Longevity and Patience

Falk, Hermle, Sunde (2019)

How to use Diff-in-Diff estimators in panel data

Longevity and Patience

- Hypothesis: greater longevity leads to greater patience and more future-oriented behavior (Becker and Mulligan, 1997)
- Dataset: two survey items (n=80,000, 76 countries)
- Identification strategy: variation in longevity across gender-age-country cells (period life tables) to variation in patience (survey)
- Longevity variation: we cannot simply compare answers across countries [institutional differences] or across age [biological/income-cycle differences]

Difference-in-Difference

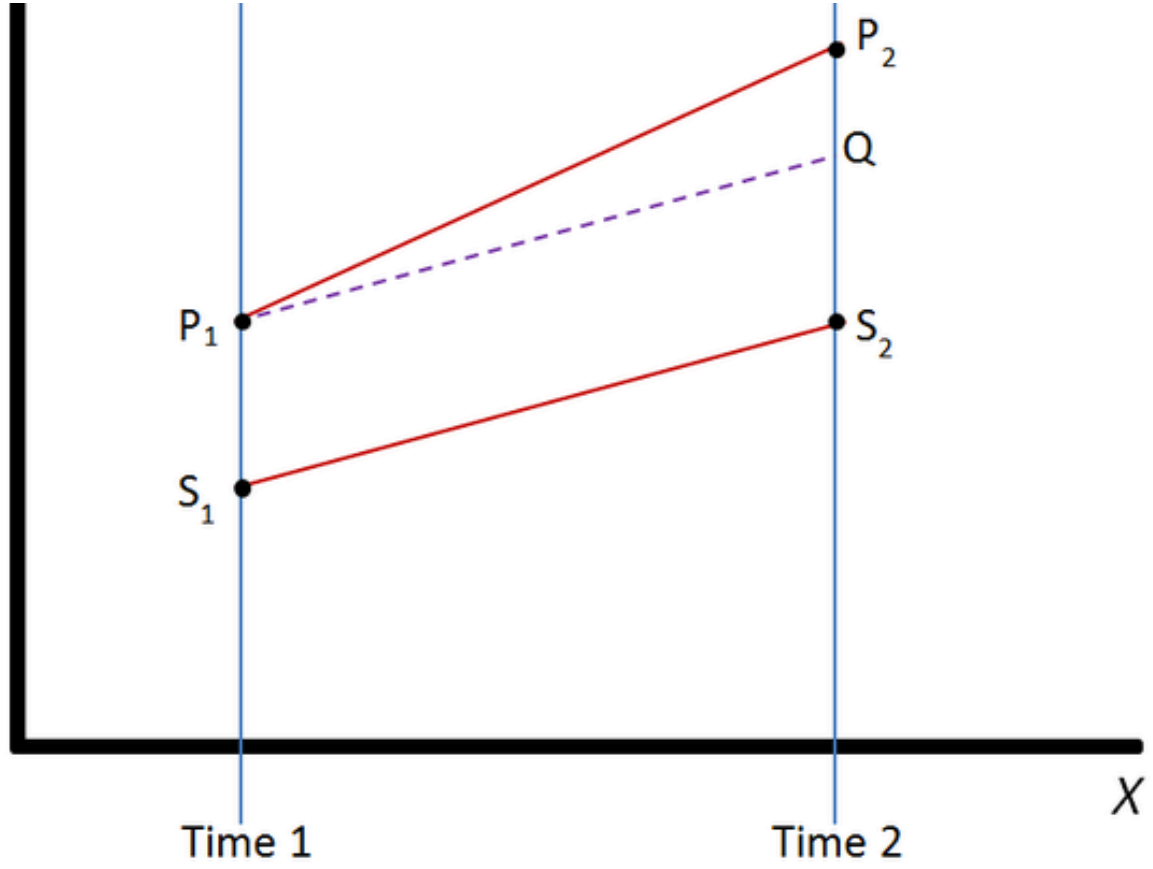
Patience	20 y.o.	50 y.o.	Difference
US	$y_{US,20}$	$y_{US,50}$	$y_{US,20} - y_{US,50}$
South Africa	$y_{SA,20}$	$y_{SA,50}$	$y_{SA,20} - y_{SA,50}$
Change	$y_{US,20} - y_{SA,20}$	$y_{US,50} - y_{SA,50}$	$(y_{US,20} - y_{US,50}) + -(y_{SA,20} - y_{SA,50})$

Diff-in-Diff: Motivation

- Use panel data (time series + cross-country)
- Remove country-specific confounding factors (shared by individuals from the same country, e.g. institutional quality)
- Remove age-specific confounding factors (e.g. biological factors)
- In general: the treatment is assigned using an endogenous rule (e.g. the decision “where” to open a new store is strategic)

Diff-in-Diff: Assumptions

- Parallel trend assumption
- Treatment and control group start from different absolute levels, but they share the same general trend (or "no trend")
- We do not observe a control group, but we simulate a "counterfactual" scenario based on the available info



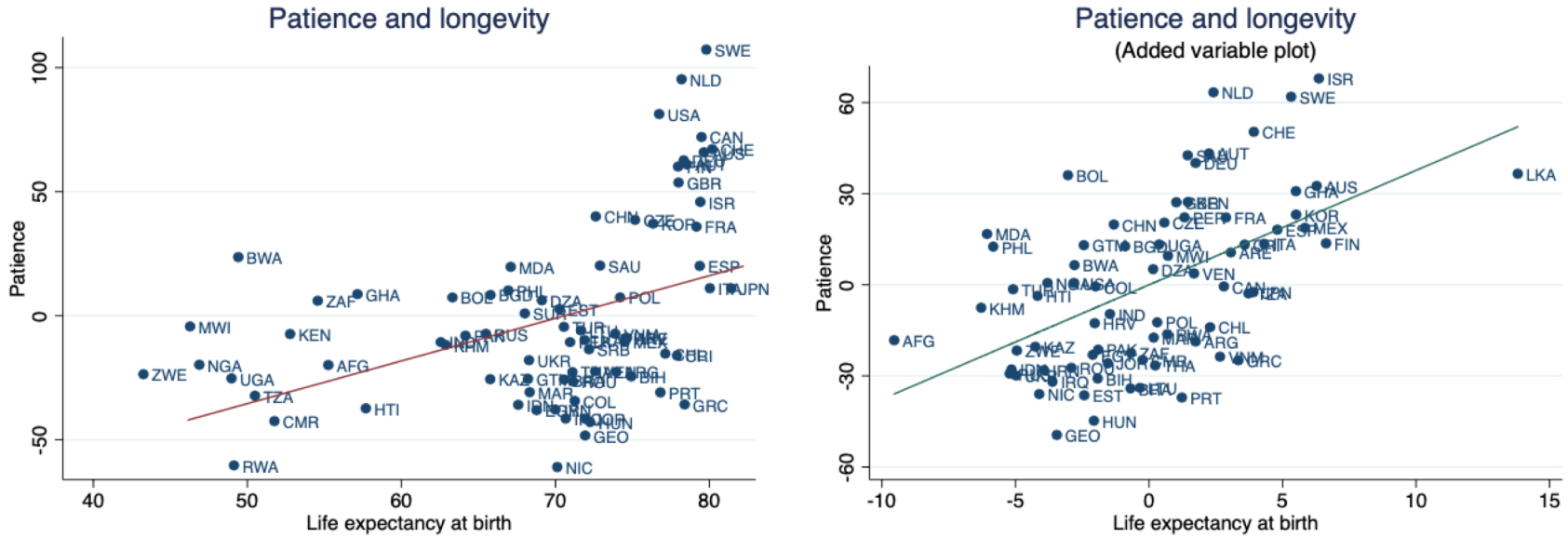
$$\beta_{it} = \gamma\, I(\text{treatment}) + \delta_t + \alpha_i + \varepsilon_{it}$$

Diff-in-Diff: Limits

- Identification with parallel trends requires a “single treatment”
- The composition of the groups is unchanged (no spillovers)
- Selection bias can still exist based on the choice of the treatment group
- Methodological limits for event studies: multiple treatments (e.g. opening multiple stores in an area), lag in the effect, etc.
- Reverse causality and omitted variable bias can persist

Longevity and Patience: Raw data

- Longevity: life expectancy (from gender-age-country mortality)
- Patience: quantitative and qualitative measures
  - Binary choices: 100 Euros today or x Euros in 12 months?
  - How willing are you to give up something today (for a future benefit)?



(a) Raw Data

(b) Conditional on Observables

Longevity and Patience: Empirical strategy

$$\beta_{igac} = \gamma \cdot \pi_{igac} + \zeta_g + \delta_a + \alpha_c + \rho \cdot X_{igac} + \varepsilon_{igac},$$

- Patience β_{igac}
- Longevity π_{igac}
- Gender FE ζ_g
- Age FE δ_a
- Country FE α_c
- Individual characteristics X_{igac}

Longevity and Patience: Results

- A one-year increase in remaining years of life is associated with a 1.6% std. dev. increase in patience
- A ten-year increase in life expectancy implies a 5% higher discount factor
- No significant effect of individual-level controls (e.g. log income), region (instead of country), religion, or language FE

	Dependent variable: Patience					
	(1)	(2)	(3)	(4)	(5)	(6)
Remaining years of life	1.63***	1.73***	1.67***	1.68***	1.75***	1.59***
	(0.359)	(0.376)	(0.375)	(0.381)	(0.413)	(0.423)
1 if female	-13.5***	-11.5***	-11.6***	-10.8***	-12.4***	-11.2***
	(2.246)	(2.207)	(2.209)	(2.294)	(2.295)	(2.422)
Subj. math skills		2.24***	2.05***	2.22***	2.22***	2.05***
		(0.208)	(0.191)	(0.218)	(0.209)	(0.195)
Education level		8.58***	8.63***	9.32***	8.73***	9.71***
		(1.381)	(1.303)	(1.356)	(1.457)	(1.416)
Log [Household income p/c]		3.28***	3.04***	3.47***	3.31***	3.49***
		(0.562)	(0.553)	(0.581)	(0.607)	(0.627)
Country FE	Yes	Yes	No	Yes	Yes	No
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	No	No	Yes	No	No	Yes
Religion FE	No	No	No	Yes	No	Yes
Language FE	No	No	No	No	Yes	Yes
Observations	79433	77693	76793	69245	71987	62691
R^2	0.161	0.172	0.218	0.176	0.184	0.232