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Surveying citizens to estimate welfare measures: a cost-benefit analysis of In-Vitro-Fertilization

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Agenda

1. Policy context
2. Objectives
3. Methods
4. Data source and sampling
5. Results
6. Reflections

Policy Context

- Pre “Legge 40” regulating Assisted Reproduction Techniques (ARTs) in Italy
- In the 90s ARTs often used as a case of explicit rationing (Clinton’s Plan, Deccker Plan in the Netherlands, exclusion by NHS coverage in several English NHS authorities)
- ARTs peculiarities: adults couples, medical condition and personal responsibility, ethics, problems with CEA
- “Baby business”: a new market where demand (desire of procreation and ancillary “needs”) is increasing and technologies make possible to satisfy demand
- Society: demographics and women’s role

Objectives

Methodological

- Test the feasibility of internet surveys for Willingness-To-Pay (WTP) Contingent Valuation (CV) studies
- Compare Take-It-Or-Leave-It (TIOLI) to Payment Card formats in CV survey
- Investigate the possibility of negative WTP in health care???

Policy

- Estimate WTP for personal use of In-Vitro-Fertilisation (IVF) and for a publicly funded programme providing IVF to infertile couple
- Perform a cost-benefit analysis of the public programme
- Evaluate the distribution of WTP across population groups (age, socio-economic condition, attitude towards ARTs)

Data

National Survey conducted by ISPO/Nielsen

- Internet panel regularly interviewed on political preferences and market research (about 6,500 individuals)
- Selected to include individuals belonging to different age group, regions, socio-economic conditions, dimension of municipality of residence
- Weighting system produce “representative” estimates
- Web-based
- Questionnaire discussed with some experts and then tested by 10 people (using a paper format)
- Questions on demographic and socio-economic characteristics of respondents + attitude to IVF + WP questions

Personal use of IVF

Immagini di essere in una situazione in cui è sposato/a da qualche anno e in cui, malgrado desiderandoli, non riesca ad avere dei bambini. Immagini che le venga indicata la Fertilizzazione in Vitro e che le venga prospettata una probabilità del 30% di riuscire ad avere un bambino. Lei personalmente proverebbe la fertilizzazione in Vitro:

Please, for each alternative indicate yes or not"

If it were free	□ Yes, I would try IVF □ No, I would not try IVF
If it cost £ 1 million (€ 516)	□ Yes, I would try IVF □ No, I would not try IVF
If it cost £ 5 million (€ 2,582)	□ Yes, I would try IVF □ No, I would not try IVF
If it cost £ 10 million (€ 5,165)	□ Yes, I would try IVF □ No, I would not try IVF
If it cost £ 20 million (€ 10,329)	□ Yes, I would try IVF □ No, I would not try IVF
If it cost £ 50 million (€ 25,823)	□ Yes, I would try IVF □ No, I would not try IVF

WTP for a publicly funded IVF proramme (TIOLI)

- *"Imagine that there is a referendum in order to decide whether to fund IVF with public money. Each year public funding would be available to about 30,000 couples who are advised to use IVF. Out of these couples about 10,000 would have a baby. Without public funding, couples requiring IVF should spend between It. Liras 5 and It. Liras 15 million for the procedure"*

- ***"Would you vote in favour of funding IVF with public money if you were asked an annual payment, that is a tax, of Italian Liras X?""***

Split into four groups

- ***X = € 2.6***
- ***X = € 5.2***
- ***X = € 10.3***
- ***X = € 25.8***

Payment card: WTP for a IVF programme for infertile couple

"How much would you be willing to pay annually? For each alternative, please indicate would you try IVF if…….Please, for each alternative indicate yes or no."	
It. Liras 2,000 (€ 1.0)	□ Yes, I would pay □ No, I would not pay
It. Liras 5,000 (€ 2.6)	□ Yes, I would pay □ No, I would not pay
It. Liras 10,000 (€ 2.6)	□ Yes, I would pay □ No, I would not pay
It. Liras 20,000 (€ 10.3)	□ Yes, I would pay □ No, I would not pay
It. Liras 50,000 (€ 25.8)	□ Yes, I would pay □ No, I would not pay
It. Liras 80,000 (€ 41.3)	□ Yes, I would pay □ No, I would not pay
It. Liras 100,000 (€ 51.6)	□ Yes, I would pay □ No, I would not pay
It. Liras 200,000 (€ 103.3)	□ Yes, I would pay □ No, I would not pay

Table. Socio-economic characteristics of survey respondents (n=5,739).

	Total		
	#	%	Cum %
Self-reported socio-economic status			
Low	1,235	21.52	21.52
Low-middle	942	16.41	37.93
Middle	1,733	30.20	68.13
Middle-upper	1,369	23.85	91.98
Upper	460	8.02	100.00
Self-reported household monthly income (after taxes)			
Up to It £ 800.000 (€ 413)	47	0.82	0.82
It £ 800.001-1.000.000 (€ 413-516)	64	1.12	1.93
It £ 1.000.001-1.500.000 (€ 516-775)	272	4.74	6.67
It £ 1.500.001-2.000.000 (€ 775-1.033)	803	13.99	20.67
It £ 2.000.001-2.500.000 (€ 1.033-1.291)	904	15.75	36.42
It £ 2.500.001-3.000.000 (€ 1.291-1.549)	652	11.36	47.78
It £ 3.000.001-3.500.000 (€ 1.549-1.808)	536	9.34	57.12
It £ 3.500.001-4.000.000 (€ 1.808-2.066)	545	9.50	66.61
It £ 4.000.001-5.000.000 (€ 2.066-2.582)	502	8.75	75.36
It £ 5.000.001-6.000.000 (€ 2.582-3.099)	249	4.34	79.70
It £ 6.000.001-7.000.000 (€ 3.099-3.615)	86	1.50	81.20
It £ 7.000.001-8.000.000 (€ 3.615-4.132)	48	0.84	82.04
More than It £ 8.000.000 (€ 4.132)	98	1.71	83.74
" I prefer not to answer"	933	16.26	100.00

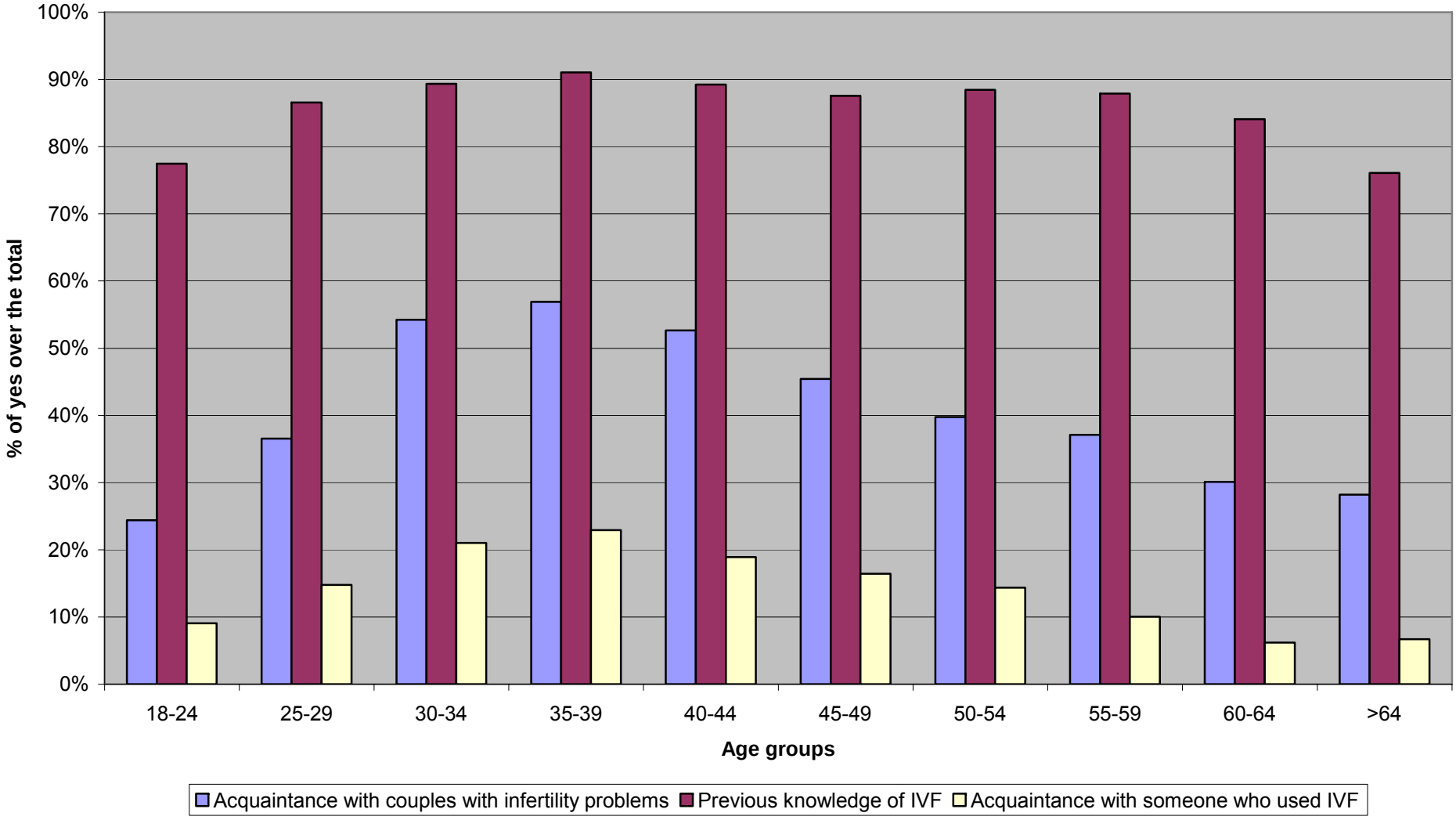
Multiple regression: self reported level of Knowledge of In-Vitro-Fertilisation and socio-economic characteristics (dependent variable: *You would state that your level of knowledge of In-Vitro-Fertilisation is*: very limited (1), limited (2), intermediate (3), deep (4), very deep (5))

	Full dataset: all dependent variables included	
Number of observations	4,960	
Fisher test	(11, 4,848) 20.80	
P-value (p> F)	<0.0001	
R^2	0.0675	
	Coefficient	t-student (p-value)
Age	-0.0025	-1.29 (0.196)
Fertility age*	0.045	1.02 (0.308)
Gender	0.1237	4.78 (<0.001)
Education**	0.1981	11.70<0.001)
Employed (yes=1, no=0)	-0.0272	-0.96 (0.338)
North (yes=1, no=0)	0.0166	-0.47 (0.637)
South (yes=1, no=0)	-0.0002	-0.00 (0.996)
County town (yes=1, no=0)	0.0254	1.00 (0.315)
Married*** (yes=1, no=0)	0.1704	4.93 (<0.001)
Number of children	0.0216	1.68 (0.094)
Self-reported socio-economic status or monthly net income	0.0037	0.37 (0.712)
Constant	1.6973	14.33 (<0.001)

Predicted probability according to the full dataset models according to education level

	Number of respondents	Mean probability (standard deviation) fitted by the stepwise regression model		
		Acquaintance with infertile couples	Acquaintance with someone who used IVF	Knowledge of IVF
Less than 8 year of school	609	0.335 (0.093)	0.090 (0.030)	0.730 (0.059)
Between 8 and 13 years of school	2068	0.406 (0.115)	0.134 (0.049)	0.824 (0.072)
High school diploma	2577	0.446 (0.130	0.173 (0.065)	0.908 (0.043)
University degree	485	0.520 (0.114)	0.232 (0.074)	0.970 (0.014)

Figure 6.1 The curvilinear relation between age and knowledge of infertility and IVF



Tobit regression model of willingness to pay for per personal use of IVF in case of infertility: payment card data

(dependent variable: 6 values ranging from It. Liras 0 to It. Liras 50.000.000 (€ 25,823);

	Income dataset: stepwise regression model (5% significance level)	
Number of observations	4,806	
Likelihood Ratio χ^2 (p-value)	1009.56 (<0.0001)	
Pseudo R^2	0.032	
	2,623 left-censored observations 422 right-censored observations	
	Coefficient	t-student (p-value)
Age	-0.0884	-5.14 (<0.001)
Fertility age (1= age from 18 to 44, 0 otherwise)		
Gender (female=1, male=0)		
Education*	1.4723	5.97 (<0.001)
Employed (yes=1, no=0)	1.0925	2.82 (0.005)
North (yes=1, no=0)	-0.3734	-5.62 (<0.001)
South (yes=1, no=0)		
County town (yes=1, no=0)		
Married** (yes=1, no=0)		
Number of children		
Self-reported socio-economic status or monthly net income***	0.000701	5.91 (<0.001)
Constant	-3.8789	-4.00 (<0.001)

Logistic regression of WTP for a publicly funded IVF programme. Dependent variable: Yes definitely or probably (=1) and No definitely or probably (=0) to the question *"Would you vote in favour of funding IVF with public money if you were asked an annual payment, that is a tax, of Italian £ X?"";* bids € 2.6, € 5.2, € 10.3 and € 25.8

	Income dataset: stepwise regression model (5% significance level)	
Number of observations	4,071	
Likelihood Ratio χ^2 (p-value)	187.41	
Pseudo R^2	0.0341	
	Odds Ratio	Z (p-value)
Bid*	0.9838	-8.84 (<0.001)
Age	0.9792	-6.60 (<0.001)
Fertility age (1= age from 18 to 44, 0 otherwise)		
Gender (female=1, male=0)		
Education**	1.0978	2.01 (0.045)
Employed (yes=1, no=0)	1.1745	2.23 (0.026)
North (yes=1, no=0)		
South (yes=1, no=0)	1.1813	2.34 (0.019)
County town (yes=1, no=0)	1.1952	2.65 (0.008)
Married*** (yes=1, no=0)	1.5069	4.56 (<0.001)
Number of children	0.9008	-2.96 (0.003)
Self-reported socio-economic status or monthly net income****	1.0903	3.70 (<0.001)

WTP for personal use of IVF in case of infertility (hypothetical scenario presented in the questionnaire) (5,739 respondents)

Value	Willing to Pay # (%)	No Willing to Pay # (%)
€ 0	3,040 (53.0)	2,699 (47.0)
€ 516	2,482 (43.2)	3,257 (56.8)
€ 2,582	1,895 (33.0)	3,844 (67.0)
€ 5,165	1.309 (22.8)	4,430 (77.2)
€ 10,329	879 (15.3)	4,860 (84.7)
€ 25,823	500 (8.7)	5,239 (91.3)

WTP for a publicly funded programme providing IVF to infertile couples: payment card format (all values presented to the entire sample)

	Willingness-to-Pay			
Values	Yes		Not	
	#	%	#	%
€ 1.0	3,192	55,62%	2,547	44,38%
€ 2.6	3,168	55,20%	2,571	44,80%
€ 5.2	3,043	53,02%	2,696	46,98%
€ 10.3	2,632	45,86%	3,107	54,14%
€ 25.8	1,845	32,15%	3,894	67,85%
€ 41.3	1,291	22,50%	4,448	77,50%
€ 51.6	1,127	19,64%	4,612	80,36%
€ 103.3	590	10,28%	5,149	89,72%

WTP for a publicly funded programme providing IVF: referendum format (each bid presented to one of the four sub-samples)

Value	Yes (probably or definitely)	No (probably or definitely)
€ 2.6	63.3%	36.7%
€ 5.3	64.2%	35.8%
€ 10.3	59.6%	40.4%
€ 25.8	48.2%	51.8%

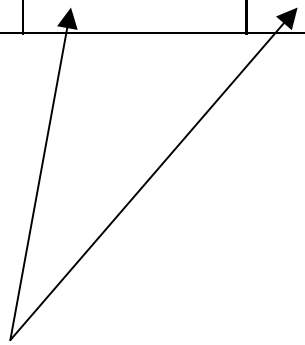
Total and mean WTP for a public programme funding IVF to infertile couples (5,739 respondents)

Amount offered	Mid-range value (*)	Number of respondents willing to pay	Total Willingness to pay
It. Liras 0	0	2,057	€ 0
It. Liras 2.000 (€ 1)	€ 1.80	109	€ 196
It. Liras 5.000 (€ 2.60)	€ 3.90	251	€ 979
It. Liras 10.000 (€ 5.20)	€ 7.80	474	€ 3,697
It. Liras 20.000 (€ 10.30)	€ 18.10	869	€ 15,728
It. Liras 50.000 (€ 25.80)	€ 33.60	561	€ 18,849
It. Liras 80.000 (€ 41.30)	€ 46.50	251	€ 11,420
It. Liras 100.000 (€ 51.60)	€ 77.50	577	€ 44,717
It. Liras 200.000 (€ 103.30)	€ 103.30	590	€ 60,947
Total WTP (€)			€156,536
Mean WTP per respondent (€)			€ 27.28

WTP for a publicly funded programme providing IVF to infertile couples and WTP for personal use of IVF:…

some individuals willing to pay for something they would never use, even in case of "need"!!!!

	"Imagine you are infertile and you desire a baby. Would you try IVF?"						
	Do not know	No, definitely not	No, probably not	Yes, probably yes	Yes, definitely yes	Not	Yes
Mean WTP per respondent	17.83	8.68	16.94	38.68	49.59	12.77	42.13
% of respondents having positive WTP	50.7%	26.6%	50.2%	88.3%	91.3%	65.5%	83.8%



Pure altruism

Mean WTP from the TIOLI Format (four subsamples and one bid foe each sub sample)

If Probability of answering "yes" follows a logistic distribution, then

$$P(yes) = (1 + e^{-a+b*bid})^{-1}$$

$$E(WTP) = \int_{L}^{U} (1 + e^{-a+b*bid})^{-1} db - \int_{L}^{0} 1 - (1 + e^{-a+b*bid})^{-1} db$$

Limits of integral: Min WTP (negative WTP), Max WTP

“Structural” uncertainty: results strongly dependent on assumptions on decision rules (how to treat do “not know” and “probably yes”) and integration limits

				A	B	C	D
Lower Limit				€ 0	€ 0	€ -25.8	€ -25.8
Upper Limit				€ 25.8	€103.3	€ 25.8	€ 103.3
Mod.	No/Yes	Const.	B coeff.	**Mean willingness to pay**			
1	1989/2849	0.67409	-0.01475	€ 19.04	€ 89.77	€ 8.06	€ 78.80
2	2890/2849	0.25089	-0.01264	€ 16.96	€ 82.22	€ 3.64	€ 68.89
3	1989/1274	0.13940	-0.00218	€ 14.16	€ 60.73	€ 0.99	€ 47.56
4	4465/1274	-0.8818	-0.01916	€ 10.39	€ 71.54	€ -10.06	€ 51.09

Cost-benefit analysis of a programme providing IVF to Italian infertile couples (10,000 babies born from IVF) (cost of one IVF cycle = € 2,600; probability of success after 3 cycles 30%)

Assumptions on WTP estimates	Mean WTP per survey respondents (€)	Aggregate WTP (benefits in million €)	Total costs of the programme (costs in million €)	Net benefits (million €)
Dichotomous Choice data (model 1)	19.04	898.08	237.52	660.56
Dichotomous Choice data (model 2)	16.96	799.88	237.52	562.36
Dichotomous Choice data (model 3)	14.16	667.82	237.52	430.30
Dichotomous Choice data (model 4)	10.39	490.02	237.52	252.50
Payment Card data (un-weighted)	27.28	1,286.32	237.52	1,048,80
Payment Card data (weighted)	26,59	1,253.79	237,52	1,016,27

Some reflections

• Negative Willingness to Pay for IVF? Should we include it in welfare measures? How?

• WTP for IVF strongly concentrated in a small minority of the population (mean versus median values)

- •Equity concern (but see at generational equity as well)
- •Economic measures and democratic decision making (that do not assign weight to individual preferences)

• Pure altruism (some people willing to pay for something that they would not use even in case of need)