

# Does education make people more patient?

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# Overview

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- 2 Data
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- 4 Conclusion

# Research Question and Background

- What are the determinants of individual time preference? (Becker and Mulligan, 1997)
- **The causal effect of education on time preference**
  - ▶ Time preference hypothesis: More patient individuals decide to obtain more schooling.
  - ▶ Schooling may affect preferences in a way that makes individuals more patient, more goal-oriented, and less likely to engage in risk behavior (Oreopoulos and Salvages, 2011).

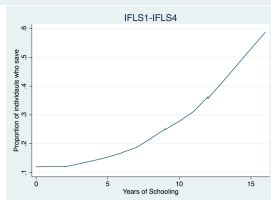
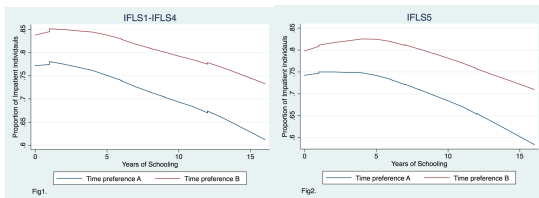
## Previous Literatures

- Standard economic models assume the individual preferences are stable across time (Stigler and Becker, 1977)
- Preferences are likely to be endogenously formed (Fisher, 1930; Becker and Mulligan, 1997; Bowles, 1998)
- Preferences are different across individuals (Barsky et al., 1997; Dohmen et al., 2005; 2006 ; Hamoudi, 2006; Ng, 2012)

## Previous Literatures

- Previous studies focus on correlation between preferences and wealth (Fisher, 1930; Ameriks et al, 2003; Stephens and Krupka, 2006), health (Fuchs, 1982; ), education (Becker and Mulligan, 1997; Ng, 2012), and cognition(Frederick, 2005; Dolmen et al., 2010; Benjamin et al., 2013)
- Perez (2011) is trying to causally estimate the effect of education on time preference.

# The Lowess graph - education, saving and time preference



# Empirical Challenge

- How to estimate the causal effect
  - ▶ Unobservable factors such as genetic background, family characteristics
  - ▶ Reverse causality
- Measurements
  - ▶ Kirby and Marakovic (1995), Anderson et al.(2011) : Use real and hypothetical rewards to compare time discounting. Discount rates were lower for hypothetical rewards.
  - ▶ Coller and Williams (1999) , Frederik et al. (2002), Green and Myers (2004): Not support any significant differences between real and hypothetical rewards.
  - ▶ Dohmen et al. (2011), Hamoudi (2006): Pretty similar between using hypothetical and real rewards.

# Empirical Challenge

- Instrument Variable (IV) approach (Duflo (2001) - Indonesia Primary School Construction)
- Supportive evidence by using individual fixed effect specification
- Factor analysis to overcome measurement error



# INPRES

- Starting in 1973, the largest primary school construction project: a total of 61,807 primary schools (World Bank, 2010)
- The construction varies by district (Kabupaten) and year - use district FE and year FE separately
- $INPRES = \text{treatment status (cohort level)} * \text{intensity}$  (variable constructed by Duflo(2001) using Ministry of Education and Culture reports)
- Treated cohorts: 1968-1972
- Control cohorts: 1950-1962

## Indonesia Family Live Survey (IFLS)

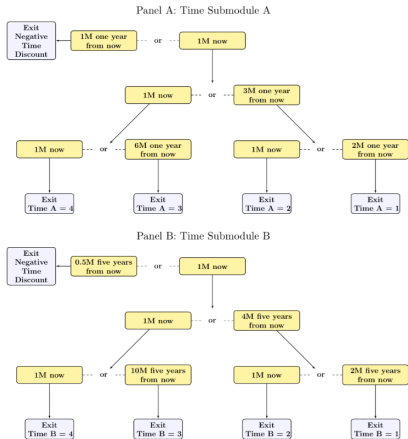
- IFLS4 and IFLS5 : Representative of about 83% of Indonesian population (Strauss et al., 2009) : a total of 29,504 adult respondents aged 15 and over
- Individual time preference and risk preference information + Various socioeconomic backgrounds information (the district of birth and migration)
- We match IFLS4 individual data with INPRES based on the district of birth and migration information.
- IFLS4 and IFLS5 is matched based on the individual ID for fixed effect specification

# Empirical Strategy

- 1<sup>st</sup> stage :  $S_{ijc} = \alpha + \delta_j + \gamma_c + (P_j T_i)\rho + X_i + \epsilon_{ijc}$
- 2<sup>nd</sup> stage :  $Y_{ijc} = \mu + \delta_j + \gamma_c + \beta_1 \hat{S}_{ijc} + X_i + \eta_{ijc}$ 
  - ▶ Preference Measure
- Controls: Year of birth FE, district (Kabupaten) FE, season FE, religion dummies, urban dummy, ethnicity dummies, father's and mother's education (Hryshko et al. 2011), log-rainfall deviation from the district mean level from birth to twelve years old.

# Time Preference Measure

Figure 1: Time preference categories



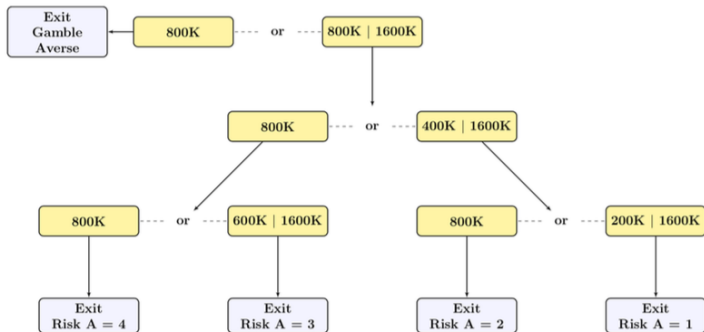
Notes: The chart is cited from Ng(2012).

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# Risk Preference Measure

**Figure 2:** Risk Preference categories

Panel A: Risk Submodule A



Notes: The chart is cited from Ng(2013).

# Empirical Results

**Table:** The effect of education on time preference

Specification	(1) FE	(2) IV-2SLS	(3) IV-PROBIT
Years of schooling	-0.0035* (0.0019)	-0.0834*** (0.0236)	-0.0526*** (0.00132)
Observations	2,010	2,010	1,750
Mean DV	0.83	0.83	0.80
Mean Edu		8.48	
First stage F		13.96	

Notes: A dependent variable is a dummy variable being equal to 1 if the respondent is most impatient (category4). All regressions control for age and age square, parent's education, an urban dummy, season FE, District FE, Ethnicity, religion FE and log-rainfall deviation. Standard errors are clustered at the province level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table: Compliers for LATE

	(1)	(2)	(3)	(4)
Years of schooling	0 to 5	6 to 12	6 to 16	9 to 16
Main coefficient	-1.017	-0.107	-0.100	-0.277
	(-0.17)	(-1.40)	(-1.75)	(-0.44)
First stage F	0.0231	5.754	4.641	0.127

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

# Suggestive Mechanism

Table: Suggestive Mechanism

Mechanism	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Years of schooling	-0.0749*** (0.0219)	-0.0624*** (0.0182)	-0.0914*** (0.0260)	-0.0754*** (0.0208)	-0.0780*** (0.0214)	-0.0648*** (0.0189)	-0.0722*** (0.0211)	-0.0610*** (0.0179)
Self health			0.0517** (0.0261)	0.0499* (0.0266)				
Subjective Well-being			0.0364*** (0.0111)	0.0259*** (0.0078)				
Depression			-0.0208** (0.0097)	-0.0187** (0.0073)				
Total word recall		0.0205*** (0.0069)		0.0229*** (0.0072)		0.0199*** (0.0068)		0.0195*** (0.0065)
log PCE					0.0875*** (0.0333)	0.0548** (0.0264)		
Community participation							0.0890** (0.0431)	0.0655* (0.0377)
Observations	1,946	1,946	1,946	1,946	1,950	1,950	1,950	1,950
IV F-stat	10.59	12.22	8.326	11.38	11.27	11.69	9.087	10.55



## Suggestive mechanism

- Cognition-Time preference correlation (Frederick, 2005; Dohmen et al. 2010; Benjamin et al. 2013)
- Psychology (Amos, Tversky and Kahneman, 1981): Theories of choice bracketing
- Health is another plausible mechanisms. (Cutler and Lleras-Muney, 2006)

# The effect of education on time preference (IFLS4 and IFLS5)

Table: The effect of education on time preference

	(1) OLS	(2) Individual FE	(3) OLS	(4) Individual FE
Years of schooling	Time preference A		Time preference B	
Pooled	-0.0193*** (0.00233)	0.0000 (0.00439)	-0.0164*** (0.00212)	-0.0129*** (0.00427)
Obs		5,034		5,252
Mean DV		0.69		0.78
Mean Edu			8.75	
Female	-0.0198*** (0.00302)	-0.0110* (0.00600)	-0.0207*** (0.00278)	-0.0126** (0.00585)
Obs		2,799		2,915
Mean DV		0.69		0.79
Mean Edu			8.53	
Male	-0.0193*** (0.00366)	0.0121* (0.00638)	-0.0103*** (0.00328)	-0.0133** (0.00625)
Obs		2,235		2,337
Mean DV		0.69		0.78
Mean Edu			8.95	

# Conclusion

- Main objective of this research is to reveal the causal relationship between education and time preference.
- We find the significant effect of education on time preference
- We support this evidence by using additional data with different specifications
- We provide plausible mechanism that cognition and health may explain the link

# The End