The Optimal Timing of Unemployment Benefits: Theory and Evidence from Sweden

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Motivation

- Social Insurance/Transfer Programs specify a **full time profile** of benefits
  - not just a benefit level or some benefit duration
- Policy debate: pressure for **steeper UI profiles**
  - debate lacks evidence-based arguments
  - opposite to SI practice: insure large rather than small risks
- Sufficient statistics literature on "average" generosity of UI

  $\Rightarrow$ *empirical implementation, but silent about optimal timing*
- Theoretical literature on optimal timing of UI

  $\Rightarrow$ *insights are model-dependent and hard to connect to data*

This Paper

We revisit the optimal timing of UI and provide:

(1) a **simple** characterization

(2) in a **general** framework

(3) that connects to **data**

Theory: Simple and General

- Consider dynamic model of unemployment (with search, consumption, heterogeneity, duration dependence,...)
- Baily ['78] intuition generalizes for UI benefit b_t paid at *any* unemployment duration t:
  1. *insurance gain* depends on the drop in consumption at t
  2. *incentive cost* depends on the (full) survival function response to b_t

  $\Rightarrow$ simple to evaluate welfare gain from changing benefits profile
- Identifying underlying primitives is not necessary (Chetty '06, '09)
- Still, model allows to evaluate separate arguments for increasing or decreasing profiles.

Empirics I: Consumption Profile

- Limited evidence of unemployment impact on consumption (Gruber '97)
  - survey data on consumption (small samples, measurement error,...)
  - limited ability to observe unemployment status and duration
- We use unique **admin data on income and wealth** in Sweden to obtain residual measure of yearly expenditures linked to unemployment spells in **UI registers**
- Consumption drops significantly when unemployed:
  - consumption is 22% lower during first six months of unemployment and 25% thereafter
  - pattern results from limited ability to smooth consumption

Empirics II: Survival Function Responses

- Extensive analysis of unemployment duration responses
  - focus on responses in average unemployment duration
  - limited attention for timing of benefits
- We exploit variation in the time profile of unemployment benefits in Sweden and consider the impact on the survival function
- The estimated incentive cost of increasing benefits is high overall ($\varepsilon \approx 1$), but particularly large for ST benefits ($\varepsilon \approx 2$)
- Accounting for the consumption drop, our results indicate a large welfare gain from decreasing ST benefits relative to LT benefits

Outline

- Dynamic Theory: Identifying Sufficient Statistics
- Data & Context
- Empirics I: Consumption profiles
- Empirics II: Survival function responses
- Policy & Welfare

Setup: Workers' Behavior

- Dynamic model of unemployment: focus on worker's behavior
- Each individual i optimizes her job search strategy (e.g., effort, reservation wage)
  - results in an exit rate out of unemployment $h_{i,t}$ at each duration t
  - observed survival function equals

$$S(t) = \Sigma_{i=1}^{N} \left[\Pi_{s=0}^{t} (1 - h_{i,s}) \right] / N$$

- Each individual i optimizes intertemporal consumption
  - results in consumption level c_i^e and $c_{i,t}^u$ when employed and unemployed
  - observed unemployment consumption at duration t

$$C^u(t) = \Sigma_{i=1}^{N} \left[\frac{S_i(t)}{S(t)} \times c_{i,t}^u \right] / N$$

Setup: Unemployment Policy

- We consider policies of the form $(b_1, b_2, ...)$ providing UI benefit b_1 for the first B_1 periods of unemployment, b_2 for the next $B_2 - B_1$ periods etc.
- The benefits are paid by a uniform tax τ on the employed.
- The average unemployment duration equals sum of survival rates at each duration:

$$D = \Sigma_t S(t) = \underbrace{\Sigma_0^{B_1} S(t)}_{=D_1} + \underbrace{\Sigma_{B_1}^{B_2} S(t)}_{=D_2} + .. + \underbrace{\Sigma_{B_{n-1}}^{T} S(t)}_{=D_n},$$

where D_i is the average duration spent receiving benefit b_i.

Illustrating for a Two-Part Policy

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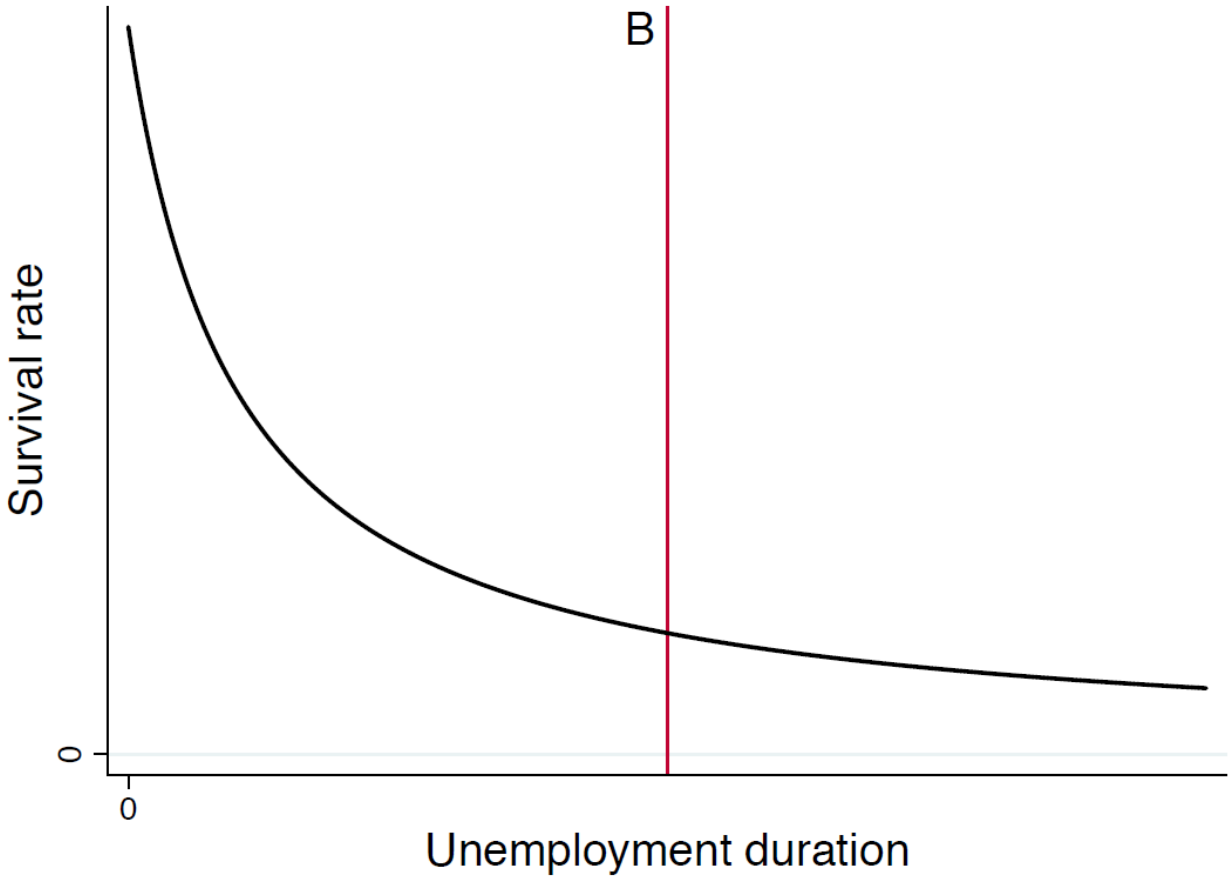

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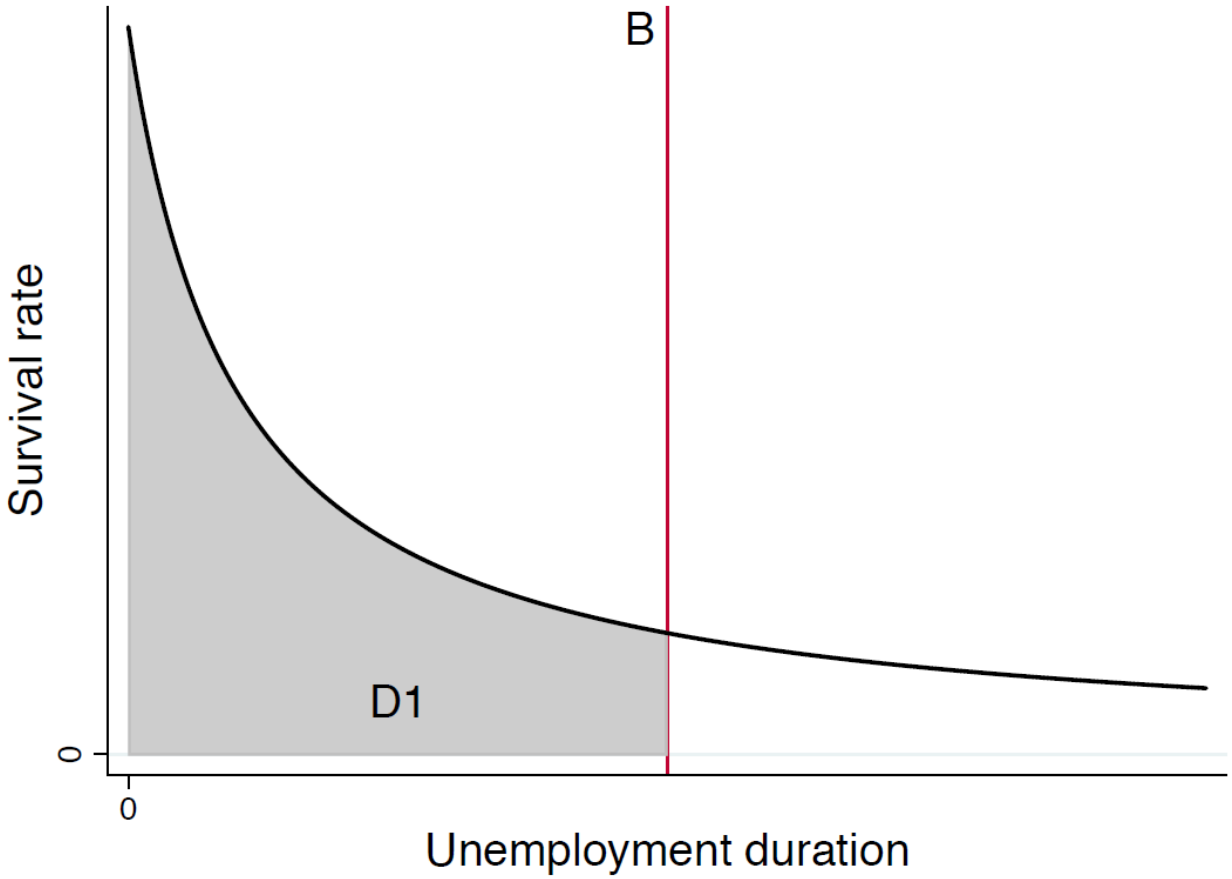

Illustrating for a Two-Part Policy

Setup: Welfare

- The optimal unemployment policy solves

$$\max_{\mathbf{b},\tau} \quad \Sigma_i \mathcal{U}_i(\mathbf{b},\tau) \text{ for } \mathcal{U}_i(\mathbf{b},\tau) = \max_{\tilde{x}_i} U_i(\tilde{x}_i|\mathbf{b},\tau)$$

such that $[T - D] \cdot \tau = D_1 \cdot b_1 + D_2 \cdot b_2 + .. + D_n \cdot b_n$.

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- Baily-Chetty benchmark: the **optimal flat profile** b solves

$$\underbrace{\frac{E\left[u'\left(c^u\right)\right]-E\left[u'\left(c^e\right)\right]}{E\left[u'\left(c^e\right)\right]}}_{=\mathbf{CS_b}} = \underbrace{\varepsilon_{D,b}}_{=\mathbf{MH_b}}. \tag{1}$$

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- **Key insight** ($\sim$ Env. Thm): behavioral responses have *first-order* welfare effect through the fiscal externality only

Theory: Dynamic Baily

- Baily formula generalizes for any n-part policy. Two-part example;

$$\text{for } b_1 : \frac{E\left[u'\left(c^u\right)|t \leq B\right] - E\left[u'\left(c^e\right)\right]}{E\left[u'\left(c^e\right)\right]} = \varepsilon_{D_1,b_1} + \frac{b_2 D_2}{b_1 D_1} \cdot \varepsilon_{D_2,b_1}$$

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$$\text{for } b_2: \frac{E\left[u'\left(c^u\right)|t > B\right] - E\left[u'\left(c^e\right)\right]}{E\left[u'\left(c^e\right)\right]} = \frac{b_1 D_1}{b_2 D_2} \cdot \varepsilon_{D_1,b_2} + \varepsilon_{D_2,b_2}$$

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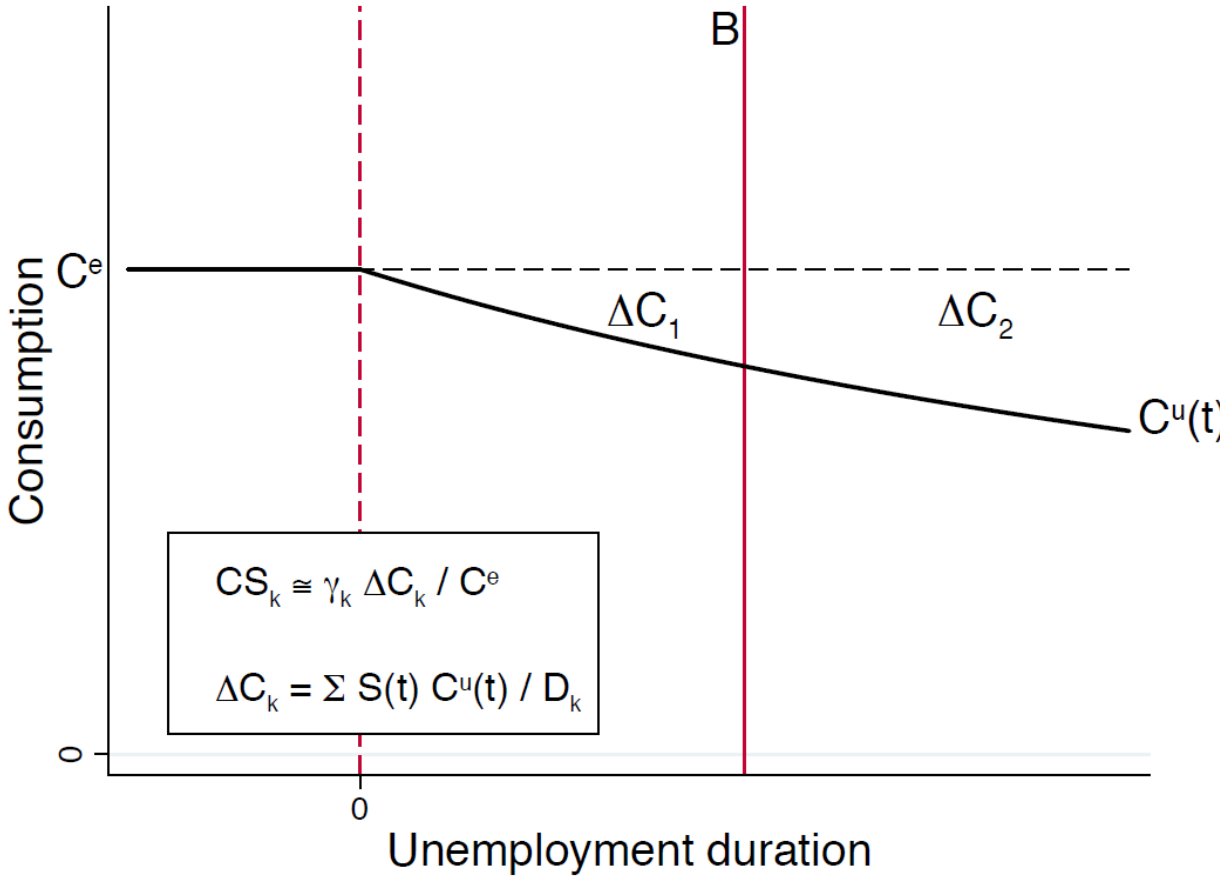
- Envelope conditions still apply. S*ufficient* to consider for each benefit level b_i:
  - the gain CS_{b_i}: (direct) effect depending on the consumption drop
  - the cost MH_{b_i}: (behavioral) effect captured by the benefit duration elasticities

Sufficiency of Consumption Drop



Sufficiency of Cross-Duration Elasticities

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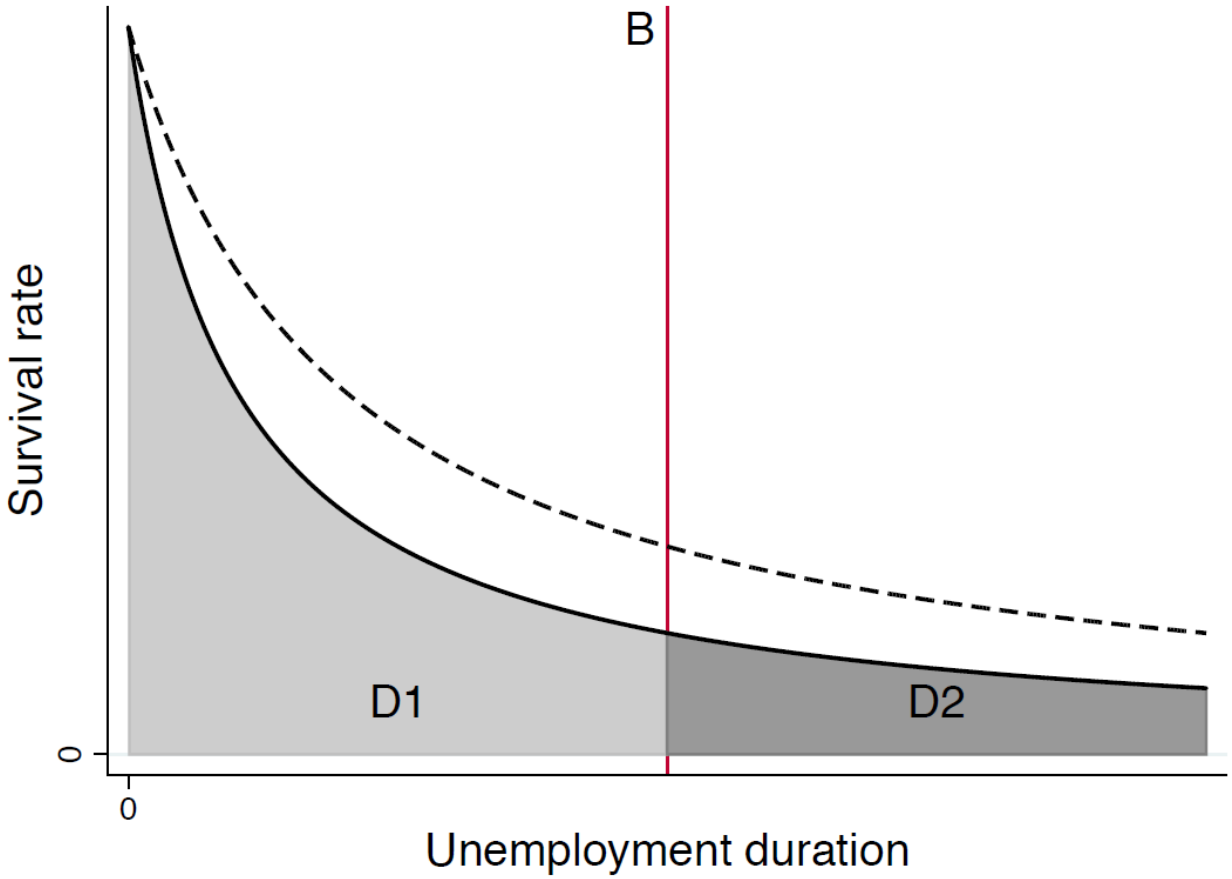

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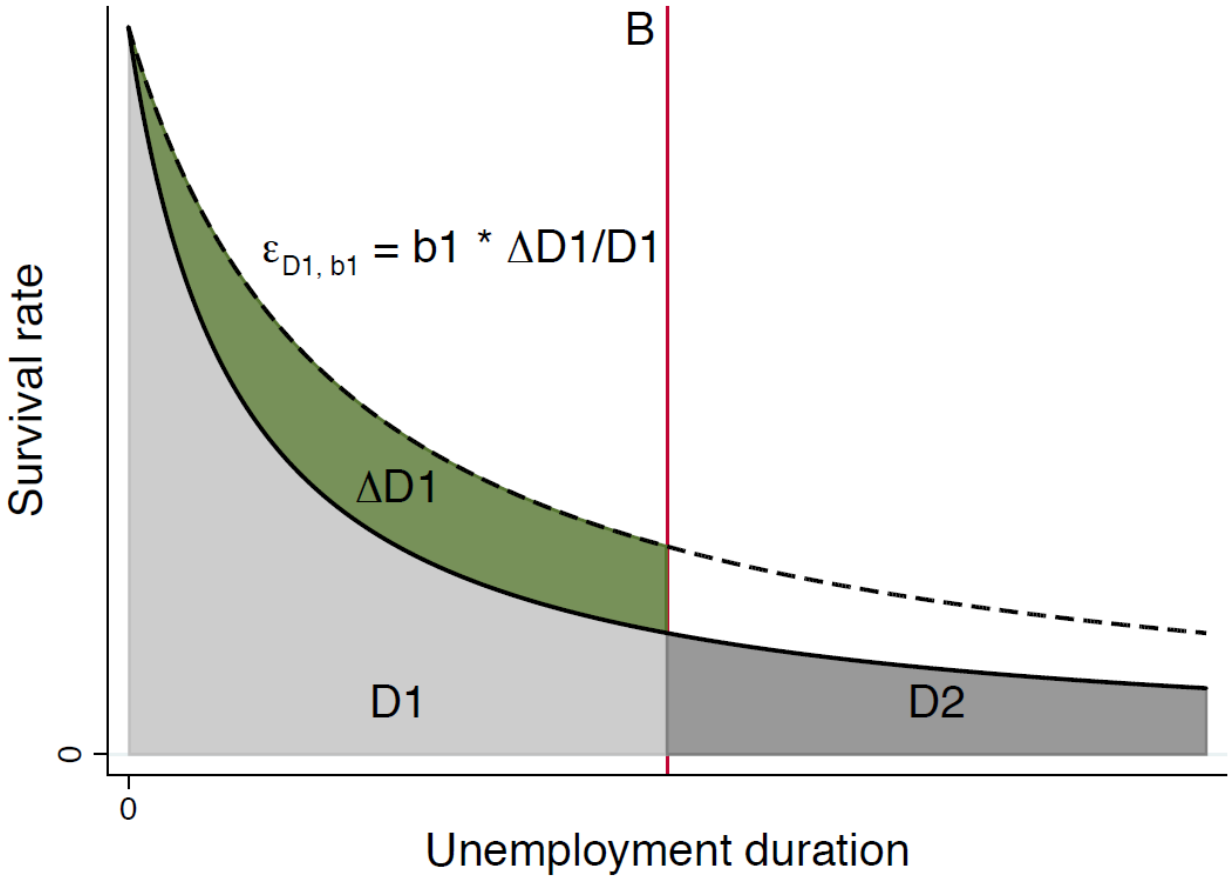

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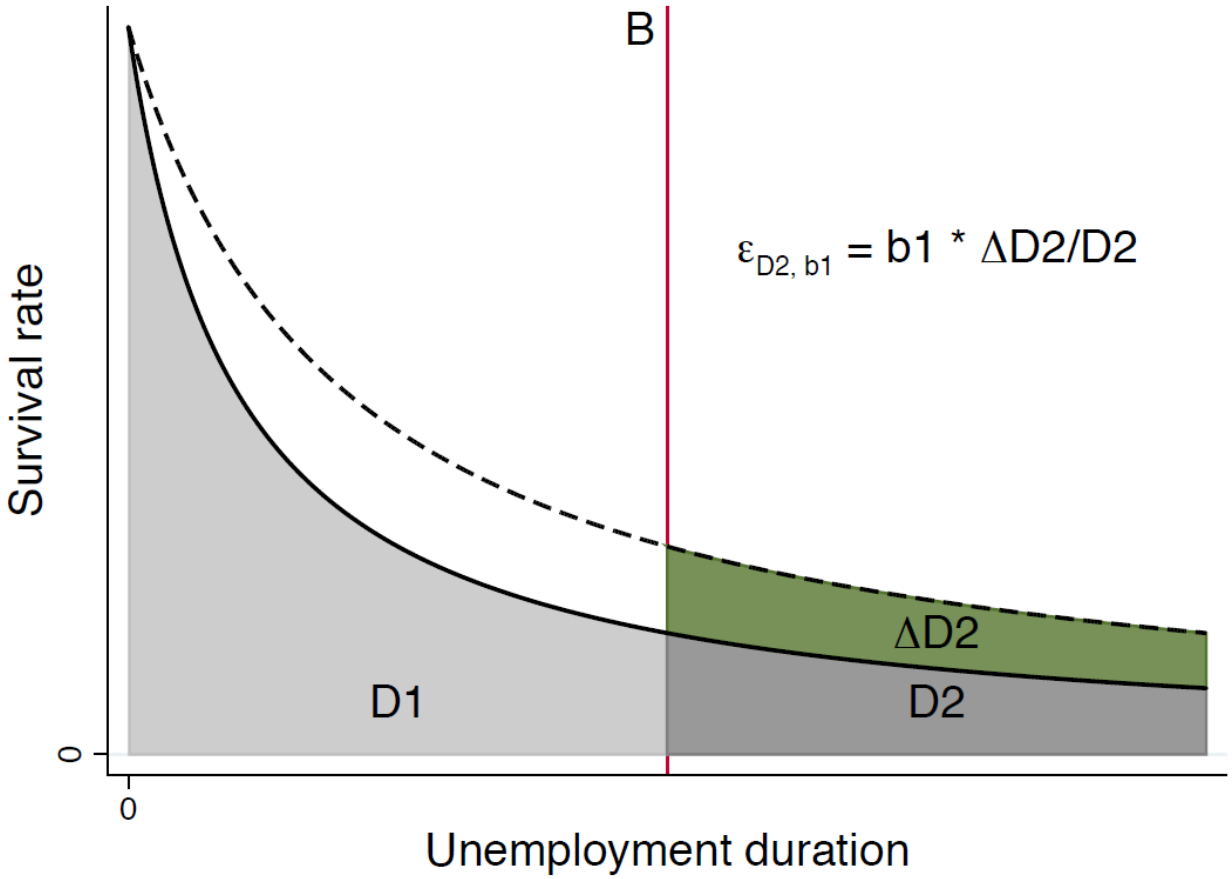

Revisiting Previous Theoretical Results

- For constant CS_{b_k} and MH_{b_k} over the spell $\Rightarrow$ *constant* benefits are optimal
- F**orward-looking** behavior: ST unemployed responding to LT benefits (Shavel&Weiss '79, Hopenhayn&Nicolini '97,...)
  - MH_{b_k} increasing in $k \Rightarrow$ *declining* benefits
- A**ssets**: unemployed draw down assets during unemployment (Werning '02, Shimer&Werning '08,...)
  - CS_{b_k} increasing in $k \Rightarrow$ *inclining* benefits
- Relax **stationarity**: duration-dependence and heterogeneity (Pavoni '09, Shimer&Werning '09)
  - MH_{b_k} may well be decreasing in $k \Rightarrow$ *inclining* benefits
  - CS_{b_k} may well be decreasing in $k \Rightarrow$ *declining* benefits

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- **Data & Context**
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Context and Data

- Universe of unemployment spells from unemployment registers in Sweden (1999-2013)
- Income and wealth registers for full Swedish population (2003-2007)
- Unemployment benefits replace 80% of pre-unemployment wage, but are capped at a threshold close to the median wage
- Unemployment benefits can be received forever. Participation into ALMP is required after 60 or 90 wks of unemployment.

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Consumption Measure using Admin Data

- Simple idea: residual measure of consumption/expenditures

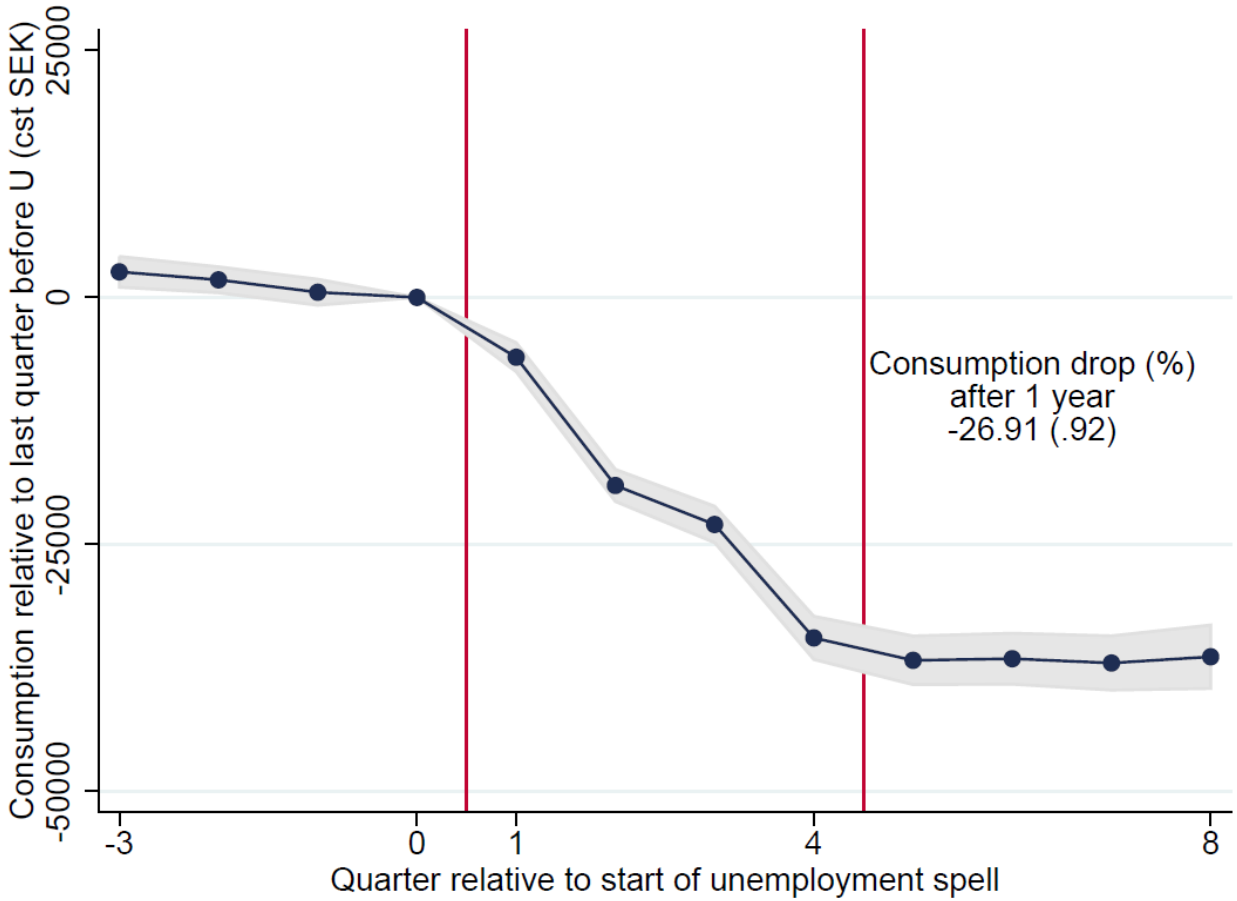
$$c_t = y_t + y_t^b - \Delta b_t - y_t^d + \Delta d_t + y_t^v - \Delta v_t - \Delta h_t$$

- We use admin data from (third-party reported) tax returns on income y, outstanding debt d, on bank savings b, other financial assets v. We ignore (for now) rebalancing of other financial assets Δv and housing Δh.

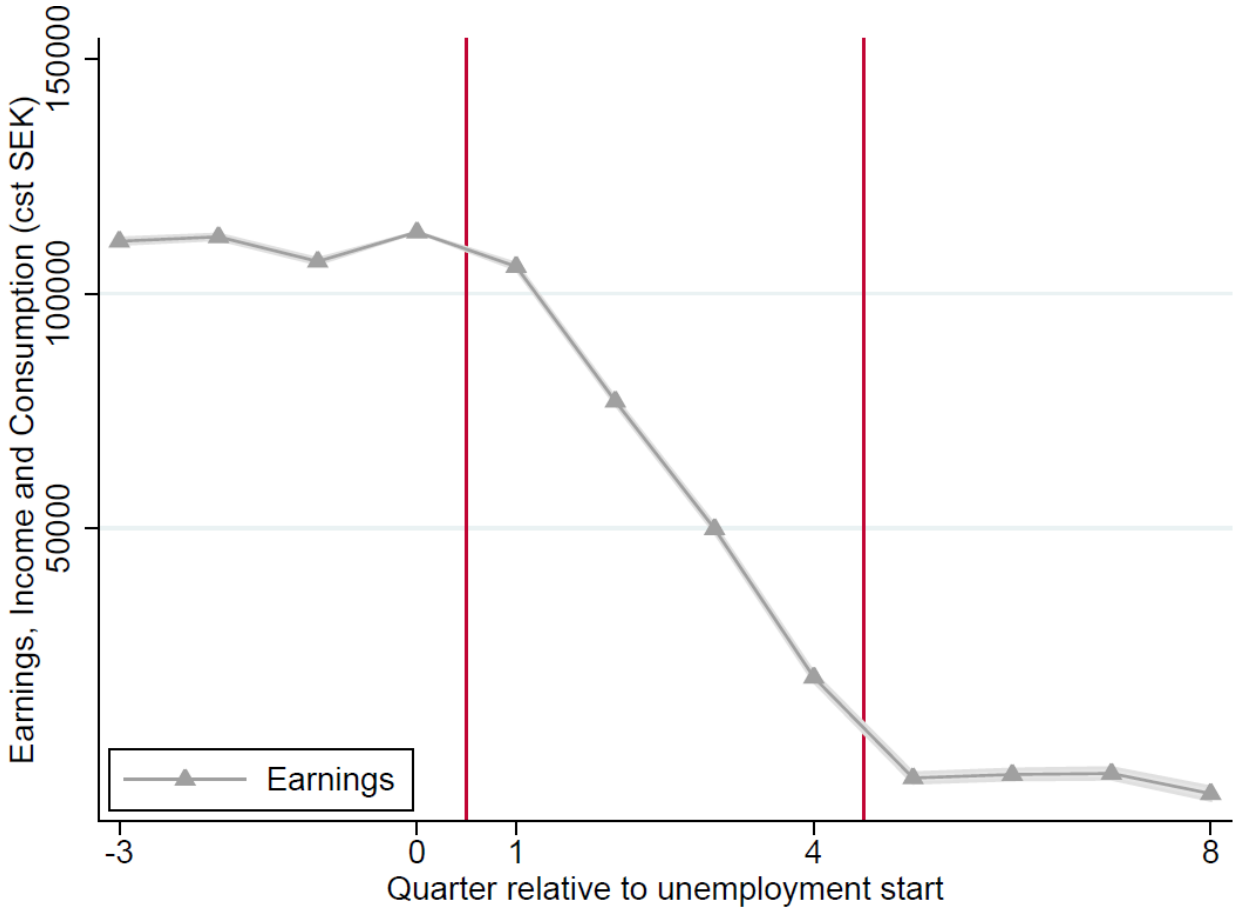
- Using stocks at the end of the year and flows for the past year, we construct yearly consumption C and correlate this with spell length t in Dec

- Koijen et al. ['11] and Kreiner et al. ['12] checked consistency with consumption survey data in Sweden and Denmark

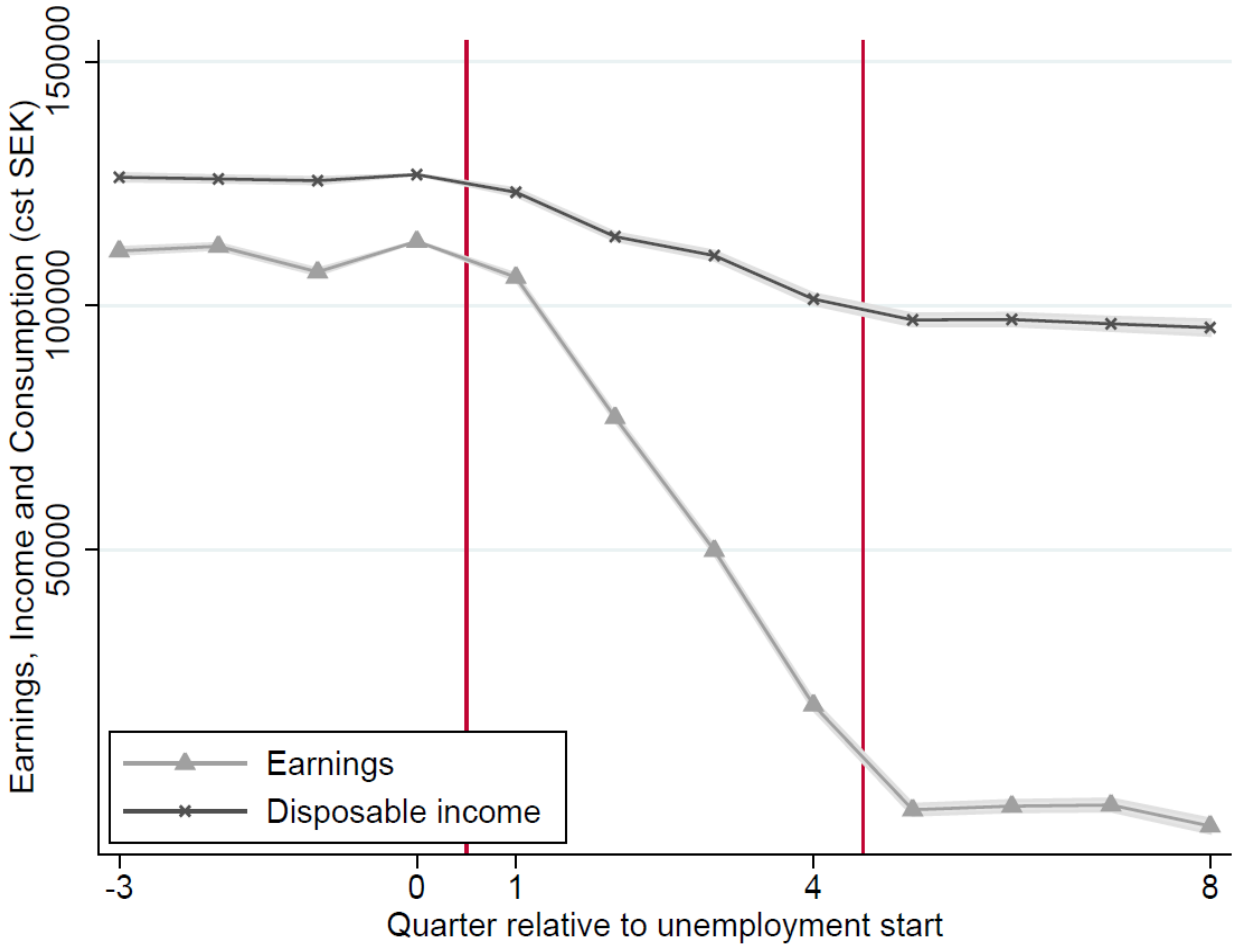
Yearly Consumption over the Spell



Decomposing Consumption over the Spell



Decomposing Consumption over the Spell



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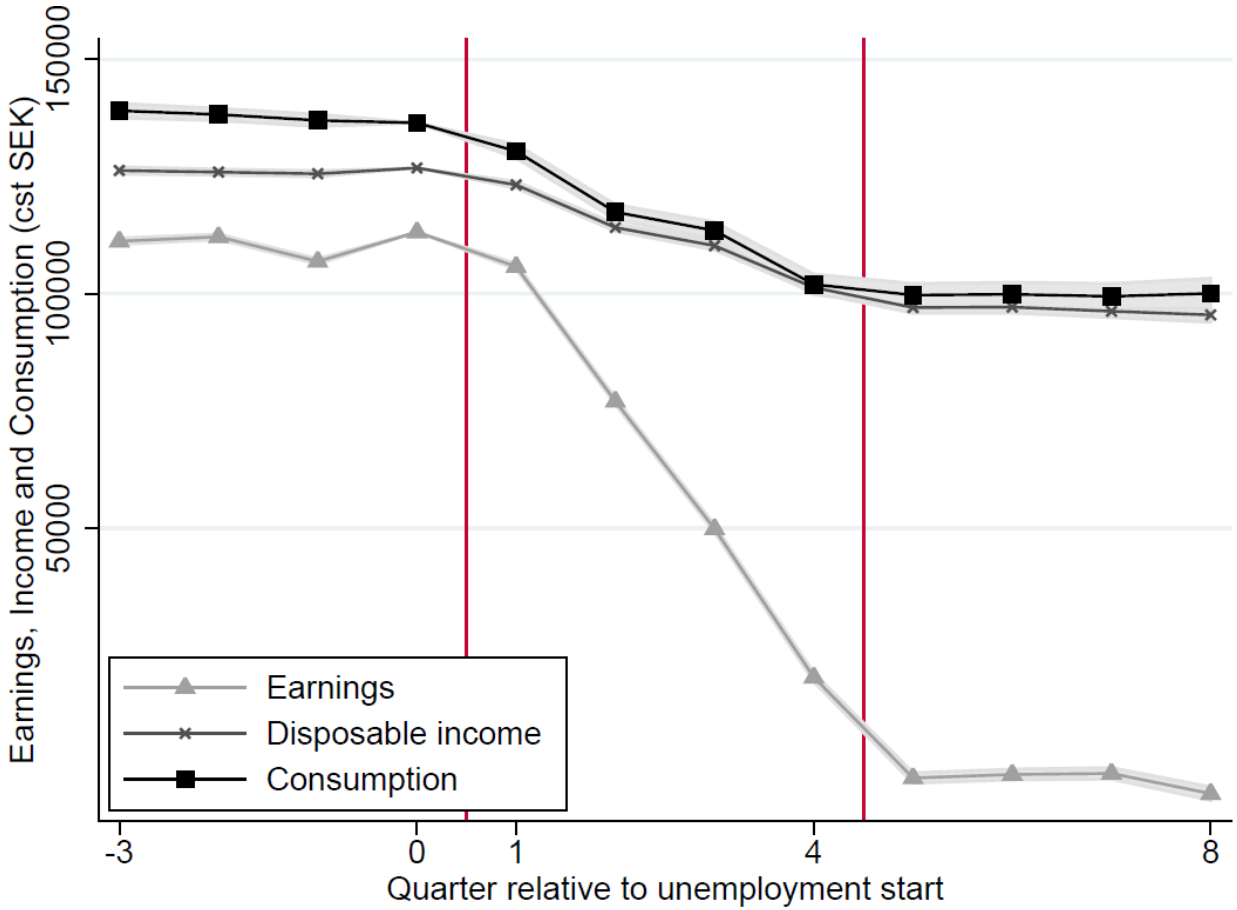
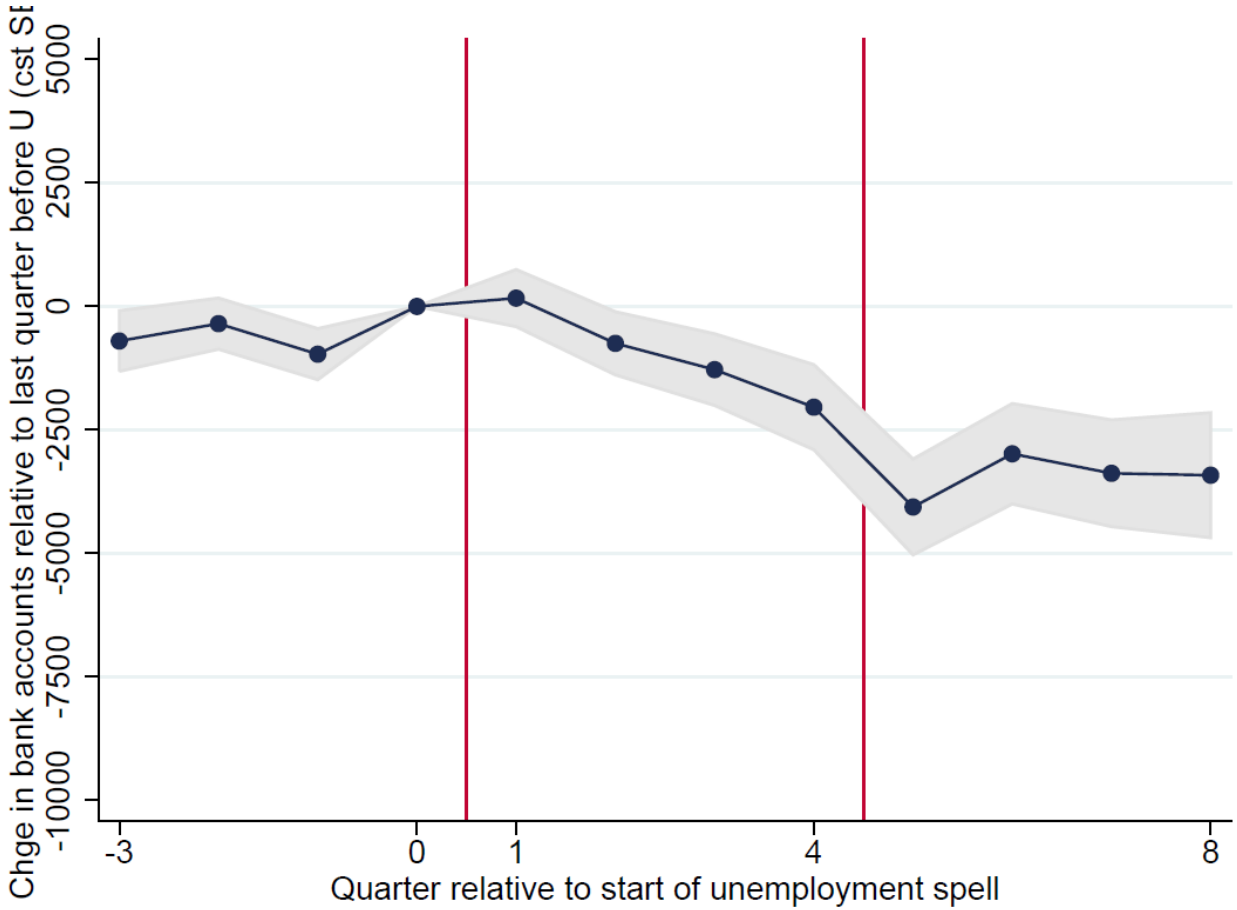
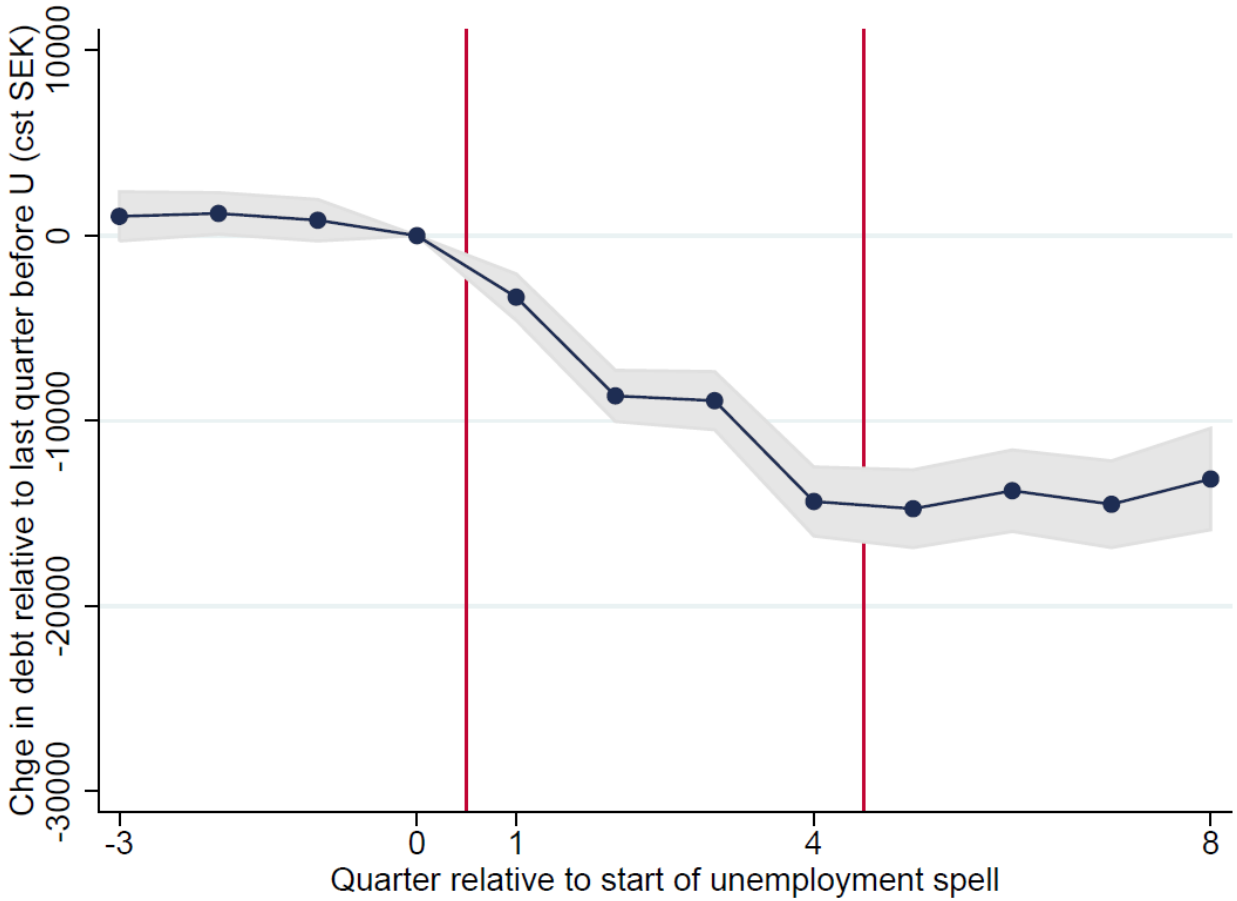


Bank Withdrawals over the Spell



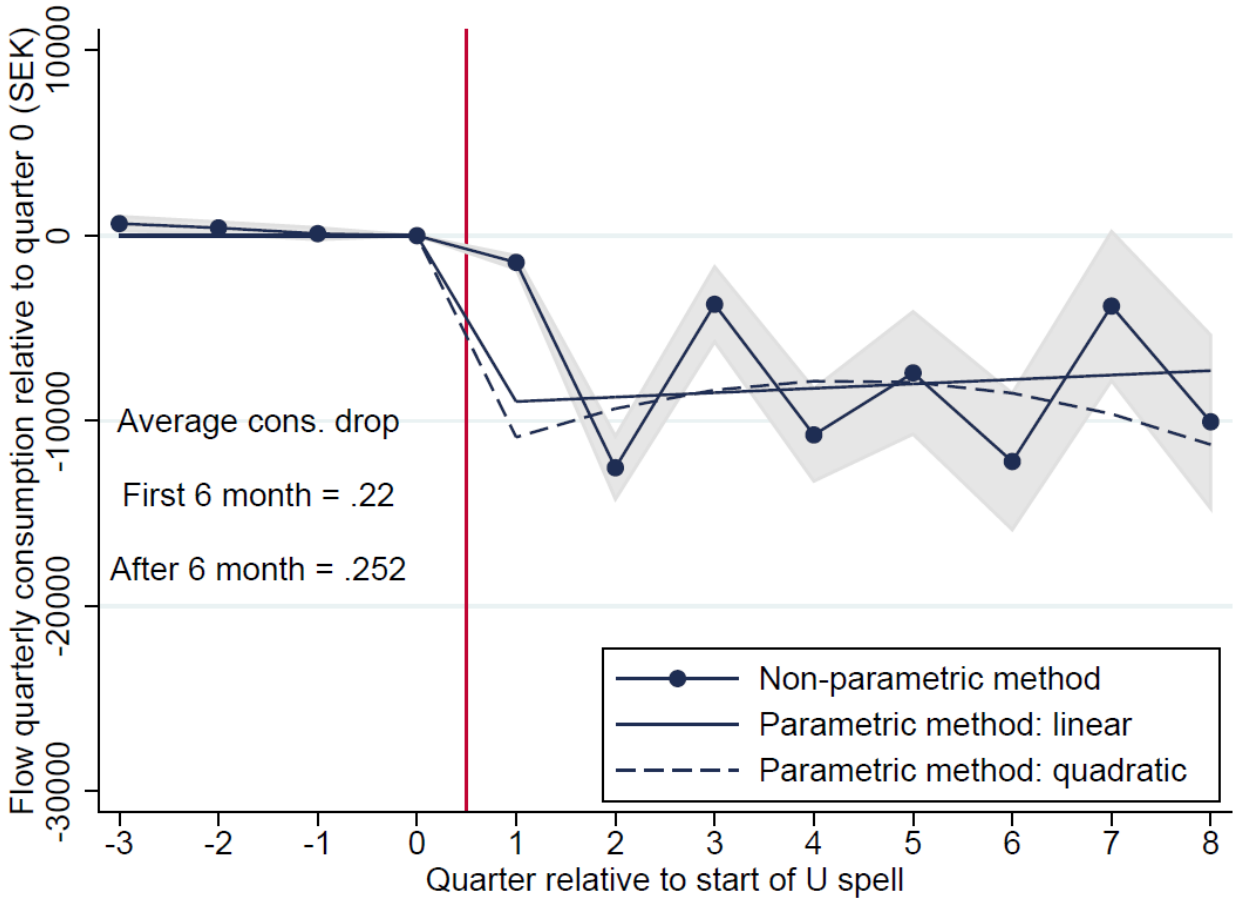
Debt Increases over the Spell



Recovering Higher-Frequency Consumption

- Can we recover high-frequency unemployment consumption c_t from yearly aggregates?
  - we observe consumption at different spell lengths t, but aggregated over the past year (e.g., $C_t = \sum_{q=0}^{3} c_{t-q}$)
  - yearly measure mixes c^e and c^u for spells shorter than a year
- Parametric approach:
  - specify parametric function for c_t depending on the unemployment length
- Non-parametric approach:
  - use differences $C_t - C_{t-1} = c_t - c_{t-4}$ and $c_t = \bar{c}$ before unemployment

Quarterly Consumption over the Spell



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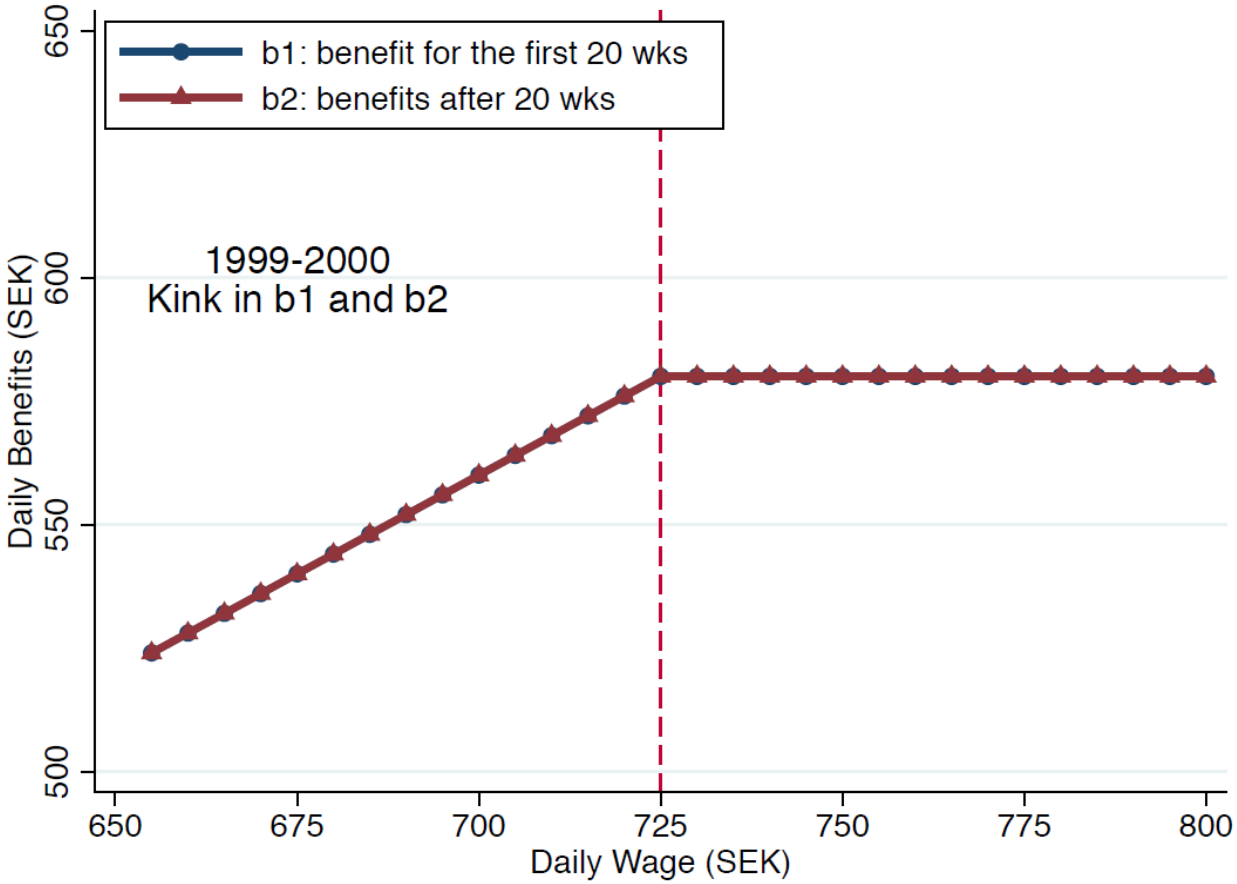
Regression Kink: Duration-dependent Benefit Cap



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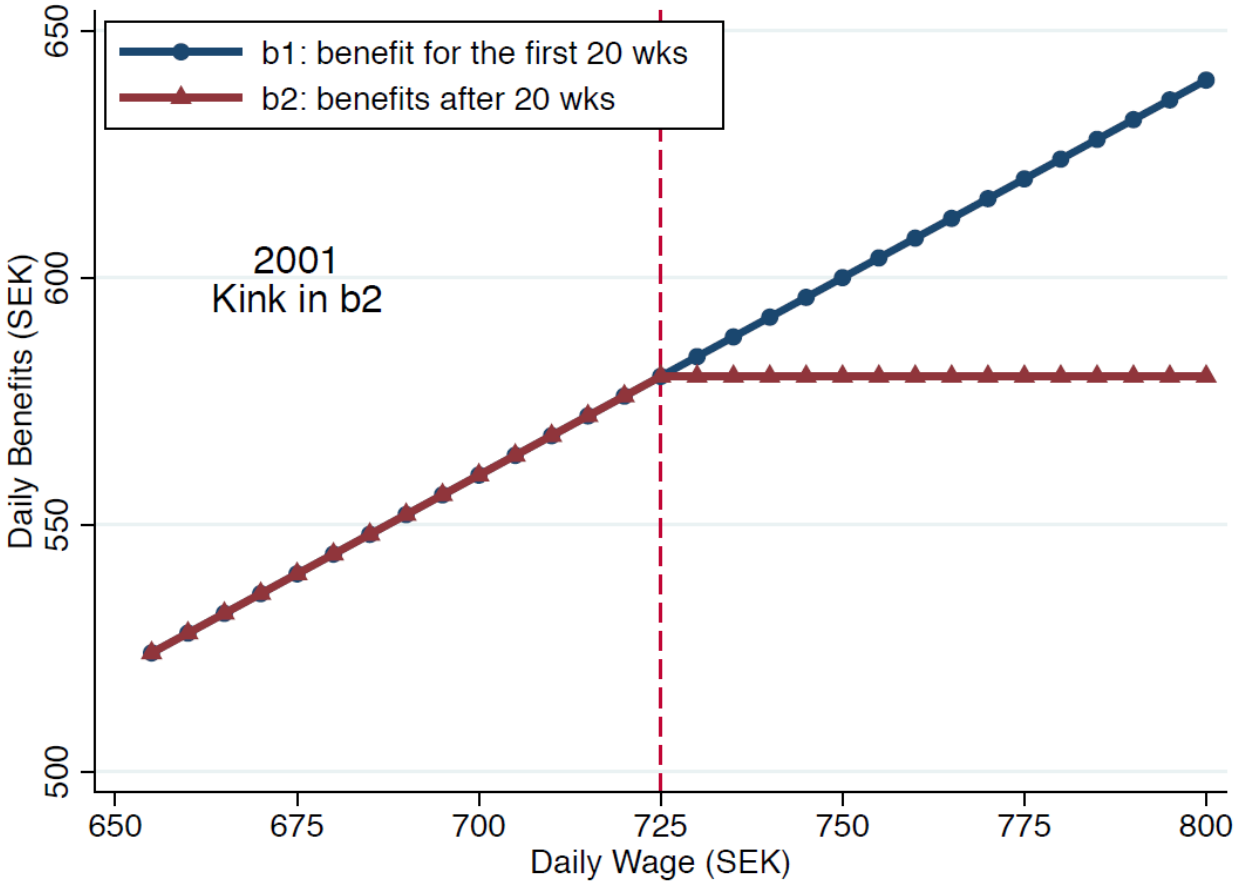

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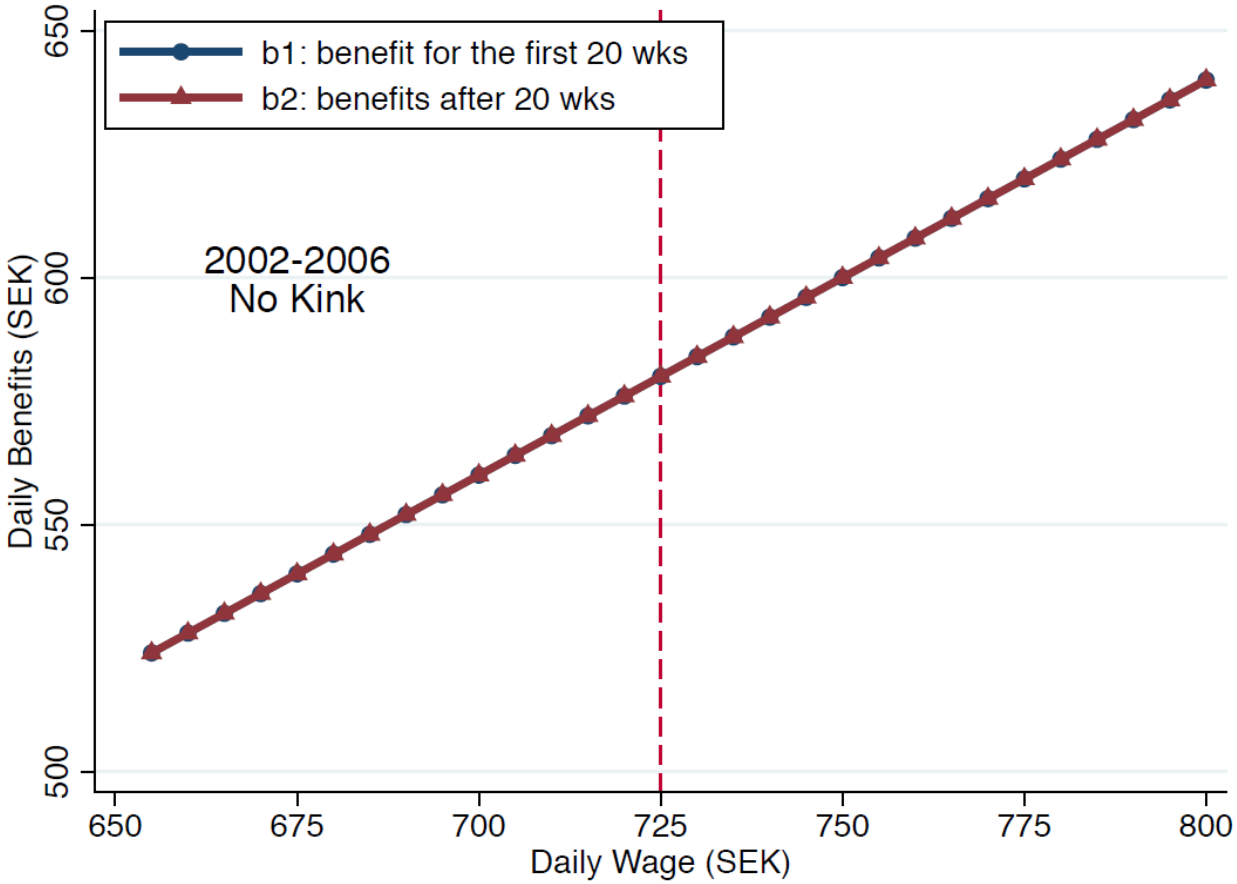


Regression Kink Design

- General model:

$$Y = y(b_1, b_2, w, \varepsilon)$$

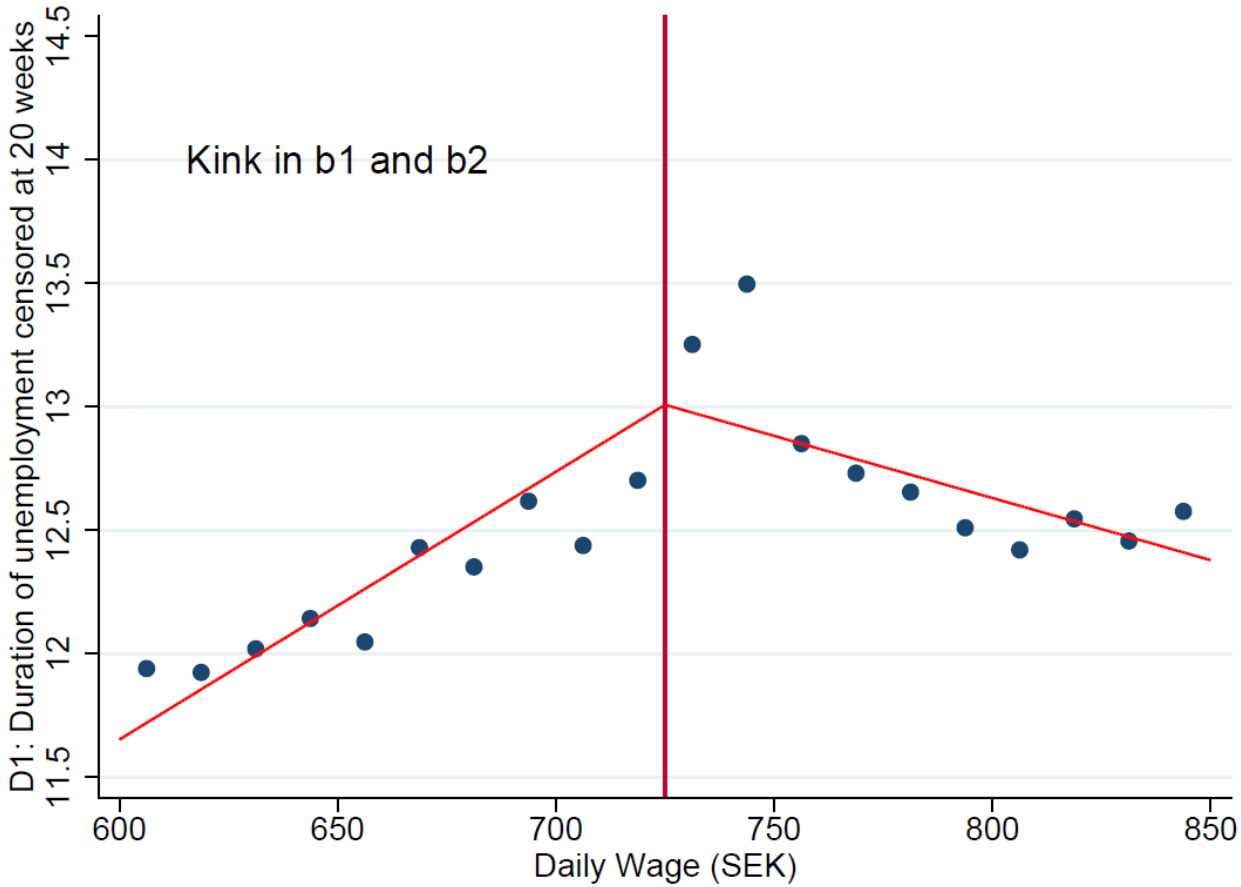
  - Y: duration outcome of interest; D_1 (<20wks), D_2 (>20wks)
  - b_t: endogenous regressor of interest; deterministic, continuous function of earnings w, kinked at $w = k_t$

- **Identifying assumptions:**
  - smooth density of forcing variable w
  - direct marginal effect of w on Y is smooth
- **Non-parametric identification** of the average marginal effect of b_t on Y:

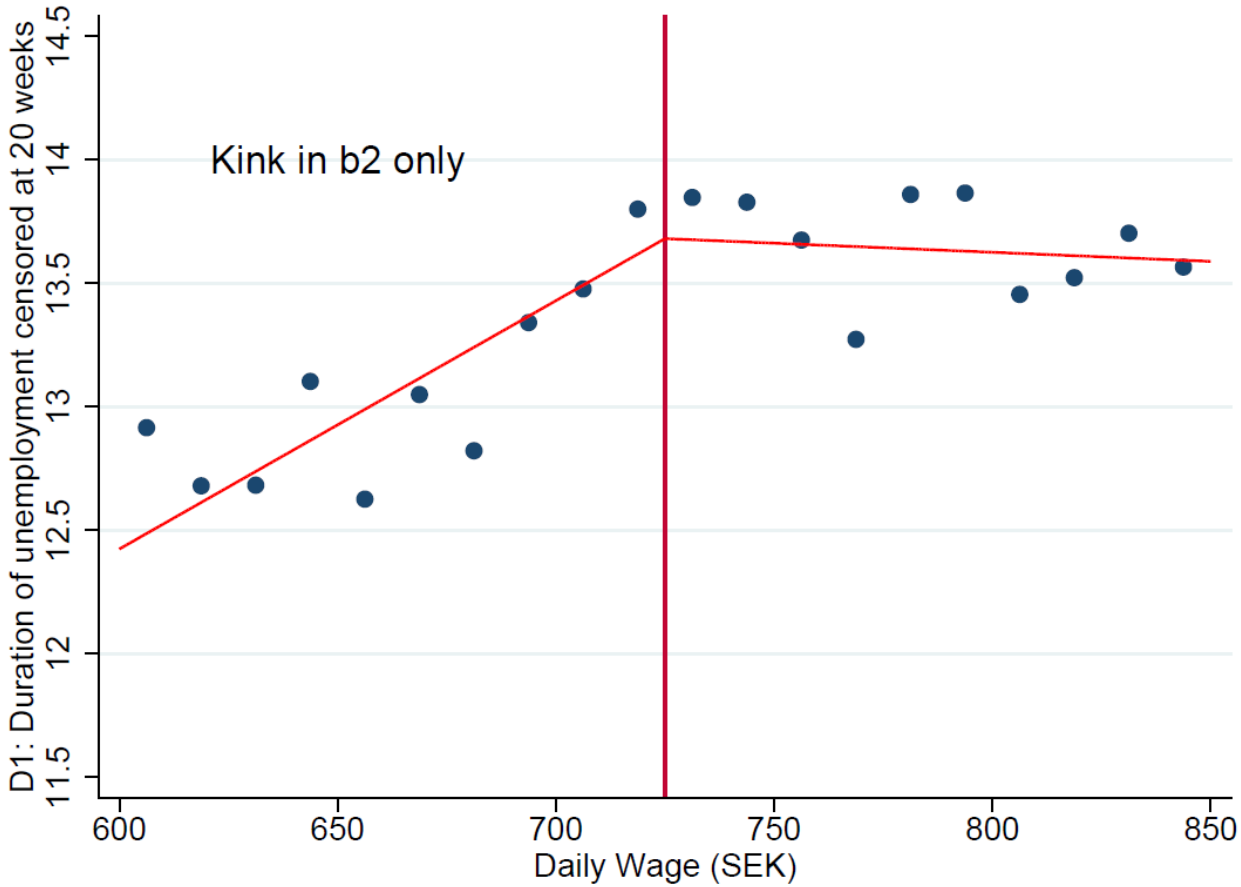
$$\hat{\alpha}_t = \frac{\hat{\delta}_t}{\nu_t}$$

  - $\hat{\delta}_t$: estimated change in slope between Y and w at kink k_t
  - ν_t: deterministic change in slope between b_t and w at kink k_t

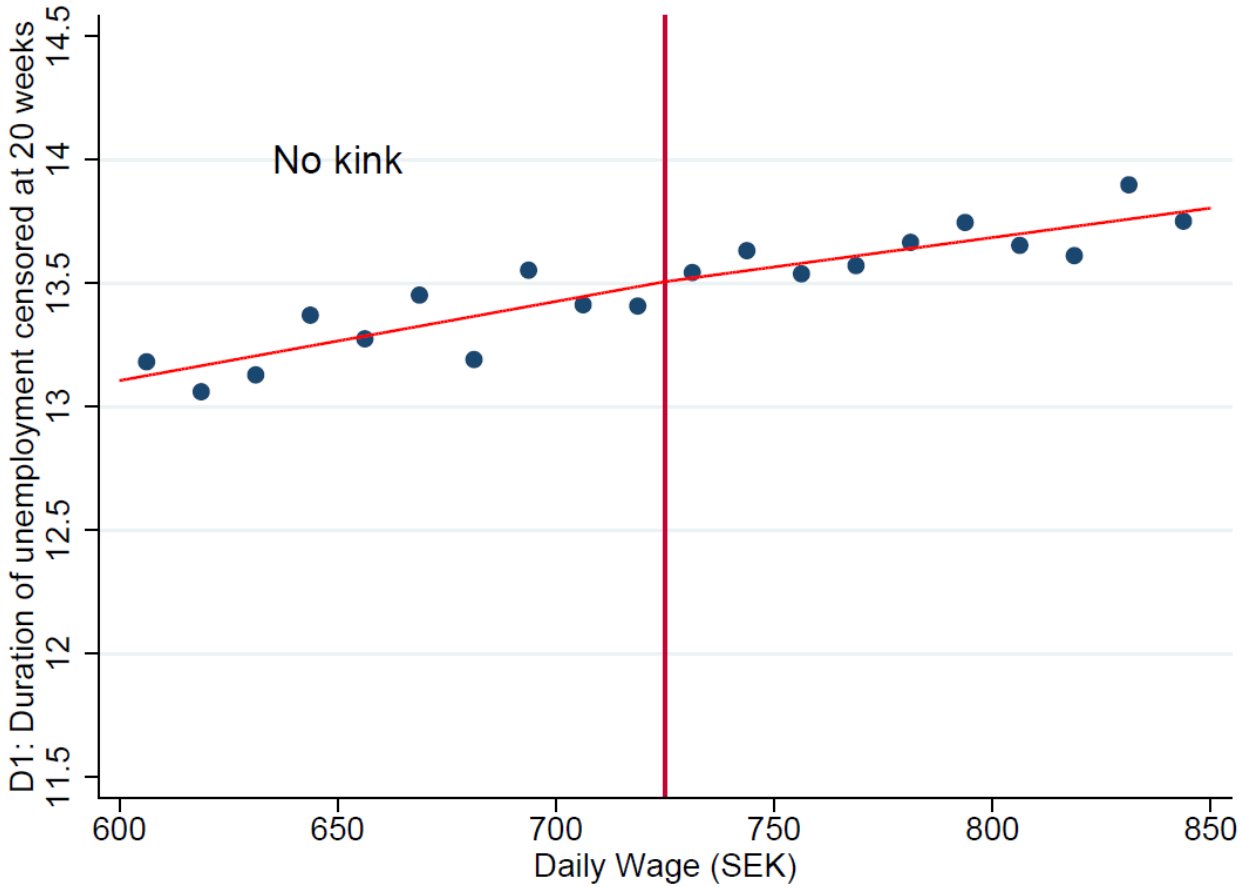
Duration and Wages: Kink in b_1 and b_2



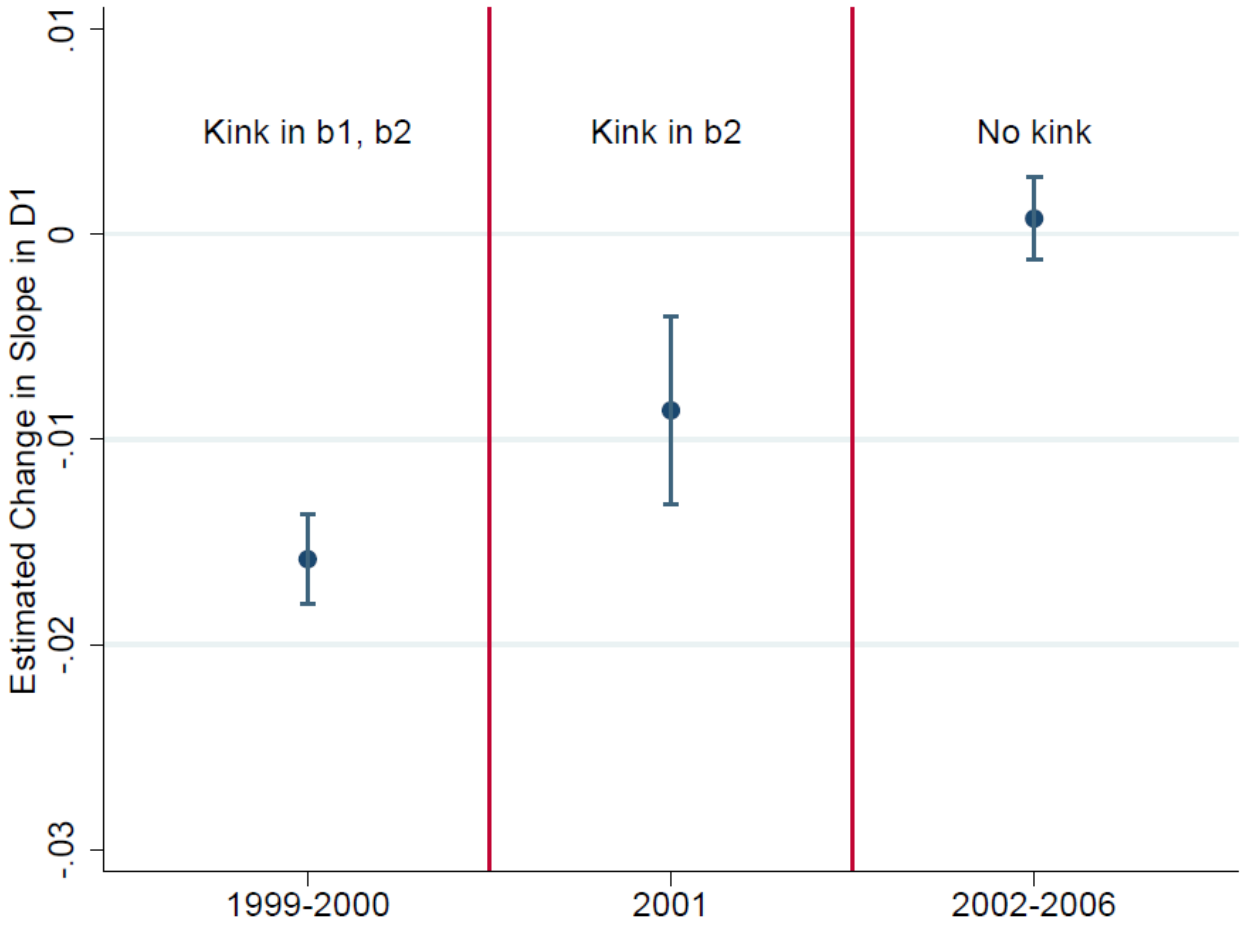
Duration and Wages: Kink in b_2



Duration and Wages: No kink



RKD: Duration Responses



Welfare: Putting Things Together

Table: Moral Hazard & Consumption Smoothing Estimates

	$\varepsilon_{D_1,x}$	$\varepsilon_{D_2,x}$	MH_x	CS_x	CS_x / MH_x (value per kr spent)
b_1, b_2	-.88	-1.59	-1.235	$\tilde{\gamma} \times .24$	$\tilde{\gamma} \times .19$
	[.06]	[.25]	[.13]		
b_1	-.66	-1.39	-2.05	$\tilde{\gamma}_1 \times .22$	$\tilde{\gamma}_1 \times .11$
	[.41]	[.52]	[.66]		

- Starting from a flat rate of 80% in Sweden, we find:
  - a welfare gain from lowering benefits throughout the spell if $\tilde{\gamma} < 5$
  - lowering benefits before 20 weeks provides the largest welfare gain
- (Local) welfare gains push towards an increasing rather than decreasing benefit profile!

Conclusion

- We provided a simple framework to connect theory to data in the context of unemployment policies:
  - use admin data to evaluate consumption smoothing effects
  - focus on the timing of benefits for behavioral responses
  - find no evidence to support the switch from flat to declining benefit profiles
- Framework can be used to think about various policy-relevant issues: role of business cycles, role of heterogeneity,...
- Framework can be used to think about any time-dependent policies: pensions (career length/age), poverty relief (child's age),...