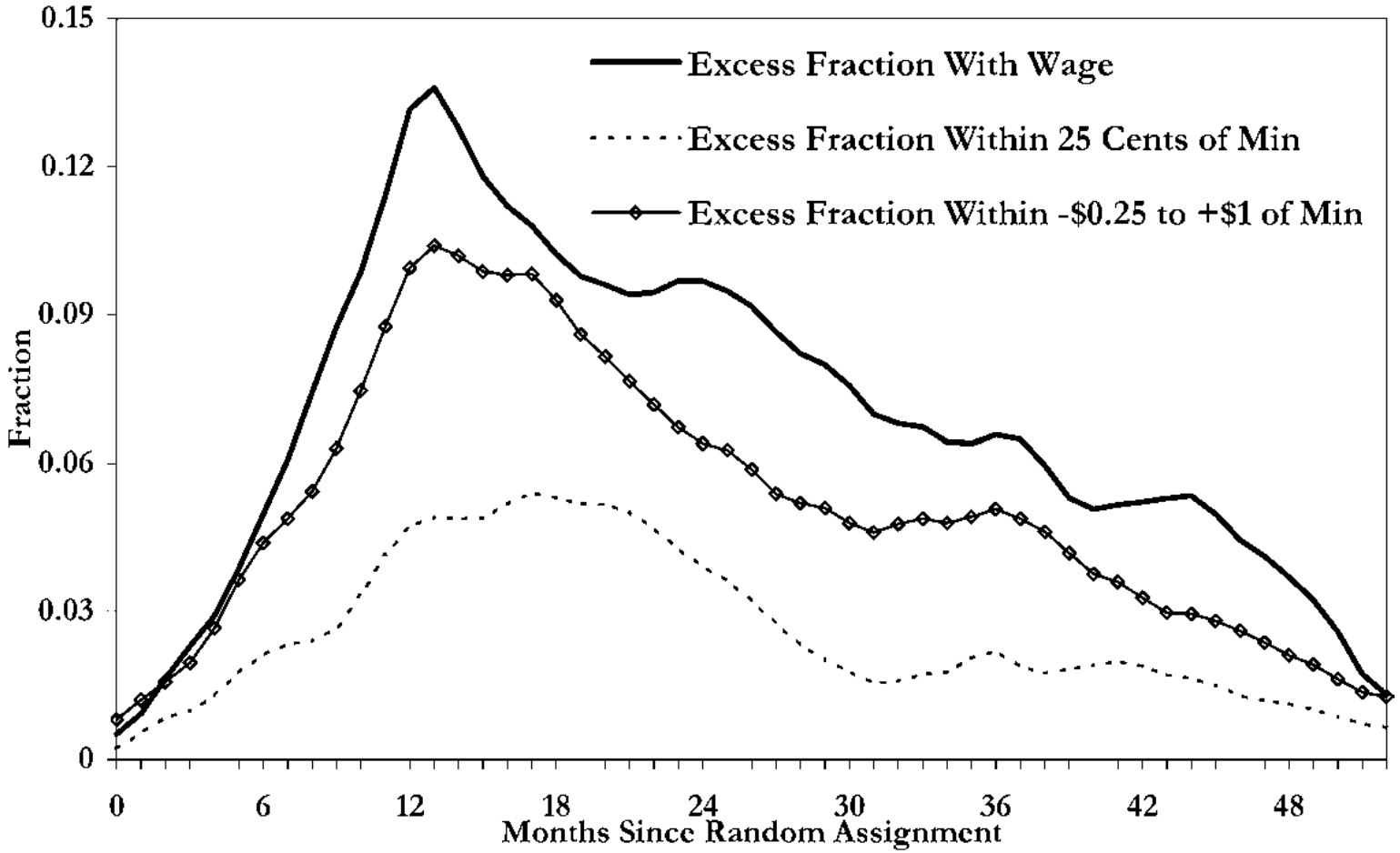


Employment (Survey Data)



- Differential attrition in survey data: 1.5*pp* off 84% control mean

Wages (Survey Data)



- $60-80\%$ of extra wage earners in program group paid within \$1 per hour of the minimum wage

SSP Impact on Average Rate of Pay

- Difference in average earnings estimates

$$\begin{aligned} E[w_1 h_1 - w_0 h_0] &= E[w_1 h_1 - w_1 h_0 + w_1 h_0 - w_0 h_0] \\ &\equiv E[w_1 \Delta h + h_0 \Delta w] \end{aligned}$$

- If wages for people who work without SSP are unaffected by SSP:

$$E[h_0 \Delta w] = E[w_1 - w_0 | h_0 = 1] P(h_0 = 1) = 0$$

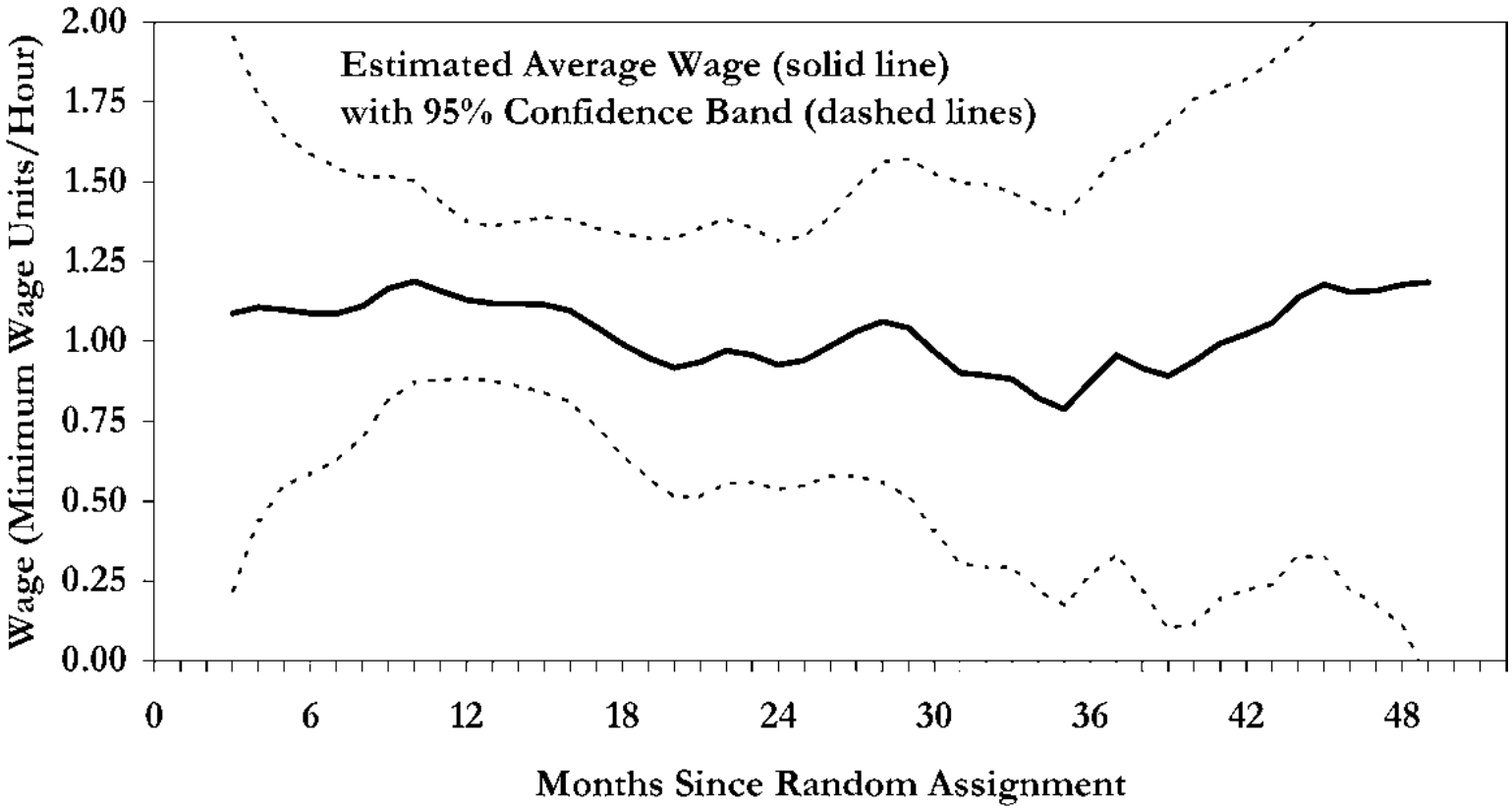
- If SSP only has positive effects on labor supply ($P(\Delta h \geq 0) = 1$)

$$\frac{E[w_1 h_1 - w_0 h_0]}{E[h_1 - h_0]} = E\left[w_1 \frac{\Delta h}{E[\Delta h]}\right]$$

  is a properly-weighted average of wages earned by people in the program group, weighted by the increase in hours caused by SSP

- Look familiar, 14.387 students?

Average Rate of Pay



- $\frac{E[w_1 h_1 - w_0 h_0]}{E[h_1 - h_0]}$ is IV (with a weak first stage for $t \leq 6$, $t \geq 18$)

Unpacking the Effect of SSP

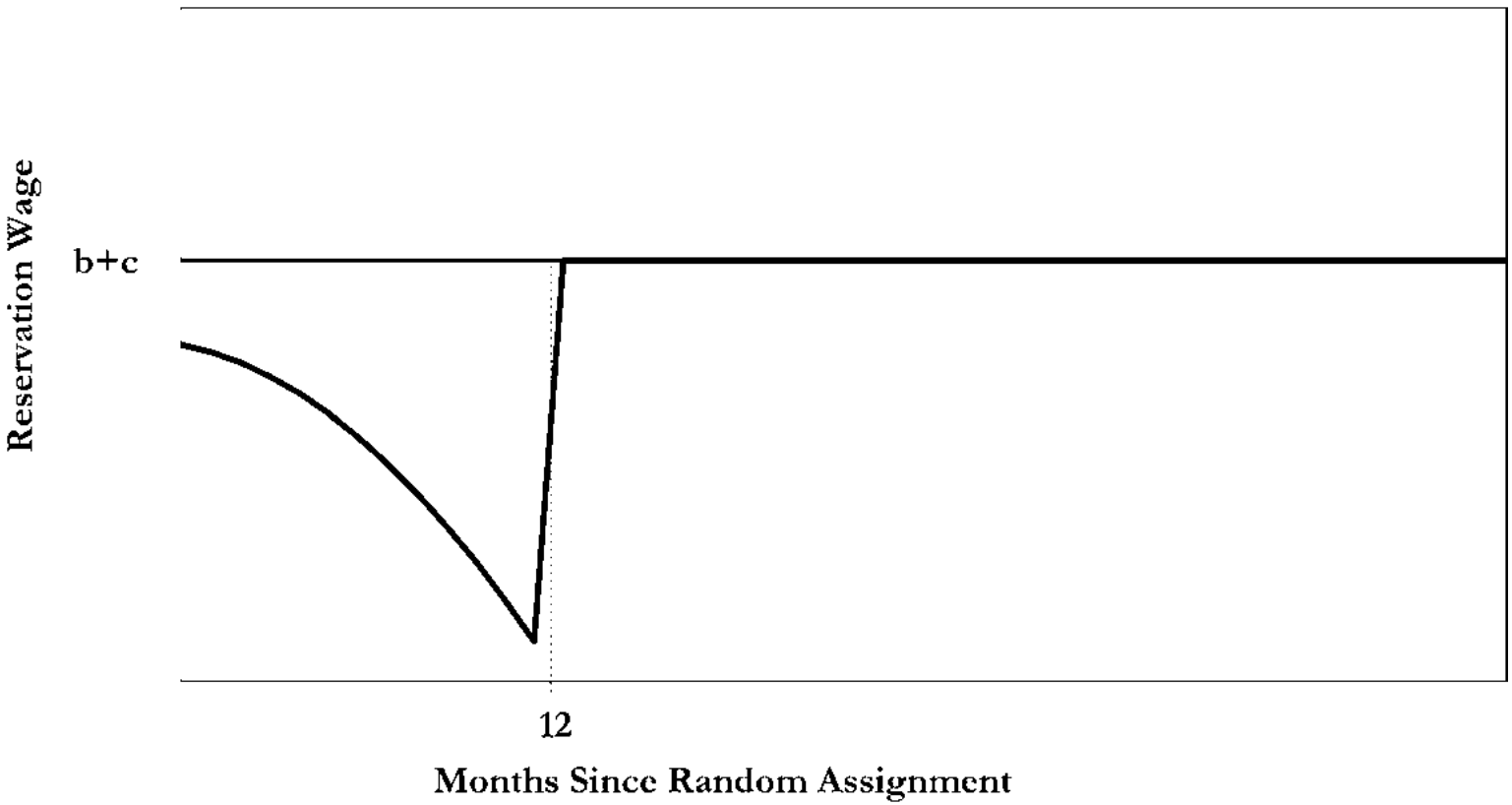
- SSP offer introduces two phases of incentives:
  - "Establishment" effect: incentive to find a full-time job within a year to establish SSP eligibility (SSP-specific)
  - "Entitlement" effect: incentive to choose work over welfare once eligibility is achieved (common to NITs)
- We want to isolate the entitlement effect, but can't condition on (nonrandom) date of establishment
- Motivates a dynamic model of labor force participation (i.e. search)

A Benchmark Search Model

- Welfare yields flow payoff of b
- Full-time employment at wage w yields flow payoff of $w - c$
- Job offers arrive at rate λ (same for workers and non-workers), destroyed at rate δ
- Wages drawn *iid* from distribution $F(w)$
- Individuals maximize expected future income at discount rate r

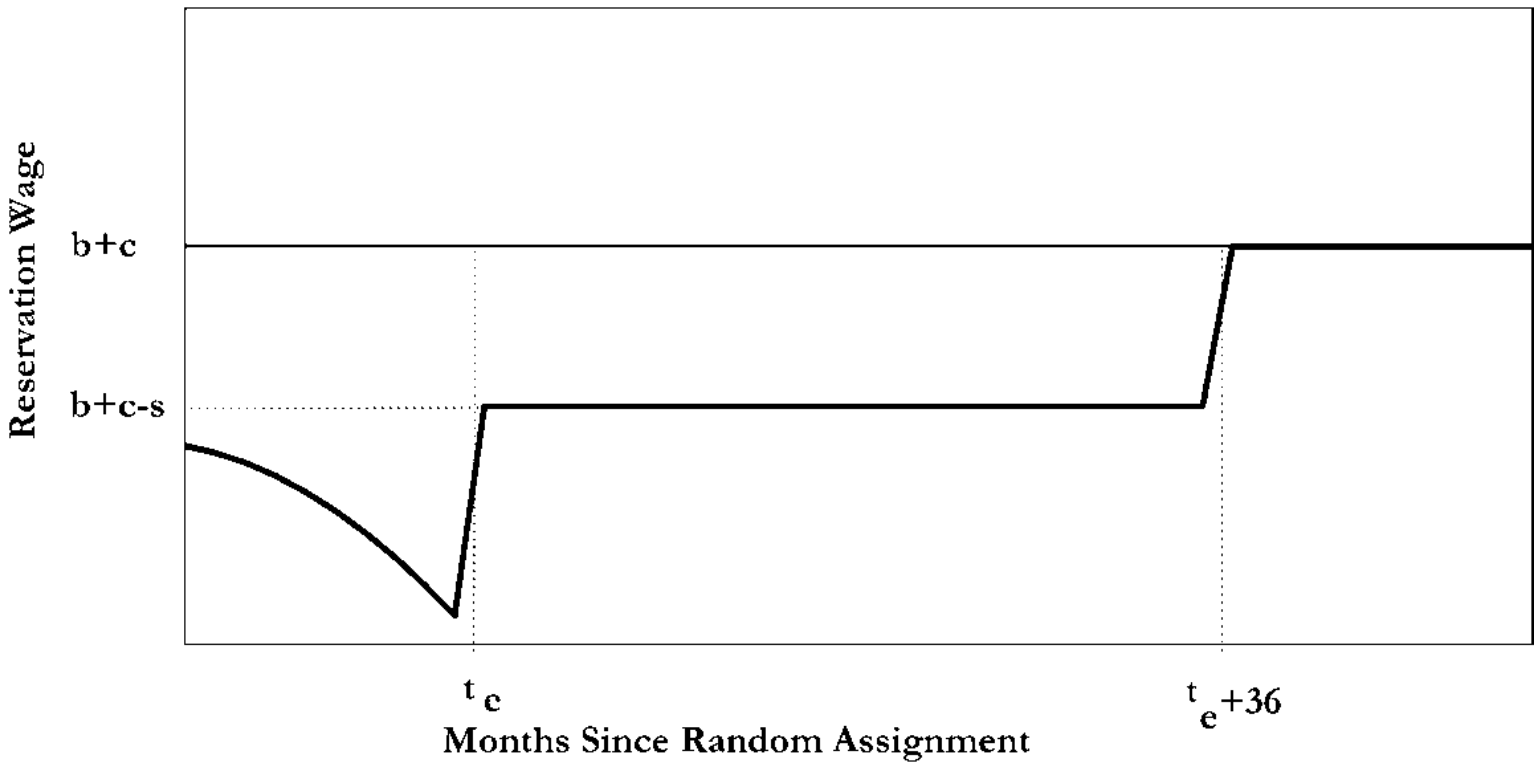
  $\Longrightarrow$ Reservation wage: $b + c$
  $\Longrightarrow$ Exit rate from welfare: $\lambda(1-\delta)(1-F(b+c))$

Search with SSP: Offered and Ineligible



- Reservation wage at $t = 0$ strictly lower than $b + c$ (why?)
- Strictly decreasing in $t \in [1, 12]$ (why?)
- Jumps to $b + c$ at $t = 12$ to $b + c$ (why?)

Search with SSP: Offered and Eligible



- With eligibility, reservation wage fixed at R s.t. $R + s(R) = b + c$, where $s(\cdot)$ is the subsidy profile
- Mass quits at t_e and $t_e + 36$ (why?)

Modeling Search without SSP

- Let $y_{it} = 1$ if individual i receives welfare in month $t = 1, \ldots, T$

$$
\begin{aligned}
&P(y_{i1}, \ldots, y_{iT} | x_{i1}, \ldots x_{iT}) \\
&= \int \prod_t L(\alpha_i + x_{it}\beta + (\gamma_{10} + \gamma_{11}\alpha_i) y_{it-1} \\
&+ (\gamma_{20} + \gamma_{21}\alpha_i) y_{it-2} + (\gamma_{30} + \gamma_{31}\alpha_i) y_{it-1} y_{it-2})) dF(\alpha_i)
\end{aligned}
$$

- L is a logit and $F(\cdot) = \Phi(\cdot)$ (let α_i be discrete as a robustness check)
- Single dimension of unobserved heterogeneity, constant effects for x_{it}
- Classical search has exit/entry rates independent of the length of the current spell, but second-order state dependence fits better
- Drop small number of individuals not on welfare at baseline: take initial conditions as fixed (Heckman, 1981)

Modeling Search with SSP Offers

- Let $E_{it} = 1$ denote eligibility for SSP in month t and t_i^e be the month eligibility is achieved
- Assume welfare receipt and eligibility are only correlated through α_i:

$$P(y_{i1}, \ldots, y_{iT}, E_{i1}, \ldots E_{iT} | x_{i1}, \ldots x_{iT})$$
$$= \int \prod_t P(y_{it}, E_{it} | y_{it-1}, y_{it-2}, \ldots, E_{it-1}, E_{it-2}, \ldots, x_{it}, \alpha_i) dF(\alpha_i)$$

- Random assignment: $F(\alpha_i)$ same for offered/not-offered
- Assume E_{it} independent of current/lagged welfare status conditional on α_i and x_{it} and that y_{it} depends only on current eligibility, eligibility duration, and two lags of welfare status:

$$P(y_{it}, E_{it} | y_{it-1}, y_{it-2}, \ldots, E_{it-1}, E_{it-2}, \ldots, x_{it}, \alpha_i)$$
$$= P(E_{it} | E_{it-1}, E_{it-2}, \ldots, x_{it}, \alpha_i) P(y_{it} | y_{it-1}, y_{it-2}, E_{it}, t_i^e, x_{it}, \alpha_i)$$

- $P(E_{it} | E_{it-1}, E_{it-2}, \ldots, x_{it}, \alpha_i)$ modeled by a hazard of $\Phi(f(t) - g(\alpha_i))$

Distinguishing "Establishment" from "Entitlement"

- Assume welfare participation for offered is

$$
\begin{aligned}
&P(y_{it}|y_{it-1}, y_{it-2}, E_{it}, E_{it-1}, \ldots x_{it}, \alpha_i) \\
&= L(\alpha_i + x_{it}\beta + \tau(t, E_{it}, t_i^e, y_{it-1}) + (\gamma_{10} + \gamma_{11}\alpha_i)y_{it-1} \\
&+ (\gamma_{20} + \gamma_{21}\alpha_i)y_{it-2} + (\gamma_{30} + \gamma_{31}\alpha_i)y_{it-1}y_{it-2})
\end{aligned}
$$

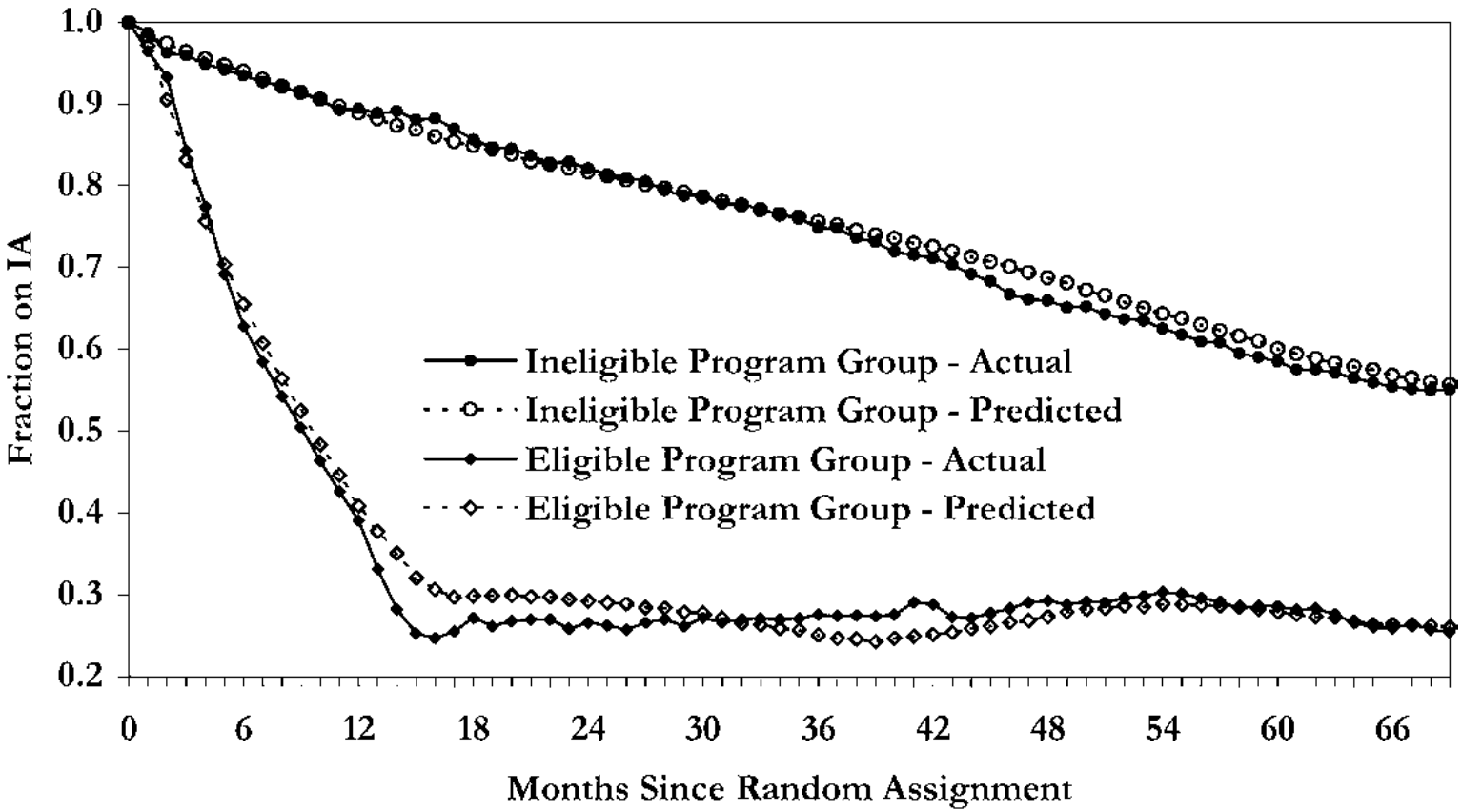
- $\tau(t, E_{it}, t_i^e, y_{it-1})$: behavioral impact of SSP (i.e. the treatment effect)

$$
\begin{aligned}
&\tau(t, E_{it}, t_i^e, y_{it-1}) \\
&= E_{it}\mathbf{1}\{t \in [t_i^e, t_i^e + J - 1]\} \\
&\times ((\psi_{00} + \psi_{01}\alpha_i)\mathbf{1}\{y_{it-1} = 0\} + (\psi_{10} + \psi_{11}\alpha_i)\mathbf{1}\{y_{it-1} = 1\}) \\
&+ E_{it}\mathbf{1}\{t \in [t_i^e + J, t_i^e + 35]\} \\
&\times ((\lambda_{00} + \lambda_{01}\alpha_i)\mathbf{1}\{y_{it-1} = 0\} + (\lambda_{10} + \lambda_{11}\alpha_i)\mathbf{1}\{y_{it-1} = 1\})
\end{aligned}
$$

  where $J = 3$ is the duration of a "transition period"

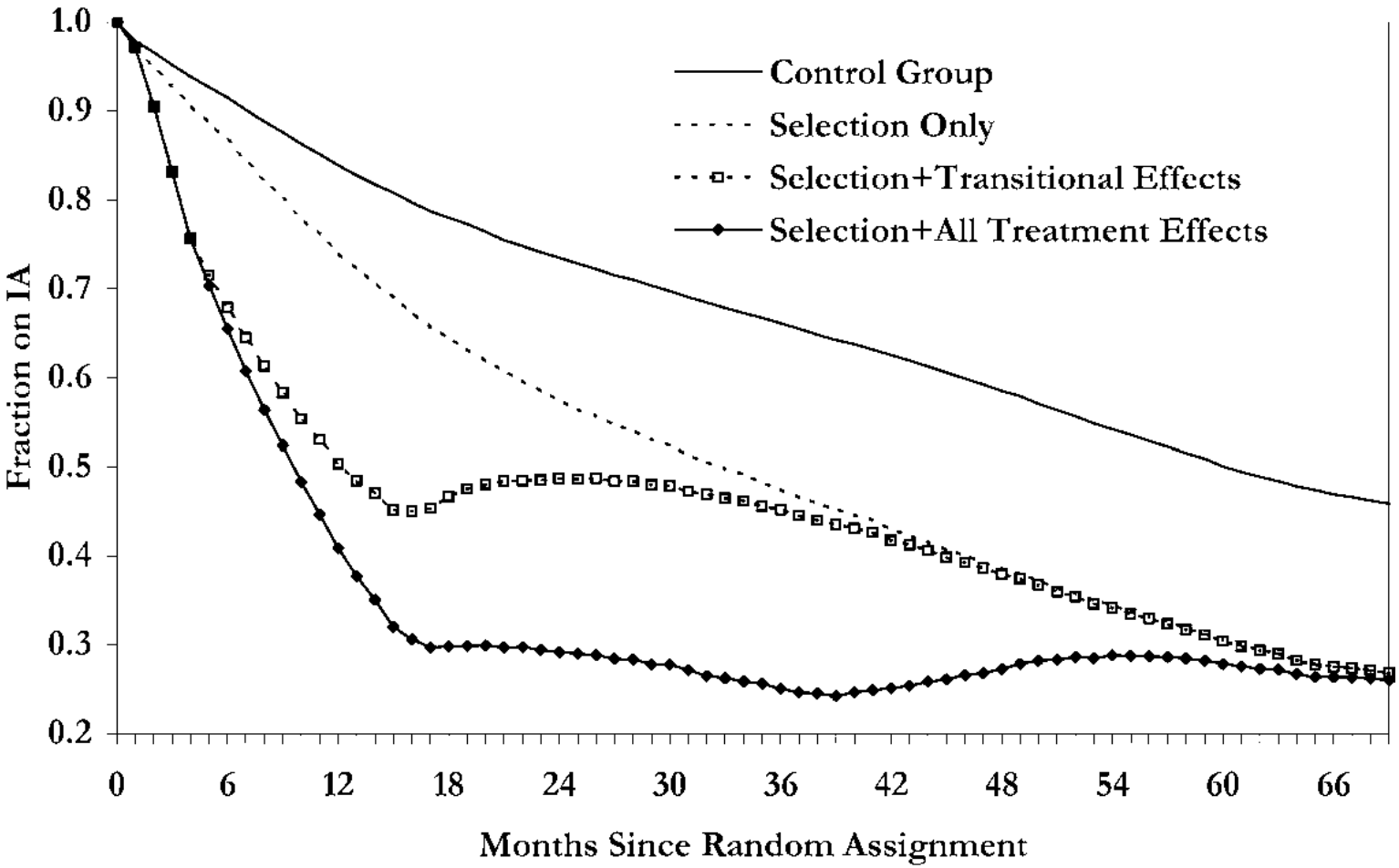
- λ capture "entitlement" effects

Model Fit



- Similar γ estimates for treatment and control (reassuring)
- Large ψ_{11}: significant treatment effect heterogeneity (worrying?)

Decomposition of Effects



Main Takeaways

- This is an ambitious, careful paper that pushes out the "reduced form" frontier (increasingly what is expected from empirical JMPs!)
- Somewhat unclear how much the assumptions are driving the results (lot of ad-hoc modeling choices to improve fit)
- Still, cleaner than many pre-"credibility revolution" papers
  - Main dynamics very intuitive
  - Main identification the gold standard
- Could probably have pushed out even further (some counterfactual analysis, but to do that properly C&H need a full structural model)

14.662 Labor Economics II

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