

# **TIME INCONSISTENCY AND DELAYED RETIREMENT DECISION: THE FRENCH PENSION BONUS**

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# The French pension bonus

- **Ensure the financial sustainability of public pensions funds in the short and long term because of the increase in life expectancy and the demographic shock.**
  - Introduction of financial incentives aiming to postpone retirements.  
In France, the pension bonus: An agent gets a higher pension if he retires beyond his full retirement age (full benefits + an additional proportional bonus).
- **The effectiveness of the pension bonus is relatively limited.**
  - In France, among new retirees from the private sector employee pension fund in 2015, only 13.70% retired with a bonus (DREES, 2017).
  - Women are less responsive than men (Benallah, 2011).
  - The global effect of financial incentives is principally led by informed individuals (Chan and Stevens, 2008).
- **Postpone retirement decision (to get the bonus) is an intertemporal trade-off:** a short-term cost from working (disutility) **versus** a delayed benefit in the long-term from an increased pension (utility).
  - Is there a behavioral explanation: **time inconsistency**?

# Time inconsistency in an intertemporal trade-off

- The traditional discounting function of a time-consistent agent (“exponential discounting”). With  $u_t$  the per-period utility and  $U_t$  the overall utility at time  $t$ :

$$U_t = u_t + \delta u_{t+1} + \delta^2 u_{t+2} + \dots \quad \text{with } \delta^t = \frac{1}{(1+r)^t} \quad r \text{ the discounted rate}$$

- However, a time-inconsistent agent has a decreasing discounted rate with time: Impatient in the short-term and more patient in the long-term (Thaler, 1981). **He planned to do an action, but as this action gets near, the agent changes his decision.**

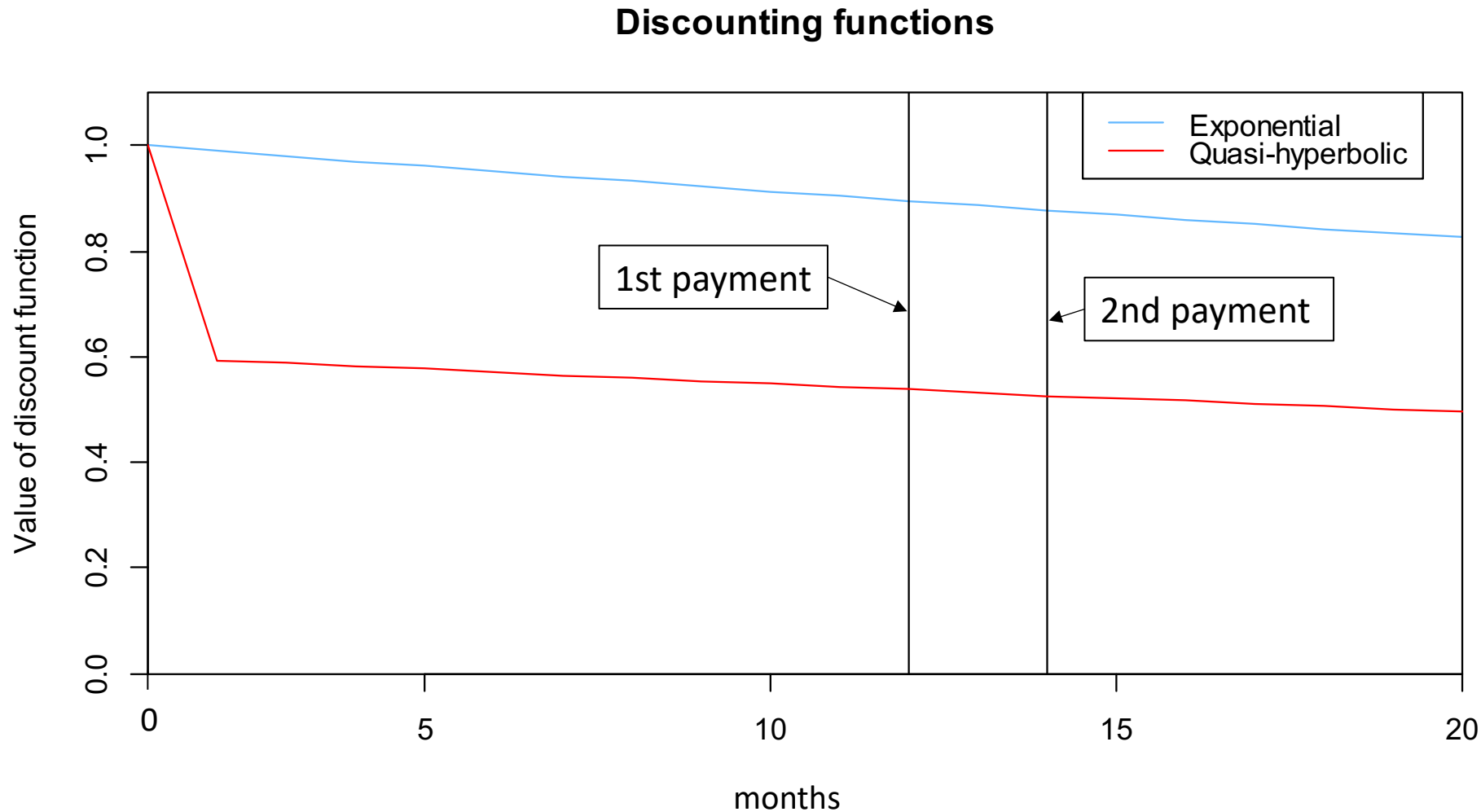
→ The tractable quasi-hyperbolic function (Laibson, 1997):

$$U_t = u_t + \beta \delta u_{t+1} + \beta \delta^2 u_{t+2} + \dots \quad \text{with } \beta \delta^t = \frac{\beta}{(1+r)^t}$$

With the present-bias  $0 < \beta \leq 1$ , representing the short-term impatience (vs.  $\delta$  the long-term impatience). The lower  $\beta$ , the more the agent is time-inconsistent because of the overweighting of immediate outcome.

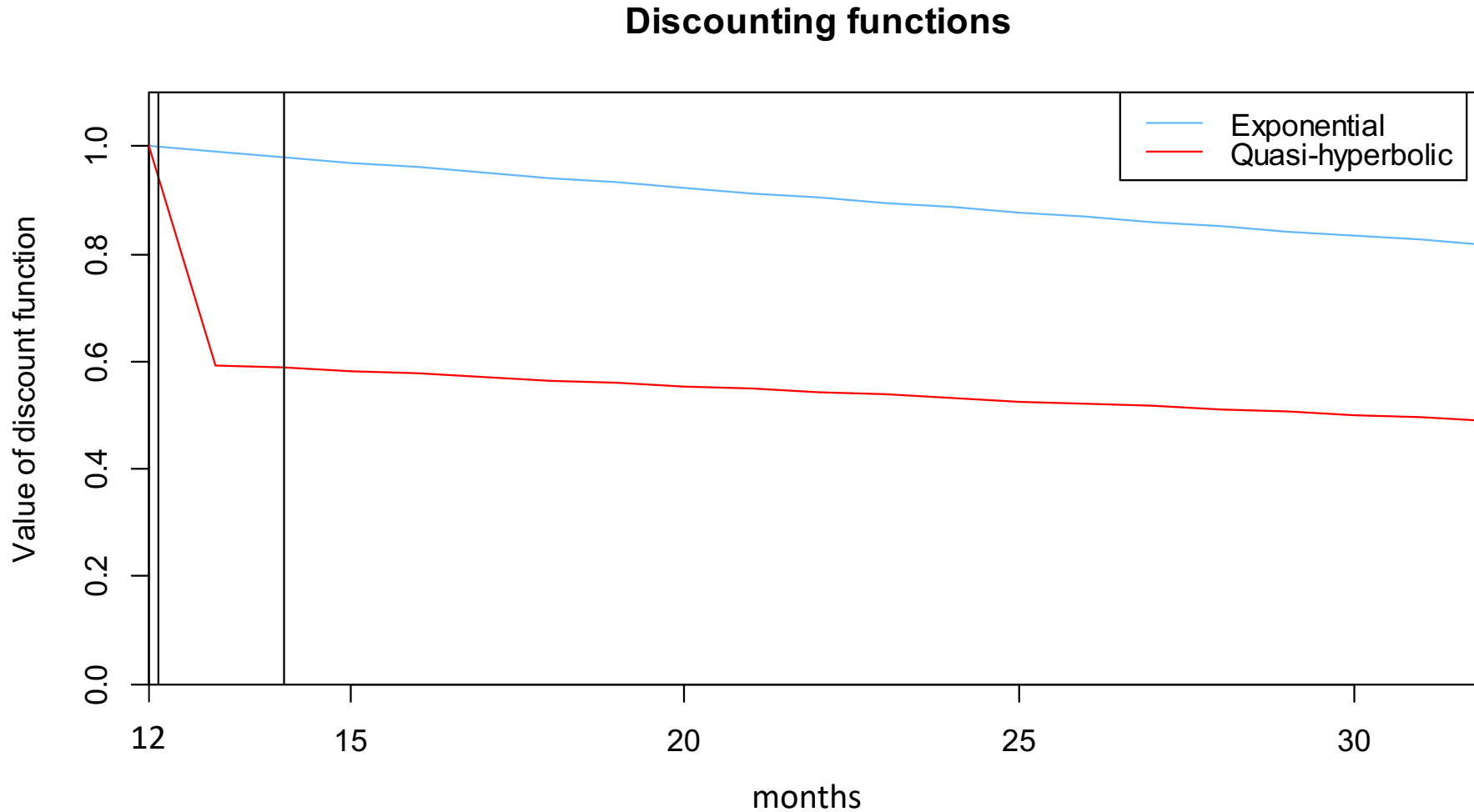
# Time inconsistency in an intertemporal trade-off (2)

- For example, a choice between two delayed payments in time (12<sup>th</sup> month and 14<sup>th</sup> month).



In  $t=0$ , we assume that both time-consistent and time-inconsistent agents have implied discounted rates such as they are indifferent between the two payments.

# Time inconsistency in an intertemporal trade-off (3)



## 1 year later...

In  $t=12$ , the payments are the same, but one is instantaneous and the other is delayed.

→ Time-consistent agent is still indifferent.

→ Time-inconsistent agent prefers the first payment.

# Data and the measure of time preferences

- A national French survey “Motivations de depart en retraite” on new retirees between July 2012 and June 2013, merged with administrative data.
  - Cohorts: 1948 – (first quarter) 1952
  - Individuals who were employees of the private and public sectors, non-active civil servants or self-employed and who have contributed at least one year to the private sector employee pension fund during their careers.
- Based on questions on motivations to retire, I construct two ordinal synthetic scores: **Short-term impatience (proxy of  $\beta$ )** and **Long-term impatience (proxy of  $\delta$ )** scores.
  - **1<sup>st</sup> step:** Two groups of questions:
    - “You decided to retire that year because of the lack of information on earlier/later retirement possibilities”.
    - > Overweighting of instantaneous disutility from the search cost. Linked to short-term impatience (4 items).
    - “You decided to retire because your future pension was sufficient”.
    - > implies the anticipation of future incomes. Linked to long-term impatience (5 items)
  - **2<sup>nd</sup> step:** answers are recoded in such a way that most impatient agents have the highest scores.

# The econometric strategy

## Two main objectives

- Verify the impact of time inconsistency on delaying retirement to get a bonus (binary dependent variable)
- Control the likely endogeneity of the bonus knowledge (binary endogenous variable)

→ Use of a **recursive bivariate probit model**, with two latent dependent variables:

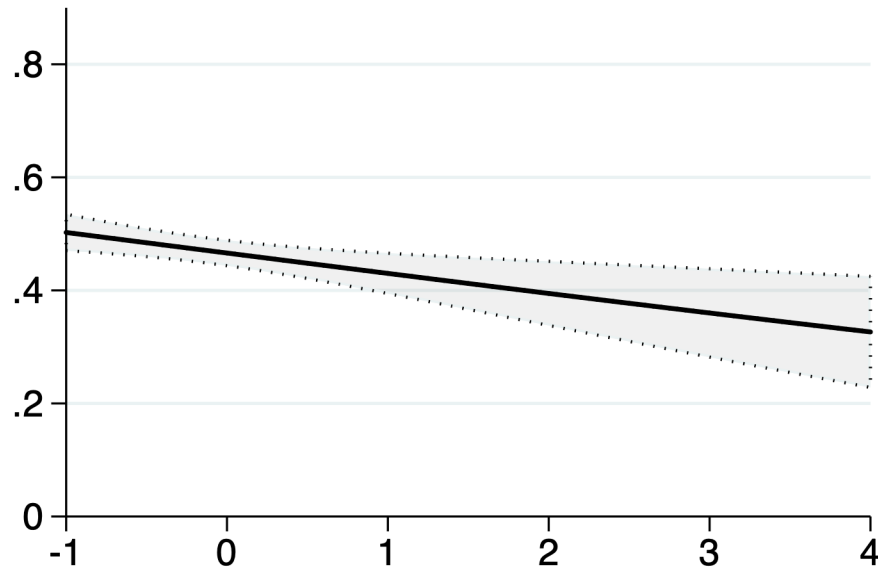
$$\begin{cases} y_1^* = X_1\beta_1 + \alpha Z + \varepsilon_1, & y_1 = 1(y_1^* > 0), \\ y_2^* = X_2\beta_2 + \gamma y_1 + \varepsilon_2, & y_2 = 1(y_2^* > 0), \end{cases}$$

With  $y_1$  the bonus knowledge and  $y_2$  the delayed retirement choice to get a bonus.  $X_2$  includes both short-term and long-term impatience scores.  $Z$  is a set of instruments.

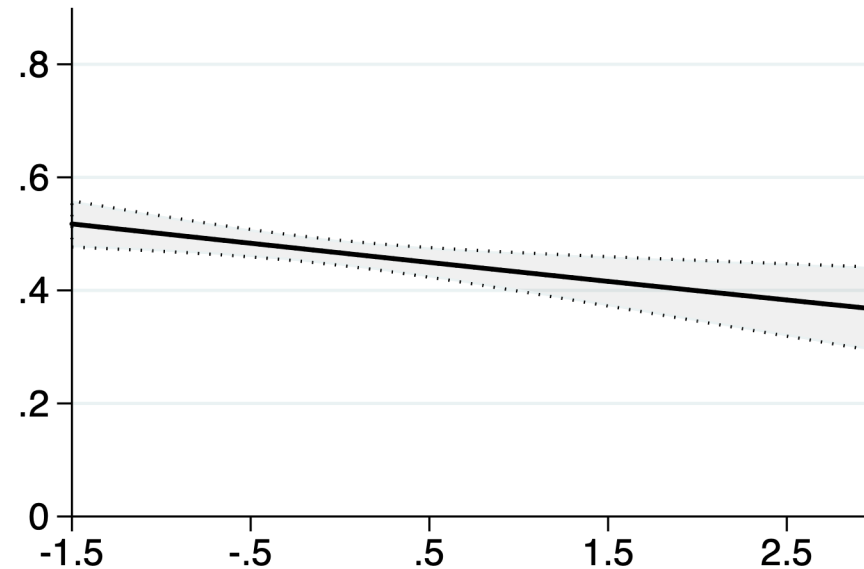
$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \end{pmatrix} \rightarrow N \left( \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right) \text{ with } \rho \text{ the correlation between the error terms.}$$

# Results

- Both short-term and long-term impatience scores are **significant and impact negatively** the probability of retiring with a pension bonus.
- The marginal effects are not very meaningful (synthetic scores) → I compute the average predicted probability of retiring with a bonus by fixing the level of short-term and long-term impatience, and letting the other explanatory variables at their true values, plotted with following graphs:



A. Short-term impatience



B. Long-term impatience

Between the most time-consistent agent and the most time-inconsistent agent, an absolute difference in average predicted probabilities of -31.60% (55.41% compared to 23.81%).



# Conclusion

- Time inconsistency is a key determinant of the decision to delay retirement to get the bonus.
  - Another **Behavioral** explanation of the limited effectiveness of financial incentives.
- Considering nonstandard preferences (time inconsistency or loss aversion) can improve public information and the efficiency of public policies (Thaler and Sunstein, 2008).
  - For example, by **Nudging** (Thaler and Sunstein, 2008): the way in which the information is presented can change behaviors and limit the impact of behavioral bias.

**Thank you for your attention!**

# References

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	Knowledge of the bonus			Retire with bonus		
	0	1	Student test (S), Wilcoxon-Mann-Whitney test (Z), Pearson chi-squared test (P)	0	1	Student test (S), Wilcoxon-Mann-Whitney test (Z), Pearson chi-squared test (P)
Short-term impatience	0.0750	-0.1006	S = 2.7999***	0.1569	-0.1833	S = 5.5261***
Long-term impatience	-0.0066	0.0088	S = -0.2437	0.1301	-0.1519	S = 4.5587***
Risk aversion (score between -2 and 4)	1.0321	0.9184	Z = 0.960	1.0665	0.8866	Z = 1.988**
Health status (score between 1 and 4)	3.34	3.61	Z = -3.744***	3.32	3.61	Z = -4.633***
Average Annual Salary	19568.72	23129.15	S = -5.8977***	19657.33	22763.85	S = -5.1656***
Gender (woman=1)	53.98%	45.80%	P = 6.7458***	53.06%	47.48%	P = 3.1926*
Another source of income in the household	66.33%	67.57%	P = 0.1768	69.60%	63.66%	P = 4.0959**
Knowledge of the actual insurance duration	26.73%	38.78%	P = 16.8613***	33.09%	30.46%	P = 0.8176
Knowledge of the reference insurance duration	35.53%	56.24%	P = 43.8519***	42.27%	46.85%	P = 2.1817
Age of the first contribution	17.84	18.36	S = -3.3091***	17.99	18.14	S = -0.9800
Participation in the labor force index	0.8837	0.9502	S = -7.4737***	0.8894	0.9387	S = -5.5091***
Knowledge of the bonus				33.99%	52.94%	P = 37.6252***

Results for the first equation  
P(Knowledge of the bonus=1)

Knowledge of the bonus	Bivariate probit
Average Annual Salary (ref: less than 12500)	
12500 to 25000 euros	-0.035 (0.125)
More than 25000 euros	0.421 (0.142)***
Occupation before retirement (ref: private sector employee)	
Non-active civil servant	0.302 (0.130)**
Employee of the public sector	0.211 (0.176)
Self-employed worker	-0.425 (0.172)**
Full-time job	-0.025 (0.120)
Contribution to more than one fund	0.190 (0.092)**
Woman	0.201 (0.098)**
Instruments	
Participation to the labor force index	2.008 (0.376)***
First contribution age	0.015 (0.016)
Knowledge of actual insurance duration	-0.003 (0.087)
Knowledge of reference insurance duration	0.340 (0.090)***
Constant	-2.797 (0.498)***

<b>Retiring with bonus</b>	<b>Simple probit</b>	<b>Bivariate probit</b>
<b>Average Annual Salary (ref: less than 12500)</b>		
12500 to 25000 euros	0.364 (0.121)***	0.274 (0.118)**
More than 25000 euros	0.249 (0.134)*	-0.118 (0.154)
<b>Preferences</b>		
Short-term impatience	<b>-0.159</b> <b>(0.047)***</b>	<b>-0.122</b> <b>(0.041)***</b>
Long-term impatience	<b>-0.127</b> <b>(0.045)***</b>	<b>-0.115</b> <b>(0.039)***</b>
Small risk aversion	0.083 (0.115)	0.064 (0.095)
High risk aversion	-0.041 (0.105)	-0.009 (0.086)
<b>Occupation before retirement (ref: private sector employee)</b>		
Non-active civil servant	-0.258 (0.126)**	-0.372 (0.118)***
Employee of the public sector	-0.046 (0.177)	-0.115 (0.165)
Self-employed worker	-0.304 (0.161)*	-0.136 (0.164)
Full-time job	0.328 (0.118)***	0.293 (0.116)**
Woman	0.006 (0.089)	0.005 (0.083)
Knowledge of the bonus	0.440 (0.086)***	1.530 (0.216)***
Constant	-0.567 (0.178)***	-0.735 (0.163)***
N	1032	1032
Rho		-0.78

Results for the second equation  
P(Retirement with a bonus=1)