Behavioral Determinants of Blood Donation

Theory and Empirical Findings in the French Context

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Introduction

The Economics of blood donation

- How to maintain/increase blood products supply ?
  - Financial incentives
    - Titmuss (1970) payment will decrease blood donation, increase unsafe blood donation
    - vs. Lacetera et al. (2013) using RCT in US find paid donation works! Still, can't always pay or increase altruism...
  - Increasing recruitment campaigns efficacy (Behavioral economics)
    - Lots of new innovative hypotheses e.g. Why Intention of donating blood > Share of donors? (Slonim et al. 2014)
    - RCTs led to new explanations → Present (over time) biased preferences, Unsure of value of donating, etc.

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  - Increasing recruitment campaigns efficacy (Behavioral economics)
    - Lots of new innovative hypotheses e.g. Why Intention of donating blood > Share of donors? (Slonim et al. 2014)
    - RCTs led to new explanations → Present (over time) biased preferences, Unsure of value of donating, etc.
- Focus on new determinants of blood donation
  - Preferences as new levers (opportunity cost + information already considered)
    - Need for a theoretical background to clarify intrinsic / extrinsic incentives
    - Provide the basis for RCTs in France (provide strong results, but difficult to generalize–US context)

Introduction

- The French context
  - Voluntary non-remunerated blood donation
    - System based on Titmuss' principle, like many European countries
    - Blood donation is a pro-social behavior (Bénabou & Tirole, 2006)
  - Blood donation may be associated with adverse health outcomes
    - Dizziness, faint, pain & discomfort, etc.
    - Not 100% certain of the outcome = risky pro-social behavior

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- Is risk aversion a barrier to blood donation?
  - Contribution to Public health policy
    - Increasing the effectiveness of recruiting campaigns in France
  - Contribution to Economics
    - Extending model for pro-social behavior (Bénabou & Tirole, 2006) to risk-aversion
    - Adapting the model to the French context and use French data to test assumptions

The model

If the individual does not donate blood, or $a = 0$, the individual utility level is

$$U(H + x\gamma_a E(v_a \mid a = 0)).$$

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Reputational payoff of non-donors (impure altruism)

The model

If the individual does not donate blood, or $a = 0$, the individual utility level is

$$U(H + x\gamma_a E(v_a \mid a = 0)).$$

If the individual donates blood, or $a = 1$, then the expected utility level equals

$$EU(\tilde{y}H + v_a + x\gamma_a E(v_a \mid a = 1) - C).$$

Perceived health risk

Health

Intrinsic valuation of blood donation (pure altruism)

Willingness to appear altruistic to others

Intrinsic valuation of blood donation (pure altruism)

Cost of action

Visibility of action

Reputational payoff of donors (impure altruism)

The model

We show in appendix that a type v_a individual donates blood if and only if:

$$\begin{aligned} & v_a + x\gamma_a \left(E(v_a \mid a=1) - E(v_a \mid a=0)\right) - C - (1 - E(\tilde{y}))H \\ \geq \ & \frac{1}{2} r_A(H) \left(H^2\sigma^2 + (v_a + x\gamma_a E(v_a \mid a=1) - C - (1 - E(\tilde{y}))H)^2\right). \end{aligned} \tag{1}$$

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Variable	First effect (lhs)	Second effect (rhs)	Testable assumption
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The second effect
Blood donation reduces expected wealth by means of its expected negative impact on health

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Net reputational gain	+	(cf. details)	"Shame > Honor"

Net reputational gain = *f* (overall participation)

When participation increases, stigma rises because the least altruistic agents start giving blood

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Health	–	?	Difficult to say…

* cf. details – due to the effect of health on risk aversion

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Risk aversion		–	Second effect

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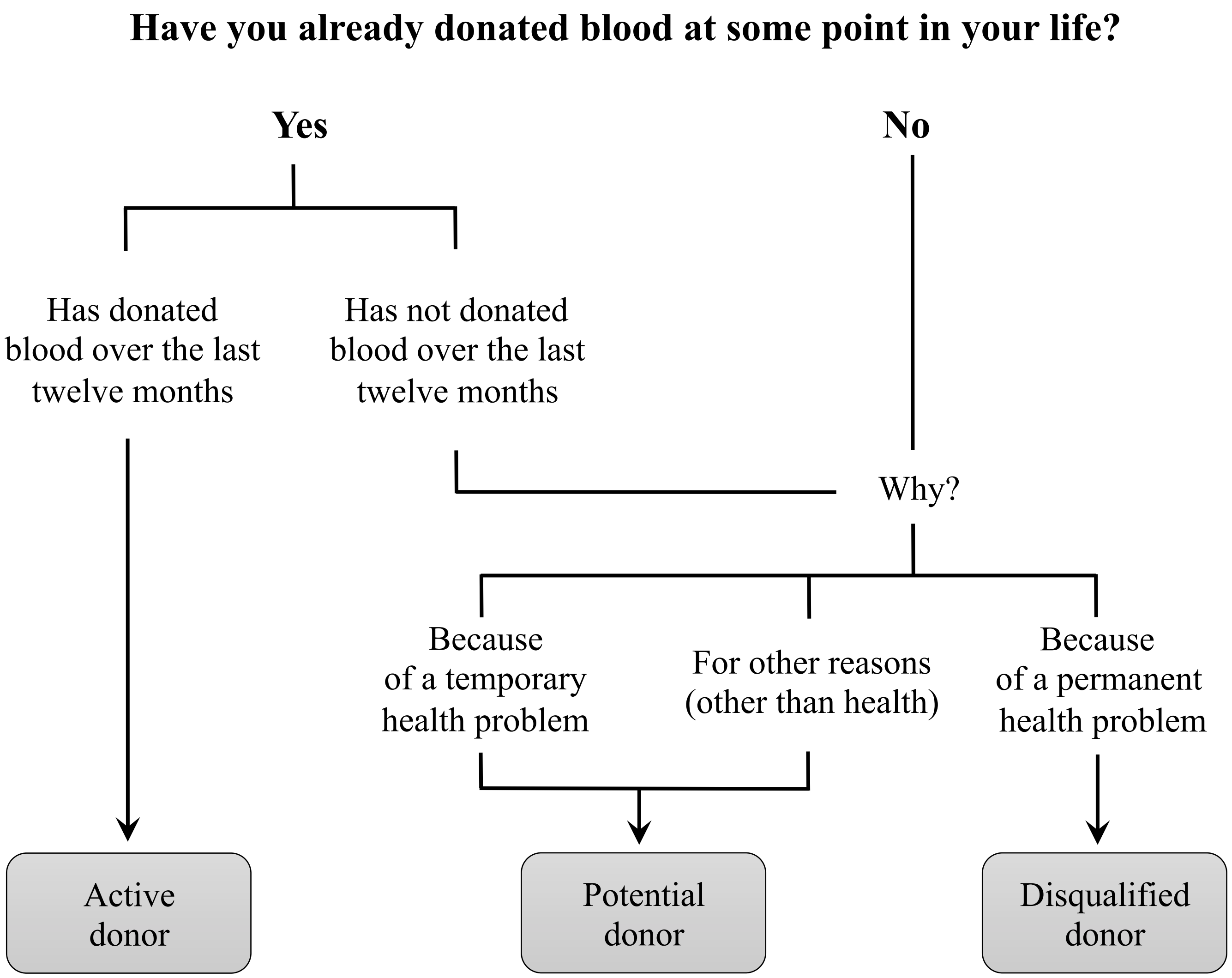
Materials and methods

- Data
  - ESPS 2012 The French health, health care, and insurance survey (IRDES, since 1988)
  - Representative of the French population living in the community
  - N= 10,132 obs. Sample restricted to 18-70 years old (legal age for blood donation)
  - Variables
    - Health, demographics, social, and economic data
    - Partnership with EFS led to a module on blood donation : classification of donors, motivations
- Classification of donors
  - Not everyone can be a donor → Health requirements
  - Potential sample selection issue as health is endogenous to the theoretical model

Materials and methods



Materials and methods

- Identification strategy
  - Sample selection (conditional choice)

    Hurdle model favored over the Heckman model

    - Reason 1: The only exclusion criteria (health) is endogenous to the theoretical model
    - Reason 2: Focus on the reason of the current choice to give, not the potential one

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    - Reason 1: The only exclusion criteria (health) is endogenous to the theoretical model
    - Reason 2: Focus on the reason of the current choice to give, not the potential one
  - Hurdle models assume that the residuals of the 2 equations are uncorrelated

    Different-person analogy (two independent generating processes)

    - (Eq. 1) Health profess. decide over (dis-)qualification of the individual (≠ Grossman 1972)
    - (Eq. 2) The individual (if qualified) decides or not to give her blood

Materials and methods

- A bivariate Probit model:

$$y^*_{1j} = x_j\beta + \epsilon_{1j} \qquad E(\epsilon_1) = E(\epsilon_2) = 0$$
$$\mathrm{Var}(\epsilon_1) = \mathrm{Var}(\epsilon_2) = 1$$
$$y^*_{2j} = z_j\gamma + \epsilon_{2j} \qquad \mathrm{Cov}(\epsilon_1, \epsilon_2) = \rho$$

  - Note 1: similar to Heckman model where $\rho = 0$ (to within a constant factor σ_u)
  - Note 2: identification works fine in hurdle if $\beta \neq \gamma$ (i.e. support the 2 generating processes)

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- Model specifications and Robustness checks
  - Alt. model is Heckman with weak exclusion criteria, with IMR
    - Exclusion criteria (Health, BMI) + Altruism (Organ donor, vaccine)
  - Choice of explanative variables (x_j , z_j)
    - Proxies for main explanative variables (endogenous to the theoretical model)
    - Controls (exogenous to the theoretical model) Age, sex, educ., income, survey mode
    - Crossed-terms systematically analyzed

Materials and methods

Main variables	**Proxy measures**
Risk aversion	Self-report of risk-aversion on a 10 points scale
Altruism (pure & impure)	- Organ donor after death (not associated with cost, no potential health damage) Estimation of pure altruism as the difference btw Altruism & Net rep gain (impure alt.)
Net reputational gain	A function of donors participation rate: (Nb active – 1) / (Nb Active + Potential)
Cost of blood donation	Transportations costs approximated by the place of residence (spatial environment)
Subjective health loss	- Self-reported "fear of health consequences" as a reason for non donation (censored) - Estimates on qualified non-donors = *f* (Isolation; generation) + Predicted value for all
Health	MCA index of seven physical and mental health measures

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Results

Table 1. Sample descriptive statistics

Variables	Mean	Std. Dev.	Min	Max
Blood donor category				
Active	0.068		0	1
Potential	0.543		0	1
Disqualified	0.389		0	1
Main variables				
Risk-aversion scale	5.846	2.425	0	10
Organ donor	0.562		0	1
Donors participation rate	0.109	0.021	0.084	0.162
Living area				
Outer suburbs	0.203		0	1
Multipolar town	0.057		0	1
Urban center	0.534		0	1
Rural area	0.206		0	1
Health index (MCA)	0.713	0.155	0	0.914
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Table 3.1. Model estimates – Equation of interest

Dep. var.	Active donor (1) vs. Non-donor (0)			
	Hurdle		Heckman	
Estimates	Coeff.	t-stat	Coeff.	t-stat
Main variables				
Risk-aversion scale	-0.033***	-3.672	-0.034***	-3.627
Organ donor	0.348***	7.841	0.375***	7.542
Donors participation rate	3.805***	4.200	4.107***	4.185
Living area				
Outer suburbs	0.033	0.660	0.031	0.591
Multipolar town	0.127	1.572	0.135	1.540
Urban centre	Ref.	Ref.	Ref.	Ref.
Rural area	0.024	0.463	0.024	0.419
Health index (MCA)	2.038***	11.009	1.428***	2.789
Fear of health consequences	-6.508**	-2.178	-7.239**	-2.184
Controls				
N	10132		10132	

Legend: * p<.1, ** p<.05, *** p<.01. Robust standard-errors used to compute t-stats.

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Risk averse indiv. are less prone to give blood

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Altruistic motives = classic determinant

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Shame > Honor

/!\ Manski (1993)
"Reflection problem"

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No effect of the Cost of blood donation because the EFS deploys a fleet of medical trucks everywhere

Cost as health vs. income = 1 vs. 2 arg. In U function

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Smaller than the selection effect (hereafter)

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Display the expected signs

Results

Table 3.2. Model estimates – Selection equation

Dep. var.	Qualified (1) vs. Disqualified donor (0)			
	Hurdle		Heckman	
Estimates	Coeff.	t-stat	Coeff.	t-stat
Main variables				
Organ donor	-0.069**	-2.346	-0.072**	-2.422
Vaccine <10 years	-0.068**	-2.232	-0.064**	-1.977
Body mass index				
Underweight	0.048	0.596	0.031	0.357
Normal	Ref.	Ref.	Ref.	Ref.
Overweight	-0.060*	-1.837	-0.059*	-1.783
Obese	-0.198***	-4.688	-0.205***	-4.676
Missing data	-0.060	-0.595	-0.060	-0.591
Health index (MCA)	4.328***	37.424	4.345***	37.323
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Organ donors + Vaccine
= Altruistic motives
= Substitution effect

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Overweight	-0.060*	-1.837	-0.059*	-1.783
Obese	-0.198***	-4.688	-0.205***	-4.676
Missing data	-0.060	-0.595	-0.060	-0.591
Health index (MCA)	4.328***	37.424	4.345***	37.323
Controls				
N	10132		10132	
Chi2	0.979		2.066	

Legend: * p<.1, ** p<.05, *** p<.01. Robust standard-errors used to compute t-stats.

Health is the main exclusion criteria

Results

Table 3.2. Model estimates – Selection equation

Dep. var.	Qualified (1) vs. Disqualified donor (0)			
	Hurdle		Heckman	
Estimates	Coeff.	t-stat	Coeff.	t-stat
Main variables				
Organ donor	-0.069**	-2.346	-0.072**	-2.422
Vaccine <10 years	-0.068**	-2.232	-0.064**	-1.977
Body mass index				
Underweight	0.048	0.596	0.031	0.357
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Higher than the effect on the decision to give

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Results

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Legend: * p<.1, ** p<.05, *** p<.01. Robust standard-errors used to compute t-stats.

Support for the Hurdle Model:
-Diff coeff. in Eq1-Eq2
-Chi2 < Critical value

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Conclusion

- Main findings (stemming from theory and econometrics)
  - Risk averse individuals are less prone to give their blood
    - Rejoinder with the internat. litt. on the effect of preferences on blood donation
  - Stigma consideration (shame) dominate honor as a motive for blood donation
    - New interpretation (intrinsic motivations) for cross-area comparisons in blood donors rate
  - Altruism (pure + impure) increased the probability of donating blood
    - Rather innovative result = the substitution effects for disqualified donors
- Main strength/limit
  - Tight linkage between theory and empirics
    - May be difficult to tie all the knots, but provides new insights

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Conclusion

- Discussion
  - Theoretical model
    - Additive vs. multiplicative risk + 1 vs. 2 arguments (cost) in the U. function => similar results
    - Alternative model: health capital model with time preferences (Becker et Murphy, 1988)
  - Identification issues
    - Endogeneity of preferences (risk aversion) goes beyond the scope of the model
    - The "net reputational gain" caused by a third factor (Mansky, 1993) → secondary concern…
- Follow-up
  - Field experiment (RCT) with the French National Blood Service (EFS) & IRDES
    - Why primo donors do give blood only once?
    - Anticipations vs. deception (*ex-ante* realistic anticipations + *ex-post* feed-back session)

THANK YOU!

LET'S KEEP IN TOUCH:

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