Do low-wage workers react less to longer unemployment benefits? Quasi-experimental evidence

Mário Centeno & Álvaro A. Novo

Labor Economics

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Synopsis[1]

- We take advantage of a **quasi-experimental setting,** generated by an exogenous increase in the UI entitlement period
- Individuals at the bottom and at the top of the wage distribution reacted less than those in the interquartile range. A **hump-shape** response.
- Poorer individuals are financially **less capable of postponing reemployment** and, therefore, benefit less from an extension that occurs at a distant period in time; larger replacement rates are more likely to potentiate the liquidity effects among these unemployed workers.

[1] Centeno & Novo (2014) *Oxford Bulletin of Economics and Statistics*, 76(2), 185-207.

Outline

1 Job search model: UI and consumption smoothing

The main theoretical results that motivate the empirical exercise in this paper are derived from the work of Lentz (2005) and Card et al. (2008).

At the core of these models is the fact that unemployed agents use the **income from UI and the period prior to unemployment to smooth consumption** during the job search period.

The reaction to an increase in UI generosity will depend on the **share of the UI income on their lifetime income** and on the **impact on consumption of transitory income shocks**.

In the model, the unemployed worker maximizes the **expected value of entering period t without a job** and with total assets A_t, $J_t(A_t)$.

Search intensity, s_t, is normalized to equal the probability of finding a job in the current period and is chosen to solve:

$$J_t(A_t) = \max_{s_t} s_t V_t(A_t) + (1 - s_t)U_t(A_t) - e(s_t), \tag{1}$$

where $U(\cdot)$ is the value function of remaining jobless in period t, $V(\cdot)$ is the value function of getting a job in that period and $e(\cdot)$ is a convex search cost function.

If unemployed, an individual receives UI worth b_t, and sets consumption equal to c_t^u for a value function:

$$U_t(A_t) = \max_{A_{t+1} \geq L} u\left(A_t - \frac{A_{t+1}}{1+r} + b_t\right) + \frac{1}{1+\rho} J_{t+1}(A_{t+1}), \qquad (2)$$

where r is an interest rate and ρ is a discount rate. L is a lower-bound on assets and $u(\cdot)$ is a concave utility function.
Similarly, we could write the value function of employment, $V(\cdot)$.

F.O.C. of problem (1)

$$V_t(A_t) - U_t(A_t) = e'(s_t)$$

equalizes marginal costs of search to marginal benefit of employment.

From the optimal solution, the impact on search intensity in the current period, s_t, of a change in future benefits, b_{t+j}:

$$\partial s_t^* / \partial b_{t+j} = -p_{t,j}^* \frac{E_t[u'(c_{t+j}^u)]}{(1+\rho)^j e''(s_t^*)} \leq 0, \quad \text{where } p_{t,j}^* = \prod_{i=1}^{j} (1 - s_{t+i}^*). \quad (3)$$

The $p_{t,j}^*$ term is the probability that an individual is still unemployed in period $t+j$, given that the worker was unemployed at t, i.e., it is the survival rate at $t+j$.

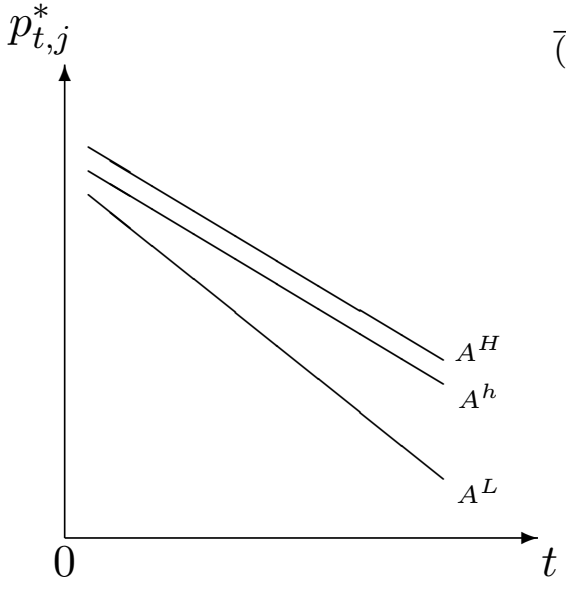
As it is standard in this literature, the model predicts that an increase in UI benefits reduces search effort, increasing unemployment duration.

Impact depends on **two channels**.

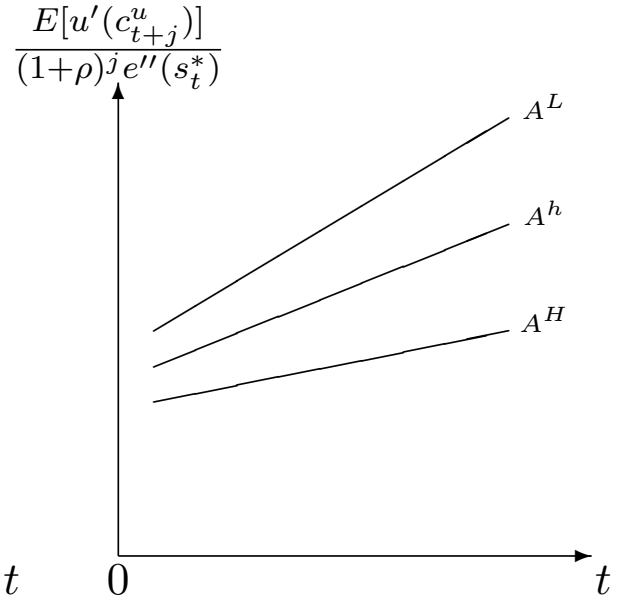
1. Through the probability that an individual remains unemployed up to the benefit extension, $p^*_{t,j}$. **Survival channel**

2. Through the impact on the expected marginal utility of consumption while unemployed, $E_t[u'(c^u_{t+j})]$, net of search costs. **Consumption channel**.

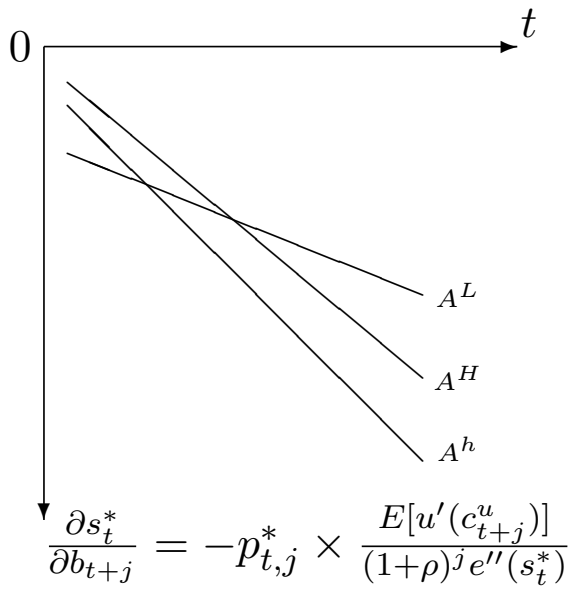
In the **empirical section**, we will explore primarily the **heterogeneity** that arises in the model due to differences in the individuals' **ability to smooth** $(\neq A_t)$ **consumption** over labor market states.



Survival channel



Consumption channel



One instance of the (negative of the) impact on search intensity

2 The UI reform and the economy

The extension of some entitlement periods

UI reform – July, 1999

Before		After	
Age (years)†	Entitlement period	Age (years)†	Entitlement period
$[15, 24]$	10	$[15, 29]$	12
$[25, 29]$	12		
$[30, 34]$	15	$[30, 39]$	18
$[35, 39]$	18		
$[40, 44]$	21	$[40, 44]$	24
$[45, 49]$	24		
$[50, 54]$	27	$[45, 64]$	$30(+8)^*$
$[55, 64]$	30		

† Age at the beginning of the unemployment spell.

* For those aged 45 or older, 2 months can be added for each 5 years of social contributions during the previous 20 calendar years.

Economic conditions

Macroeconomic conditions

	Real GDP Growth[(1)]	Employment Growth[(2)]	Unemployment Rate[(2)]	Long-term Unemployment (%)[(2)]	Subsidized Unemployed (thousands)[(3)]
1997	4.2	1.9	5.8	43.6	172.9
1998	4.7	2.3	5.0	45.4	165.1
1999	3.9	1.9	4.4	41.2	163.1
2000	3.9	2.3	3.9	43.8	166.6
2001	2.0	1.5	4.0	40.0	176.1
2002	0.8	0.5	5.0	37.3	195.2
2003	-1.2	-0.4	6.3	37.7	248.2
2004	1.1	0.1	6.7	46.2	288.4

Sources: (1) National accounts, INE; (2) Employment Survey, INE; (3) Social Security Bureau, MTSS.

3 Data

Administrative data collected by the Portuguese Social Security Bureau. The dataset recorded **all subsidized** unemployment spells initiated between January 1, 1998 and June 30, 2003.

From a statistical point of view, it is important to notice that we are able to **follow the subsidized spells until they are terminated**, either before or at the exhaustion date.

For the raw data, covariates are **well balanced across the groups**. These are also reassuring that there is common support between the groups and that, after using suitable regression methods (or matching), they will be appropriately balanced Angrist & Pischke (2009).

Summary statistics

	Before		After	
Variables	Treatment	Control	Treatment	Control
Subsidized unemployment spell (days)	202.16	301.25	275.09	294.76
Age at the beginning of the spell	31.92	36.93	31.86	36.89
Female	0.42	0.40	0.55	0.51
Pre-unemployment wages (1999 euros)	593.30	680.58	647.71	662.06
Gross replacement ratio	69.07	67.48	69.73	69.76
Month of unemployment entry				
January	0.17	0.14	0.12	0.12
February	0.12	0.12	0.08	0.09
March	0.11	0.11	0.09	0.09
April	0.11	0.12	0.08	0.09
May	0.10	0.10	0.09	0.09
June	0.09	0.09	0.08	0.09
July	0.05	0.05	0.07	0.07
August	0.05	0.05	0.06	0.06
September	0.05	0.04	0.13	0.10
October	0.05	0.06	0.07	0.08
November	0.05	0.06	0.07	0.07
December	0.04	0.05	0.06	0.06
No. of observations	4,780	5,160	30,173	22,434

4 Causal inference on the UI extension

4.1 The average treatment effect

Stratified version of the proportional hazard model

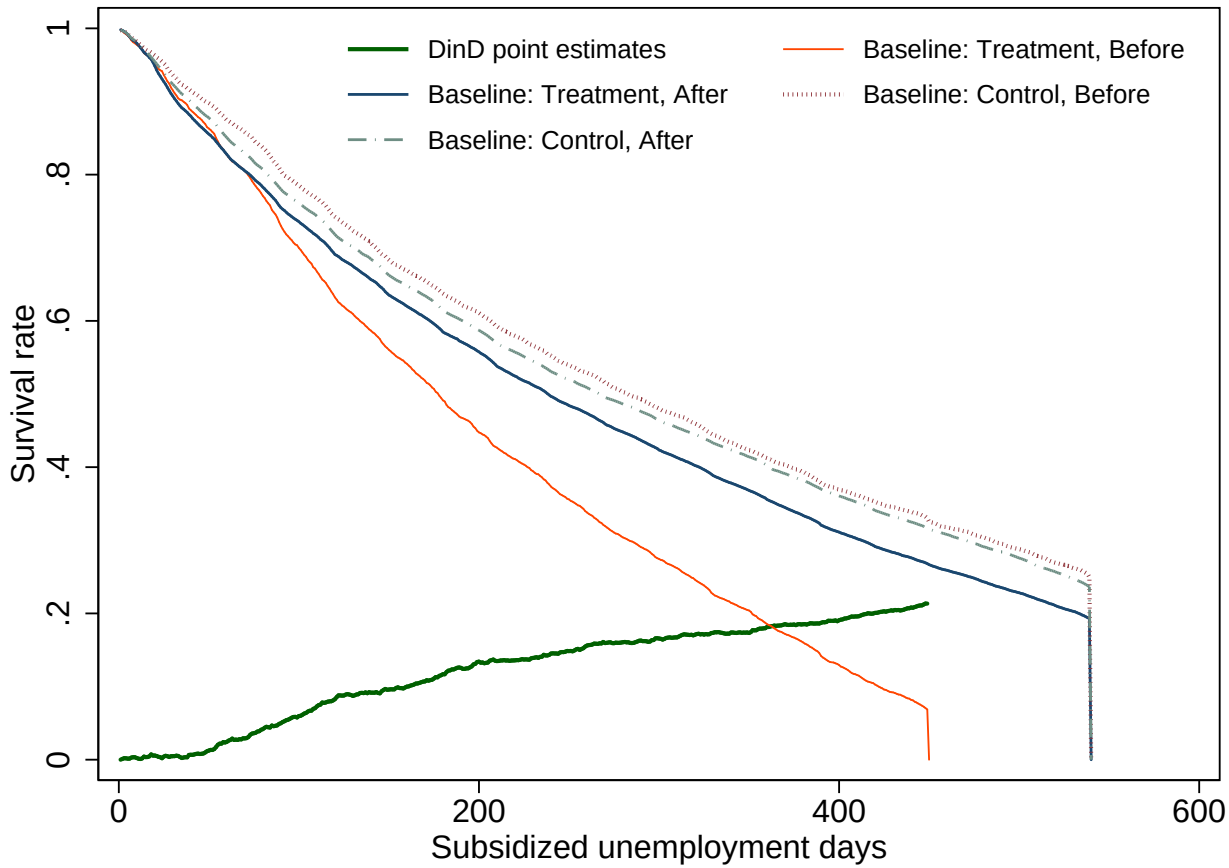
The hazard function represents the probability of unemployment termination conditional on the duration lasting up to t, formally:

$$\lambda^k(t|x) = \lambda_0^k(t)\exp(x\alpha), \tag{4}$$

where k one of the four pairs (control, treatment) $\times$ (before, after).

The x includes: individual's age at the beginning of the unemployment spell; (log) 12-month average of pre-unemployment wages; gross replacement rate; a gender (female) indicator; regional (22 districts) dummies; and month of unemployment entry dummies.

In this case $\lambda_0^k(t)$ is the baseline hazard rate at time t for the covariate vector $x = 0$ for a given pair k.



Survival curves for a reference person and, **the difference-in-differences** estimates.

The impact of the UI extension is increasing over the duration of the UE spell.

As an alternative approach, we follow the **traditional difference-in-differences** literature and estimate a **common survival model** with treatment status indicators:

$$\lambda(t|X) = \lambda_0(t)\exp\{\beta_0 + \beta_1 After + \beta_2 Treat + \\ + \beta_{\mathbf{3}}\mathbf{After} \times \mathbf{Treat} + x\alpha\},$$

Differences-in-differences estimates

Subsidized unemployment spell (days)	(1)	(2)	(3)
After	0.053	0.029	0.039
	(2.75)	(1.53)	(1.13)
Treat	0.424	0.399	0.142
	(14.93)	(14.03)	(3.25)
After × Treat	-0.492	-0.463	-0.303
	(-19.54)	(-18.37)	(-6.70)
Interquartile range Wages		-0.558	-0.665
		(-37.80)	(-16.46)
Top Quartile Wages		-0.696	-0.855
		(-35.40)	(-16.52)
After × Treat × Interquartile Wages			-0.315
			(-5.48)
After × Treat × Top Wages			-0.164
			(-2.22)
Treat × Interquartile Wages			0.364
			(7.04)
Treat × Top Wages			0.487
			(7.25)
After × Interquartile Wages			0.031
			(0.71)
After × Top Wages			-0.092
			(-1.68)
No of observations	62,547	62,547	62,547

To illustrate the size of the effect (-0.492): **Before** the new law, a 32-year-old man with an average wage would have a **53% (83%)** chance of exiting UI in the first 6 (12) months. **After** the reform, the same probability falls to **41% (74%)**.

4.2 The heterogeneous take up of extended benefits

Definition of heterogeneous groups

To proxy the ability of workers to smooth consumption intertemporally, we use **labor income over the one-year period that precedes unemployment**. In the empirical exercise, we will consider three groups: (i) the **first quartile**, (ii) the **interquartile range**, and (iii) the **top quartile**.

The interquartile range includes average monthly wages ranging from 463 to 888 euros, at 1999 prices, when the minimum wage was 306 euros.

Wages have **two shortcomings** as a proxy for the ability to smooth consumption.

1. wages are a **temporary source of income**, which may not be available to smooth consumption at the moment of unemployment.

2. Even if wages were a perfect measure, the choice of the **threshold** to distinguish constrained and unconstrained individuals is somewhat **fuzzy**.

It may lead to **misclassification** of the individuals' constraints. If that is the case, the estimates of the reactions of the two groups – constrained and unconstrained – **will be closer**.

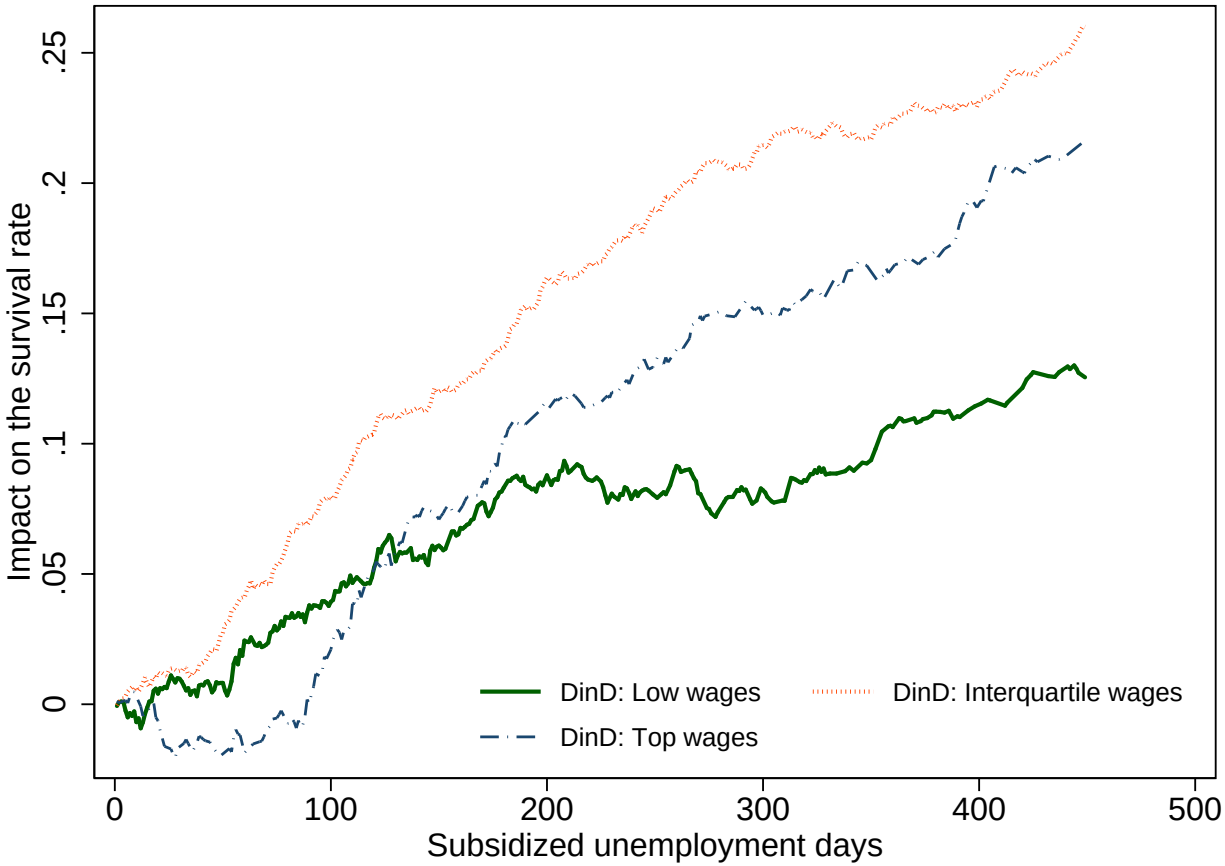
Differentiated impacts on unemployment duration

The parameters of interest (in **column (3)**):
$After \times Treat$, $After \times Treat \times Interquartile\ Wages$, and $After \times Treat \times Top\ Wages$

Main conclusion: the 3 groups **reacted differently** to the same incentive.

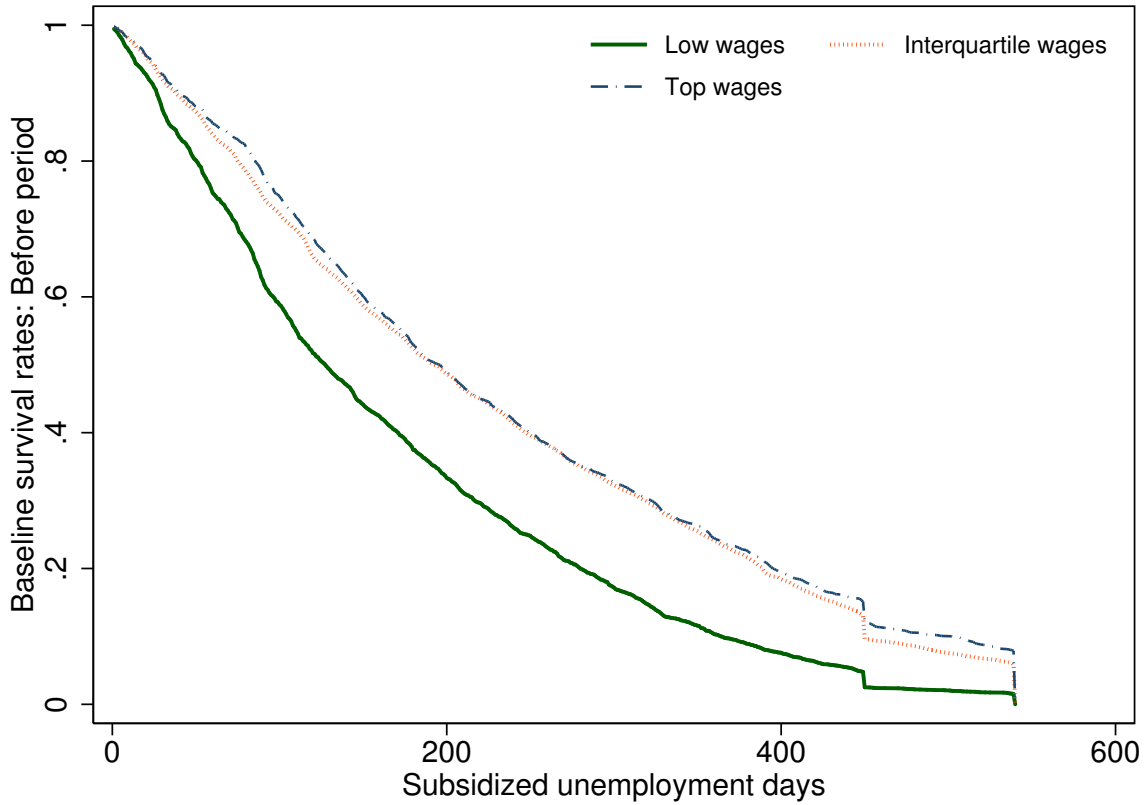
The estimates imply a reduction in the unemployment hazard of: 26% for 1st quartile; relatively to 1st quartile, the reduction is 27% larger for the interquartile range and 15% for those in the top quartile.

The evidence collected results in a **hump-shaped** (concave) response to the benefit extension with respect to the ability of smooth consumption.



The fully-flexible model with the groups **stratified over the triplet** defined by the two treatment status, the two periods and the three wage groups.

The imposition of a common baseline in equation does not drive this result.



What can account for this non-monotonic pattern?

Survival channel: We use the data from the **pre-reform period**, to avoid endogeneity issues. Figure plots Cox-proportional baseline survival rates. The estimates suggest that the conditional probability of **remaining unemployed increases with the pre-unemployment wage**.

Combining the survival and consumption channels

1. Interquartile and the top quartile groups: have virtually the same unemployment survival probability at all durations. For these two groups, the difference in the impacts is defined by the consumption channel. As expected, workers with interquartile wages react more to the incentive due to their larger marginal utility of consumption.

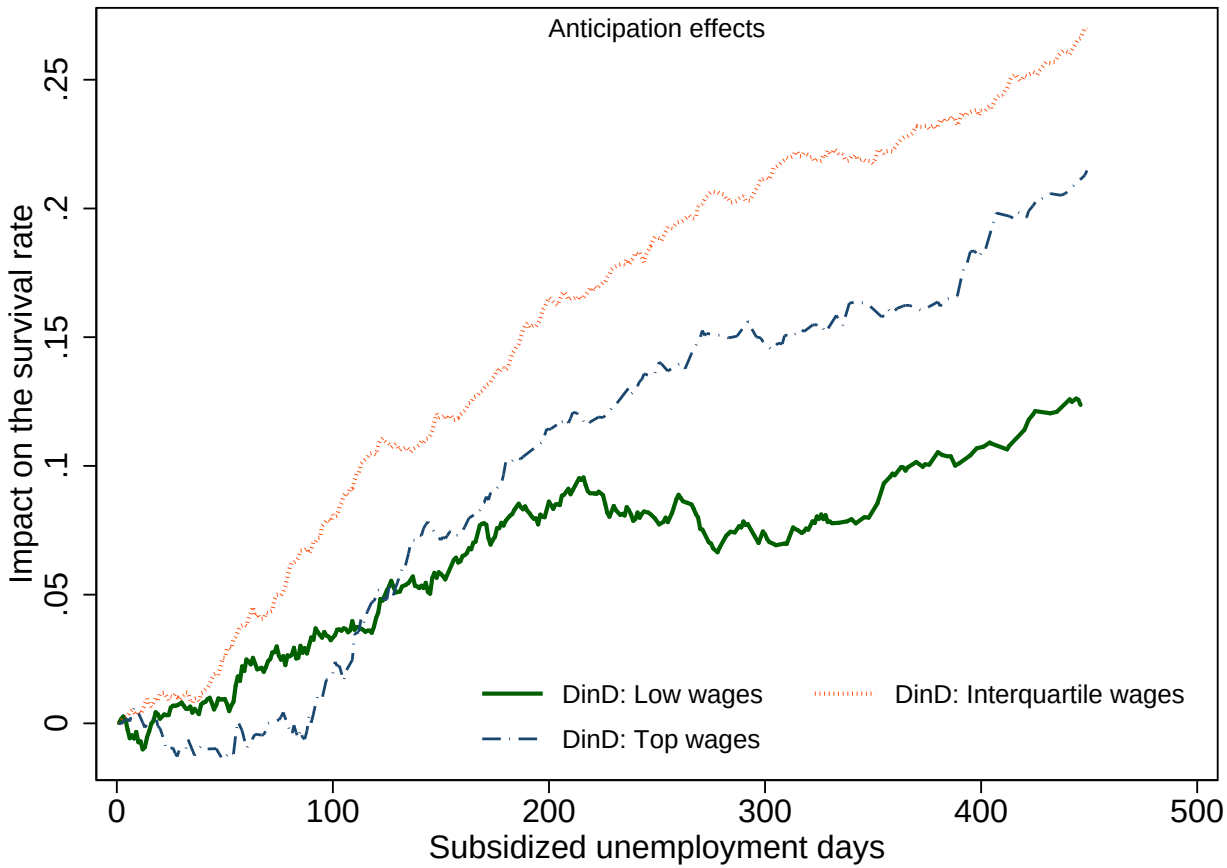
2. Lowest quartile group: the smallest probability of exhausting benefits. By the consumption channel, they should have had the largest reaction. However, the lowest survival probability mitigates the consumption channel effect to the point where the overall impact is the smallest of all these groups.

4.3 Robustness

Robustness: Sample restrictions, other treated, and falsification

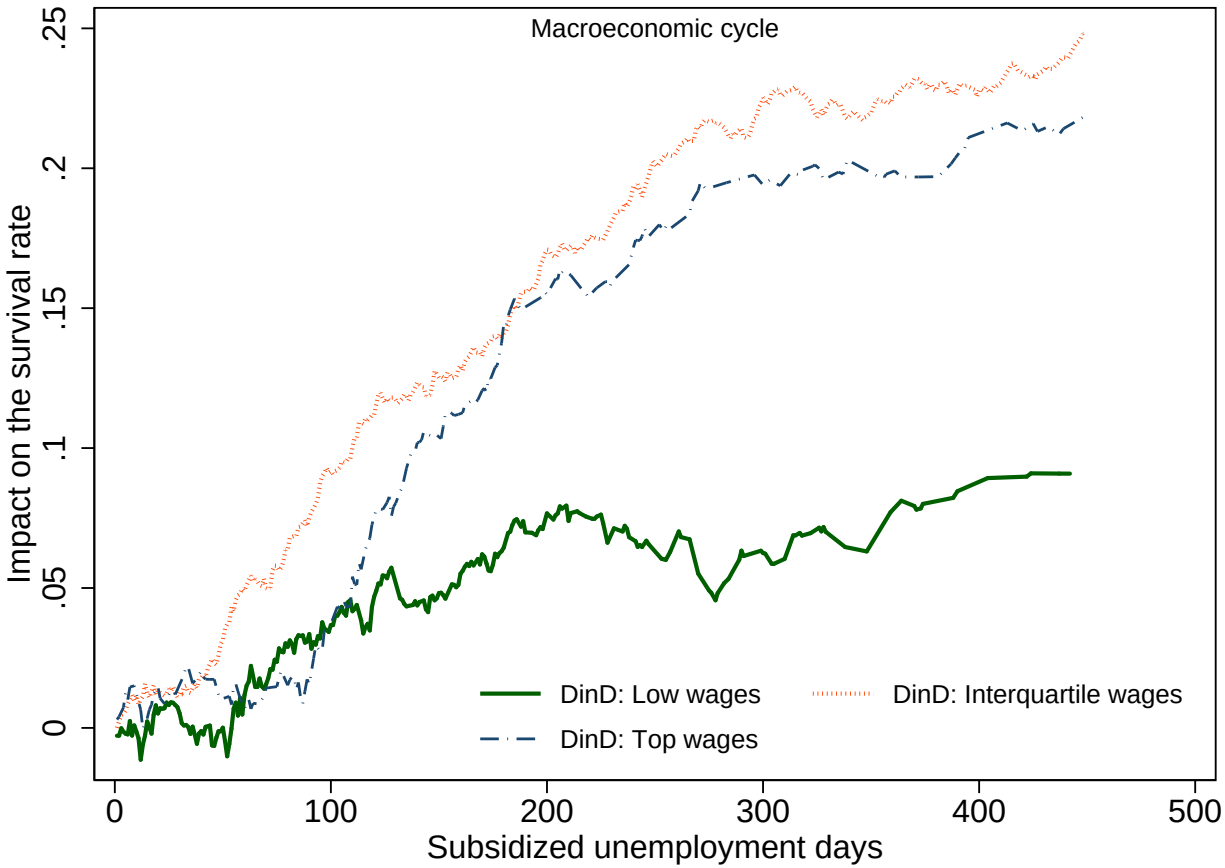
	Excluding:		Treatment	Falsification
Subsidized unemployment spell (days)	34 & 35	35	$[40, 44]$	$[25, 29]$;$[35, 39]$
After	0.006	0.006	0.053	0.027
	(0.16)	(0.15)	(1.56)	(0.75)
Treat	0.064	0.104	0.261	-0.117
	(1.26)	(2.16)	(5.27)	(-2.32)
After $\times$ **Treat**	-0.241	-0.270	-0.498	-0.001
	(-4.78)	(-5.56)	(-9.73)	(-0.03)
After $\times$ **Treat** $\times$ **Interquartile Wages**	-0.349	-0.341	-0.136	-0.070
	(-5.49)	(-5.54)	(-2.12)	(-1.24)
After $\times$ **Treat** $\times$ **Top Wages**	-0.214	-0.192	-0.155	0.317
	(-2.62)	(-2.47)	(-1.95)	(4.08)
Other variables	Yes	Yes	Yes	Yes
No of observations	60543	61427	50617	71379

Anticipation effects



Address the possibility of anticipation effects by excluding from the sample individuals enrolled 3 months before and after the new legislation.

Macroeconomic cycle



Addresses the macroeconomic cycle. The before period (January, 1998 to June, 1999) and the after period (July, 1999 to December, 2000) have rather similar positions in the business cycle.

5 Future research

The analysis focused on the heterogeneous impact of unemployment insurance extensions on **unemployment duration**.

In another paper, we are already working on the impact on **reemployment wages**. We are particularly interested on the "interaction" of reemployment wages with the moment of reemployment – while receiving UI and after running out of UI. However, this raises estimation problems...

Questions?

Thank you.

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