Demand and supply of emergency help: An economic analysis of Red Cross services

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Abstract

This paper analyzes supply and demand side characteristics of (voluntary) Red Cross services in Austria. The demand side analysis is based on a contingent valuation study on people's willingness to pay for emergency treatment, transportation services and disaster relief activities. The supply side is identified by a high percentage of volunteers in the Red Cross organization which makes the provision of emergency help at low cost possible. We find that aggregate benefits of Red Cross services exceed their cost of production.

Policy conclusions are drawn with respect to future recruitment and funding: whereas intrinsic motivation is important for the decision to volunteer, and financial incentives play a minor role in general the young Red Cross activists work voluntarily for self-realization reasons and to continue their education. Age-specific recruitment strategies accompanied by word-of-mouth advertising are recommended to address potential volunteers. As long as the volunteering character of Red Cross services will be maintained and cost of production will not go up an increase of funds does not seem necessary in the future. Moreover, a radical change in the structure of funding may crowd out both donations and voluntary labor supply.
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1. Introduction

Public discussions make clear that the funding of health care reaches its limitations. Among others

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the most important cost drivers in the health systems are: the change in demographics with an unfavorable distribution of age groups, better information of patients over methods of treatment, technological progress and the increasing skill intensity in medical treatment, and people's rising standard of living. Given the constraints of (health) budgets in most economies issues of cost effectiveness and efficiency in health

care become increasingly important. Therefore, economic evaluations as an integrating part in health care assessment play a substantial role in the process of collecting information on benefits and cost of different uses of scarce resources in the health sector.

The focus of this paper is an economic analysis of health-related services in Austria provided by the Red Cross organization. These services represent public goods (demand-side characteristics) and are supplied in large part by volunteers (supply-side characteristics). The formulation of policy recommendations for the provision of Red Cross services requires the analysis of the market in its entirety. Only the joint consideration of supply- and demand-side characteristics guarantees a coherent picture of emergency help – a prerequisite for first aid policy implications.

As far as the *demand side* is concerned the measurement of output in health care can be based on physical units reflecting changes in health status (health quality). The number of reduced diseases, an increase in people's life expectancy and quality-adjusted life years are prominent examples for quality-based output indicators. These benefit indicators seem plausible and are to a large extent undisputed. However, not only economists still miss a monetary benefit scale to be compared to the cost of the health care system. Therefore, as an alternative, it is often argued for monetary welfare measures (willingness to pay = WTP) for health services and for the use of non-market valuation techniques such as contingent valuation (CV).[1] Criticism against the usefulness of empirical benefit welfare measures concentrates on these monetary values. A significant body of literature (see [1–3]) raises fundamental caveat against Contingent Valuation welfare measures. It is argued that CV responses can be better described as expressions of attitudes than as indications of economic values. This general scepticism towards monetary benefit values is not limited to health care applications. However, the authors stress that their fundamental criticism primarily applies to passive use values and that CV measures would share the strengths and weaknesses of familiar market research

techniques when applied to the elicitation of use values.

Specific criticism is raised in connection with the use of CV in health care context. In their survey [4] review 71 WTP health care studies conducted between 1985 and 1998. The authors conclude in identifying a huge mismatch between the theoretical appropriateness of WTP and its usefulness for public health policy of the majority of studies.[2] A similar perspective is brought to the fore by [5] who argues that many health care CV studies would not represent 'best practice' studies and that the proposed NOAA guidelines[3] have had almost no influence on the quality of health-related CV surveys. The claim is made for a health-specific adoption of NOAA guidelines and for the strict application of 'state of the art' CV studies in health care context.

In this paper we present benefit estimates for health-related services from a recent CV study (Section 2). In particular we provide WTP figures for Red Cross services in Austria (and compare these with the cost of provision). Even though we basically accept the above-mentioned CV criticism two arguments may justify our procedure: first, the presented survey is a 'best practice' health care application of CV according to NOAA guidelines. And second, the focus is on consumption values for Red Cross services to which the fundamental psychological caveats would not apply.

As far as the *supply side* is concerned the Austrian Red Cross organization represents one of the most important volunteer organizations in the social area with more than 41,000 part time employees and 4000 persons in regular occupation. The range of services provided covers area-wide emergency treatment for injury before regular medical aid is available, transportation services for the sick to and from hospitals, health- and social services (elderly care services, home sick-nursing, etc.), national and international disaster relief, blood donation service, and education-and-training facilities in all these areas. In Austria up to 60% of this supply is provided by volunteers who spend

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[1] Hammitt [6] provides a comparison of willingness to pay figures with quality-adjusted life years as alternative measures of the value of reductions in health risk. Kristiansen [7] and Olsen and Donaldson [8] present willingness to pay figures for a helicopter rescue system in the rural region Troms in Norway.

[2] For another rather sceptical view, see [9].

[3] On behalf of the National Oceanic and Atmospheric Administration (NOAA) a distinguished panel of social scientists, chaired by two Nobel laureates, provided an extensive set of guidelines for CV survey construction, administration, and analysis.

a significant amount of leisure time without any payment in return. Public comments stress how important and indispensable volunteers are and thereby support the Red Cross system in its present form. Hence, we provide a typology of Red Cross volunteers according to their socio-economic attributes and investigate the motives behind volunteering (Section 3).

Previous attempts to evaluate the Red Cross system in monetary terms have been limited to the aggregation of volunteers' opportunity costs of time (multiplication of provided hours by an hourly market wage rate). This wage sum has been used as the economic welfare measure for the Red Cross organization. However, a thorough welfare economic analysis of Red Cross services requires the comparison of both market sides. Therefore, we provide a simple cost benefit analysis to compare aggregate benefit measures with actual cost of Red Cross services in Austria (Section 4). Based on these cost benefit considerations we infer policy recommendations for the (future) provision of first aid (Section 5).

2. The demand for Red Cross services

The services to be evaluated in this paper comprise the following components: emergency treatment for injury before regular medical aid is available, transportation services for the sick to and from hospitals, and both national and international disaster relief. Within the scope of emergency treatment the Red Cross organization provides necessary transportation facilities, the availability of emergency physicians, and first aid measures executed by well-versed paramedics. Moreover, ambulances carry patients for stationary and outpatient treatment. National and international disaster relief contains services such as the dissemination of aid supplies, the operation of camps and provisional hospitals, the conditioning of drinking water and others.

The valuation instrument applied is the Contingent Valuation Method [10] which aims at eliciting preferences for public goods by surveys. In doing so the respondents are asked a monetary amount they would be willing to pay for a collective good without foregoing its utilization. A closed-ended double-bounded specification is used under which the good of interest is offered to the individuals at some given price.

2.1. The closed-ended double-bounded CV model

The basis for the closed-ended double-bounded model is the following stochastic utility function[4]

$$u(q, y; s) = v(q, y; s) + \epsilon_q, \qquad (1)$$

where q denotes the amount of available Red Cross services with $q = 0$ for the original provision before any change in the regime and $q = 1$ for the considerably higher provision level the economic value of which to be evaluated. The variable y is personal income and s represents a vector of socio-economic characteristics affecting preferences for Red Cross services. The stochastic error term ε_q is statistically independent of the explanatory variables and normally distributed with zero mean (=iid). An individual confronted with the amount B for the provision of the good in question will accept this bid if

$$v(1, y - B; s) + \epsilon_1 > v(0, y; s) + \epsilon_0. \qquad (2)$$

In this notation the amount B corresponds to the Hicksian welfare measure of an 'equivalent surplus'. The probability P_y that offer B to be paid for the provision of Red Cross services will be accepted can then be written as:

$$P_y \equiv \Pr\{v(1, y - B; s) - v(0, y; s) > \epsilon_0 - \epsilon_1\}. \qquad (3)$$

A stochastic variable η can be defined as the difference between ϵ_0 and ϵ_1. With $F_\eta^*(\cdot)$ the cumulated distribution function of η – the probability that offer B will be paid for the Red Cross services – can be written as:

$$P_y = F_\eta^*(-\Delta v) = F_\eta(B; \theta), \qquad (4)$$

where the utility difference $\Delta v = v(1, y - B; s) - v(0, y; s)$ and $F_\eta^*(-\Delta v)$ is assumed as logistic or cumulated standard normal. The parameter vector θ represents the sensitivity of the socio-economic variables s, income y, and the bid variable B on the probability to accept offer B. The distribution function F^* indicates the influence of the utility difference on the probability to say 'yes' which can be reformulated with parameter vector θ and the offer B as arguments. The parameters θ of the distribution function F_η can be estimated for the closed-ended double-bounded version by the following

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[4] See [11,12].

log-likelihood function:

$$
\begin{aligned}
\ln L^{\mathrm{CE}}(\theta) = \sum_{i=1}^{N} \{ &d_i^{\mathrm{nn}} \ln[1 - F_\eta(B_i^l; \theta)] \\
&+ d_i^{\mathrm{yy}} \ln[F_\eta(B_i^h; \theta)] \\
&+ d_i^{\mathrm{yn}} \ln[F_\eta(B_i^i; \theta) - F_\eta(B_i^h; \theta)] \\
&+ d_i^{\mathrm{ny}} \ln[F_\eta(B_i^l; \theta) - F_\eta(B_i^i; \theta)] \}.
\end{aligned}
\tag{5}
$$

In the closed-ended double-bounded version an individual i gets confronted with the initial bid B_i^i. If this first bid is accepted the respondent will be asked whether she would also be prepared to pay the higher bid B_i^h for the provision of the good of interest. However, the follow-up bid is reduced to the lower amount B_i^l if the respondent was not willing to pay the initial bid. Only if the individual answers positively to both WTP questions the dummy variable d_i^{yy} (yes, yes) is equal to one. In dependence of individual answers to questions one and two the dummy variables d_i^{yn} (yes, no), d_i^{ny} (no, yes) und d_i^{nn} (no, no) are coded in an analogous way. N is the number of respondents.

2.2. Data and study design

The following empirical analysis is based on survey data of the Upper Austrian Census conducted in the year 2001. In supplement to the regular Census program a sub-sample of more than 2500 households was asked CV questions about their WTP for the provision of (health-related) Red Cross services. One person per household between 20 and 65 years old was interviewed at his or her place of residence. The respondents were presented a one page list with a description of the services to be evaluated (emergency treatment for injury, transportation services for the sick, and disaster relief). Subsequently, respondents were asked their WTP. The wording of the CV question was as follows:

"The Red Cross organization is planning the privatization of financing the emergency treatment for injury, the transportation services for the sick, and the disaster relief. The necessary resources shall be provided by private households through insurance premia since all public funds for the Red Cross up to the present will be cancelled. Only those can benefit from the Red Cross services who have paid the insurance premium. A per-

son who would not pay must organize an alternative solution in case of needed assistance.

According to calculations one household would have to pay an insurance premium of — € per month.[5] Are you willing to pay a premium of this amount for the addressed Red Cross services?"

The wording of the WTP question indicates that a maximum insurance premium has been used as a payment vehicle (Version 1). For the purpose of studying warm-glow and free-riding effects we have designed two more scenarios with alternative payment vehicles. Whereas both Versions 2 and 3 use voluntary donations as payment vehicles, the respondents in Version 2 were confronted with obvious free-riding incentives to understate their true WTP. For more details on the influence of different payment vehicles, see [13].[6]

For the estimation of the cumulated density function $F_\eta(B; \theta)$ the following specification for Δv has been applied (see Eqs. (4) and (5)) to explain the preferences for health services provided by the Red Cross organization:

$$
\begin{aligned}
\Delta v = a_0 &+ a_1\,\mathrm{bid} + a_2\,\mathrm{urban} + a_3\,\mathrm{persh} + a_4\,\mathrm{age} \\
&+ a_5\,\mathrm{female} + a_6\,\mathrm{alone} + a_7\,\mathrm{apprentice} \\
&+ a_8\,\mathrm{highschool} + a_9\,\mathrm{university} + a_{10}\,\mathrm{orgnumb} \\
&+ a_{11}\,\mathrm{volunt} + a_{12}\,\mathrm{volpart} + a_{13}\,\mathrm{volparent} \\
&+ a_{14}\,\mathrm{youthact} + a_{15}\,\mathrm{relig} + a_{16}\,\mathrm{worship} \\
&+ a_{17}\,\mathrm{member} + a_{18}\,\mathrm{donation} + a_{19}\,\mathrm{availment} \\
&+ a_{20}\,\mathrm{children} + a_{21}\,\mathrm{job} + a_{22}\,\mathrm{Version\ 2} \\
&+ a_{23}\,\mathrm{Version\ 3}
\end{aligned}
$$

with *bid* is the willingness to pay offer (in €); *urban* the dummy for urban place of residence (Linz, Wels, Steyr = 1); *persh* the number of persons living in household; *age* the age of respondent in years; *female* the person's sex (male (0); female (1)); *alone* the dummy for people living alone (single, divorced, widowed = 1);

apprentice the dummy for education level apprentice-ship; *highschool* the dummy for education level high-school or related; *university* the dummy for education level university or related; *orgnumb* the number of organizations at which respondent volunteers; *volunt* the dummy for voluntary activities (volunteering = 1); *volpart* the dummy for partner volunteering (partner volunteering = 1); *volparent* the dummy for parents volunteering (father or mother volunteering = 1); *youthact* the dummy for youth club membership (club activity in youth period = 1); *relig* the dummy for religiousness (Would you designate yourself religious? yes = 1); worship the dummy for attending *worships* (yes = 1); *member* the dummy for Red Cross club membership (membership = 1); *donation* the dummy for donations to the Red Cross (Has any member of your; household donated to the Red Cross organization last year? yes = 1); *availment* the dummy variable for the availment of Red Cross services (Have you or has any member of your household benefited from Red Cross services in the last 3 years? yes = 1); *children* the number of unprovided children per household; *job* the dummy for employment (Are you employed? yes = 1); *Version 2* the dummy for survey Version 2 (Version 2 = 1); *Version 3* the dummy for survey Version 3 (Version 3 = 1).

Table 1 provides the coefficients of the maximum likelihood estimation for the closed-ended double-bounded model. The results show the expected negative sign for the *bid* variable bid indicating that the probability for the acceptance diminishes with the offered WTP amount. We find no significant differences in WTP for those with *mandatory school* (=reference group for education) and apprenticeship but WTP increases with formal education (*highschool* and *university*) which might be a result of the omitted income variable.[7] Furthermore, the influence of respondents' club membership during their youth years youthact is significantly positive.

Whereas the respondent's age influences WTP acceptance significantly negative the Red Cross membership *member* shows a positive and significant sign.

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[7] Income is not included as explanatory variable. The reason is the high denial rate with respect to the household income question in the survey. Including the income variable would mean a reduction of the sample size by one half. Moreover, all estimations with household income resulted in not significant coefficients for this variable indicating quasi-linear preferences.

Table 1
Estimated coefficients for the closed-ended double-bounded model (Logit and Probit)[a]

Method	Logit		Probit	
	Coefficient	S.E.	Coefficient	S.E.
Urban	−0.24	0.10[**]	−0.15	0.06[***]
Persh	0.072	0.05	0.044	0.03
Age	−0.010	0.004[**]	−0.006	0.003[**]
Female	0.080	0.09	0.047	0.05
Alone	0.090	0.10	0.062	0.06
Apprentice	−0.040	0.10	−0.032	0.06
Highschool	0.393	0.12[***]	0.237	0.07[***]
University	0.450	0.17[***]	0.27	0.10[***]
Orgnumb	0.170	0.11	0.10	0.07
Volunt	−0.211	0.18	−0.131	0.101[**]
Volpart	−0.134	0.12	−0.071	0.07
Volparent	−0.017	0.10	−0.006	0.06
Youthact	0.202	0.09[**]	0.108	0.05[**]
Relig	0.020	0.09	0.012	0.05
Worship	0.075	0.11	0.036	0.07
Member	0.192	0.09[**]	0.121	0.05[**]
Donation	0.190	0.10[**]	0.100	0.06[*]
Availment	0.192	0.08[**]	0.109	0.05[**]
Children	−0.058	0.06	−0.039	0.04
Job	0.113	0.10	0.084	0.06[*]
Version 2	0.001	0.10	−0.002	0.06
Version 3	0.110	0.09	0.055	0.06
Constant	4.90	0.36[***]	2.92	0.21[***]
Bid	−1.228	0.03[***]	−0.735	0.02[***]
Observations	2536		2536	
Wald-χ^2(22df)	95.55		94.95	
Likelihood-ratio-χ^2	97.46		95.74	
McFadden p^2_{MF}	0.0149		0.0147	

[a] Standard errors are in parentheses.
[*] Indicate statistical significance at the 10% level.
[**] Indicate statistical significance at the 5% level
[***] Indicate statistical significance at the 1% level.

The probability for accepting the bid increases ceteris paribus for those who have already donated to the Red Cross in the past *donation*. A Red Cross membership means that people commit themselves to donate a predetermined amount of money per year to the Red Cross. The act of becoming a member may indicate a close relation to the organization which is in turn reflected by higher WTP amounts. The same argument holds for people who have already donated to the Red Cross in the past. Therefore, it seems to be a reasonable "funding strategy" for the Red Cross organization to attract new persons for membership and beg those for financial contributions who have done so in the past. The dummy variable whether the respondent or any member of her

Table 2
Mean WTP per household and month and aggregated for all households[a]

Truncation value	Mean WTP per month and household in €		Aggregate welfare in €	
	Logit	Probit	Logit (mio.)	Probit (mio.)
€ 2 × 40	12.07 [11.38–12.67]	11.48 [10.80–12.10]	80.54 [75.99–84.56]	76.64 [72.06–80.78]
€ 3 × 40	13.13 [12.27–13.88]	12.09 [11.27–12.84]	87.63 [81.87–92.64]	80.73 [75.21–85.67]

[a] 95% confidence interval in parentheses.

household have benefited from Red Cross services in the past 3 years *availment* is significantly positive. The experience of past Red Cross assistance increases the willingness to pay for own precaution. Since individual experience of past RC support increases WTP asking those for monetary donations who were helped recently may represent a promising fund raising approach. Voluntary activities of respondents *volunt* influence the acceptance of the offered bid amount negatively indicating the attempt of non-volunteers to ransom from volunteering activities. In urban regions we observe significantly lower WTP which might be the result of a lower affinity towards volunteering organizations as compared to rural areas. The remaining variables are not significant.

Welfare measures: From 2536 respondents 46.7% are not willing to pay the offered WTP amounts. Table 2 shows the welfare measures for the 2536 respondents calculated on the basis of the above mentioned coefficients. The means of all households including those with zero WTP lie in an interval between € 11.48 and € 13.13 per household and month. They result from numerically integrating the WTP function over the range of the offered bids up to a certain truncation limit. The results vary with the chosen probability distribution (Logit or Probit) and with different truncation limits due to flat tails of the WTP functions.[8] These welfare measures represent the lower bound for true WTP as conservative truncation values have been chosen.[9]

The willingness to pay figures for the provision of Red Cross services can be summed up for all 556,215 households in Upper Austria. Depending on truncation values and estimation models mean aggregate welfare to be used in the cost benefit analysis in Section 4 lies between € 76.64 and 87.63 mio.

3. The supply of voluntary Red Cross activities

A first glance on the supply side of Red Cross services in Austria reveals a unique feature: First aid services are predominantly provided by volunteers. Therefore, emergency help can be supplied at low cost. Motives of volunteers and the most important determinants of voluntary labor supply are covered in this section. The empirical results are based on a survey among Red Cross volunteers in Upper Austria conducted in 2001. A random sample of 2000 voluntary Red Cross employees was drawn from the population of 13,000 people who voluntarily work for the Red Cross. Persons in the sample were sent questionnaires per mail. About 941 questionnaires had been completed which is equivalent to a 47% rate of return (see [15]).

3.1. The Red Cross volunteers

The typical voluntary Red Cross person is male, 37 years old and lives in a household of size above average. He is married and well-educated. As compared to the overall population persons holding a university degree or having graduated from higher schools are over-represented and lower-educated persons are under-represented among the group of volunteers. The average avocational volunteer is highly dedicated to his profession and earns high income. On average he volunteers 18 h a month for the Red Cross organization. Beyond that he holds at least one other honorary

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[8] The value of € 40 was the highest employed bid value. Only 62 persons out of 2536 stated a willingness to pay higher than € 40. Therefore, we chose as truncation limits the two- and three-fold of the highest bid amount.

[9] With 'infinity' as the theoretically correct truncation value we obtain WTPs of € 24.8 for the Logit and € 13.08 for the Probit case. Practically, however, WTP is limited not by infinity but by the individual household income. We chose truncation values of € 2 × 40 and € 3 × 40 to guarantee conservative welfare measures.

Table 3
Individual motives of volunteering (in %)

	RC volunteers	Sex		Age		
		Male	Female	20–35	36–50	51–65
Fun with voluntary activity	79.9	76.9 a	83.7 a	87.2 a, d	76.0 a	70.8 d
Social attitude	58.9	55.9 b	62.4 b	57.4	64.7	63.5
Sensible management of leisure time	54.3	56.7 c	51.3 c	59.1 a, d	43.9 a	44.5 d
Feeling to be required	42.9	33.5 a	53.4 a	32.8 c, d	40.7 c, f	59.1 d, f
Experience of companion-ship and teamwork	42.2	39.4 b	45.9 b	52.3 a, d	38.5 a, g	28.5 d, g
Personal and professional training	35.1	35.5	35.0	44.3 a, d	28.5 a, f	15.3 d, f
Balance to everyday job	21.0	23.5 b	18.2 b	28.9 c, d	22.2 c, f	7.3 d, f
Personal acknowledgment	14.2	14.7	13.7	17.4 d	14.0 h	8.0 d, h
Fun with contests	7.2	6.5	8.0	10.6 a, e	4.1 a	4.4 e

a, d, f: differences are significant at the 99% level; b, e, g: differences are significant at the 95% level; c, h: differences are significant at the 90% level.

post. The person was a club member in at least one club during youth years. The volunteer lives in a social environment, esteems the appreciation of voluntary activities from society and distinguishes himself by a traditional but social and charitable view of the world.

3.1.1. Motives

In answering the questions about individual motives of volunteering the item 'fun with voluntary activity' has been named most frequently (79.9% of volunteers) followed by 'social attitude' (58.9%) and a 'sensible management of leisure time' (54.3%). Table 3 indicates further that motives such as 'fun with contests' (7.2%), 'personal acknowledgment' (14.2%), and 'balance to everyday job' (21.0%) play a comparably minor role. Voluntary social engagement is therefore not only a compensation for job dissatisfaction.[10] Volunteers also choose activities they feel happy about.

Women vote more often for motives such as "fun with voluntary activity", "social attitude", "the feeling to be required", and "the experience of companionship and teamwork". The opposite is true for the items "sensible management of leisure time", "balance to everyday job", and "personal acknowledgement" which have been named more frequently by men. By and large, the answers support traditional gender-specific attributions of social roles.

An age-specific inspection of motives for voluntary Red Cross activities shows that the items 'fun with

voluntary activity', 'sensible management of leisure time', 'balance to everyday job', 'personal acknowledgement', 'fun with contests', 'the experience of companionship and teamwork', and 'personal and professional training' have been selected more often by the youngest group of volunteers as compared to their older colleagues. On the contrary, the motives 'social attitude' and 'the feeling to be required' do not appear equally important for younger volunteers. It is not their social attitude which let young people volunteer, they rather work voluntarily for continuing education and self-realization reasons (for more details, see [15]).

3.1.2. Economic incentives

Volunteers supply their labor at very low (almost negligible) wages. This raises the question how important monetary incentives are and leads to the discussion of intrinsic and extrinsic motivation. To what extent would financial payments "crowd-out" intrinsic motives based on internal needs, desires and interests of people?

Current compensation payments for Red Cross volunteers are very low with mean (median) values of € 0.52 (€ 0.22) per hour of voluntary activity. Therefore, respondents were asked how they reacted to higher financial compensation payments. The following wording has been used:

"Suppose the Red Cross Steering Committee would like to express their high esteem of voluntary activities. To show the volunteers their acknowledgment the Committee resolves to increase compensation

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[10] For statistical evidence of job dissatisfaction, see the regressions below.

payments for voluntary activities significantly beyond present levels."

In answering the subsequent question as to whether one would be prepared to accept this higher payment, 58% of respondents answered "yes" whereas 42% of volunteers rejected this offer. Given the a priori expectation of 100% agreement this considerably high rate of denial seems all the more surprising as the higher payments have not been connected to additional commitments for the volunteers. These results allow the conclusion that Red Cross volunteers do not – or only to a minor degree – react on monetary incentives. They are not willing to accept higher compensation payments (even in the absence of further efforts), a circumstance stressing the importance of intrinsic motivations for voluntary Red Cross activities.

An age specific inspection of these acceptance (denial) rates shows that among the group of volunteers between 20 and 35 years old 68.4% of respondents would accept the higher payment. For the oldest group of volunteers (beyond 65 years of age) the percentage runs down to below half of this value. Young volunteers are attuned to monetary payments more positively as compared to their older colleagues who reject financial compensation in majority. We interpret this result as an indication that especially older volunteers seem intrinsically motivated to a great extent whereas the young react stronger to external incentives.

The literature on motivation emphasizes that (financial) extrinsic incentives may destroy the intrinsic motivation of volunteers and, therefore, voluntary labor supply rather decreases than increases in line with higher compensation payments.[11] This context has been studied in our survey by use of the following wording:

"Suppose the Red Cross organization strives increasingly for enlisting additional volunteers. To make voluntary activities more attractive the Steering Committee decides to increase the remuneration of volunteers clearly beyond present levels. Subsequently, a comprehensive publicity campaign will be started off showing how much money volunteers of the Red Cross organization can make. How would you react?"

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[11] See the survey article by [16].

Approximately one half of the respondents (51.9%) declare they would be pleased with higher compensation payments and continue their voluntary activities as before. Another 27.6% of volunteers bother about the announcement of higher compensation rates but would not change their voluntary labor supply. On the contrary only a minority of 6.5% of respondents would increase their labor input in association with higher monetary payments. And finally, about 10% of voluntary Red Cross employees plan either to reduce their provided hours or completely quit the service under this scenario. These results support previous arguments: 80% of respondents who would not change their labor input confirm that an explicit increase in compensation payments would not have a significant influence on voluntary labor supply. The fact that only a few persons would increase their voluntary labor supply in response to positive economic incentives makes clear that the voluntary cooperation with the Red Cross organization is not based on monetary reasons. Therefore, an increase in compensation schemes is no guarantee for a comprehensive voluntary labor supply. Yet this increase in payments would not damage intrinsic motivations altogether even if 10% of respondents plan at least to reduce their effort which is either founded in higher payments or more likely in the publicity campaign. It is important to notice that these results are valid for current Red Cross volunteers only. However, financial incentives might attract new volunteers.

Following this short illustration of descriptive results we finally present a Logit and Probit analysis to identify the most important determinants of voluntary labor supply in the Red Cross organization.

3.2. The determinants of voluntary labor supply

The following estimations are based on a dataset constructed by two different surveys (the Red Cross volunteer survey and the Upper Austrian Census). These two surveys differ with respect to their sample size and to the underlying population. Therefore, we adjust this imbalance by using weighted regressions where the weight for each observation corrects for the different survey sizes. A Logit (Probit) specification was estimated with the dummy for Red Cross volunteers (volunteering for the Red Cross = 1) as dependent variable and the following list of independent variables:

addressed the dummy for personal address (Have you been personally addressed to volunteer for the Red Cross? yes = 1); *volpart* the dummy for partner volunteering (partner volunteering = 1); *partyn* the dummy for living with a partner (living in partnership = 1); *volparent* the dummy for parents volunteering (father or mother volunteering = 1); *relig* the dummy for religiousness (Would you designate yourself religious? yes = 1); *worship* the dummy for attending worships (Do you attend worships? yes = 1); *jobdissatis-half* the dummy for job satisfaction (Are you satisfied with your occupation? rather yes than no = 1; otherwise 0); *jobdissatis-full* the dummy for job satisfaction (Are you satisfied with your occupation? 'rather no than yes' and 'no' = 1; otherwise 0); *female* person's sex (male (0); female (1)); *age* age of respondent in years; *shift* the dummy for shift work (shift work = 1); *job* the dummy for employment (Are you employed? yes = 1); *persh* number of persons living in household; *volother* the dummy for volunteering with other organizations; *persh27* number of persons in household below 27 years old (family allowance is granted to childrens' maximum age of 27 years); *apprentice* the dummy for education level apprenticeship; *highschool* the dummy for education level highschool or related; *university* the dummy for education level university or related; *job* the dummy for employment (Are you employed? yes = 1); *persh* the number of persons living in household; *volother* the dummy for volunteering with other organizations (yes = 1).

Since the variables on job dissatisfaction are only available for those who are actually employed we present estimations for two samples: first we estimate the volunteering probability for all individuals and control for their employment by *job*. The second sample is confined to employed people which allows the inclusion of *jobdissatis-half* and *jobdissatis-full*. Table 4 shows estimated coefficients for both the Probit and Logit variants. It can be seen that the probability to volunteer for the Red Cross depends significantly positive on whether a person has been personally addressed to do so. The coefficient for the variable *addressed* is highly significant. This positive influence points up how important the personal approach for recruiting new volunteers is. Therefore, word-of-mouth advertising seems to represent a more promising recruitment strategy as compared to relatively anonymous

and probably expensive media campaigns. We find no significant differences in their probability to volunteer between *apprenticeship* and *mandatory school* (=reference group for education). Education *highschool* and *university*, the number of persons in the household *persh*, whether a person is living in partnership *partyn* are positively significant. The positive and significant impact of whether the partner is volunteering *volpart* stresses further important aspects of recruiting new volunteers: on the one hand, similar preferences of the partner for volunteering may reflect a prerequisite to acquire a person to provide voluntary labor supply. On the other hand, couples organize their time management jointly. Contemporaneously volunteering allows partners to spend significant time spans together. Recruiting of volunteers may therefore account for "partnership compatibility" and/or "family friendliness". While the variable *relig* is statistically not significant we observe a higher probability to volunteer for those who attend *worships* (Table 4).

The coefficients for volunteering with other organizations *volother* and for shift work *shift* are unexpectedly positive. The probability to volunteer for the Red Cross increases if the respondent is voluntarily working with some other non-profit institution at the same time and for respondents who regularly work in shifts. It seems that people decide first whether to volunteer at all, however, once they have taken this decision they invest many hours and do not necessarily treat different organizations as substitutes. Volunteering for some other organization is no impediment for joining the Red Cross for voluntary labor provision. On the contrary, it seems worthwhile for the RC organization to be on the look-out for the general typus of volunteers irrespective as to whether a certain person has also been working for other non-profit organizations. A plausible explanation for the positive influence of the shift variable is that those who work in shifts face regular time schedules in their occupation which makes the arrangement of their voluntary working hours easier as compared to persons who work under very flexible time schedules. Furthermore, shift workers with their asynchronous working time are valuable members for organizations providing services around-the-clock. Therefore, the significant statistical influence of the variable *shift* could also be explained by the fact that shift workers are addressed more often to join the Red Cross than the rest of the population.

Table 4
Explanatory variables for the probability to volunteer for the Red Cross[a]

Method	Employed and non-employed		Only employed	
	Logit	Probit	Logit	Probit
Addressed	1.58 (0.16)***	0.62 (0.06)***	1.65 (0.24)***	0.65 (0.09)***
Volpart	1.16 (0.18)***	0.47 (0.07)***	1.17 (0.23)***	0.49 (0.09)***
Partyn	0.36 (0.20)*	0.13 (0.08)*	0.71 (0.22)***	0.25 (0.09)***
Volparent	−1.04 (0.20)***	−0.40 (0.07)***	−1.03 (0.23)***	−0.40 (0.09)***
Relig	−0.11 (0.21)	−0.05 (0.08)	−0.23 (0.24)	−0.09 (0.09)
Worship	0.44 (0.20)**	0.16 0.08**	0.64 (0.23)***	0.22 (0.06)**
Female	0.31 (0.16)**	0.16 (0.06)***	0.31 (0.20)	0.13 (0.08)*
Age	−0.06 (0.007)***	−0.02 (0.003)***	−0.08 (0.01)***	−0.03 (0.004)***
Persu27	−0.58 (0.11)***	(0.27) (0.05)***	−0.52 (0.12)***	−0.24 (0.05)***
Apprenticeship	0.04 (0.21)	0.03 (0.09)	0.14 (0.28)	0.06 (0.12)
Highschool	1.21 (0.24)***	0.48 (0.10)***	1.37 (0.32)***	0.51 (0.32)***
University	1.25 (0.33)***	0.52 (0.12)***	1.56 (0.36)***	0.65 (0.15)***
Shift	0.81 (0.20)***	0.34 (0.07)***	0.89 (0.22)***	0.37 (0.08)***
Persh	0.18 (0.07)***	0.09 (0.03)***	0.32 (0.08)***	0.14 (0.03)***
Volother	1.07 (0.16)***	0.42 (0.06)***	1.06 (0.20)***	0.42 (0.08)***
Job	−0.85 (0.21)***	−0.33 (0.08)***		
Jobdissatis-half			0.76 (0.21)***	0.31 (0.08)***
Jobdissatis-full			1.36 (0.42)***	0.50 (0.15)***
Constant	4.57 (0.52)***	2.21 (0.20)***	3.48 (0.61)***	1.89 (0.24)***
Observations	3034	3034	2034	2034
Pseudo R^2	0.1764	0.1764	0.1947	0.1911

[a] Standard errors are in parentheses.

* Indicate statistical significance at the 10% level.
** Indicate statistical significance at the 5% level.
*** Indicate statistical significance at the 1% level.

The probability of volunteering for the Red Cross depends significantly negative on the respondent's *age*, whether the parents have been volunteering *volparent*, whether the person is currently employed *job*, and on the number of persons in household below 27 years old *persu*27. The variable *persu*27 can be interpreted as a proxy for unprovided children indicating time restrictions due to child care. The negative sign of *volparent* is counterintuitive at first glance. One possible explanation might be the deterring example of volunteering parents on their kids. Children may have realized that their volunteering parents have not had enough time for joint activities and this impact outweighs the shining example effect. Furthermore, for those who have a job the probability to volunteer increases significantly with their dissatisfaction in the paid job (see coefficients for *jobdissatis-half* and *jobdissatis-full*). This is evidence that people who do not receive approval in the paid job compensate their missing self-esteem through voluntary work.

4. Cost benefit analysis for Red Cross services

In the following section we refer to allocative efficiency which means that the value consumers place on a good (the price they are willing to pay) is equal to marginal cost of production. However, in our case the provided amount of Red Cross services is given and therefore represents a non-divisible good. A simple benefit/cost rule would economically justify the realization of the given size of Red Cross (services) whenever its benefits exceed the cost of provision.[12]

The Red Cross organization is currently financed as follows (see Table 5): according to the profit and loss account direct revenues for the supply of all

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[12] However, following this rule would not guarantee welfare maximization since alternative levels of Red Cross services may exist (which we do not consider in our analysis) the benefit/cost ratios of which are higher as compared to our predetermined service amount.

Table 5
Current 'cost' (revenues) of RC services in million €[a]

Direct revenues	52.83
Social insurance contributions	11.63
Direct transfers (provincial government and communities)	25.22
Nursing allowances, blood donation, education, etc.	15.98
Private donations (collections, membership fees, etc.)	6.25
Total revenues	59.08
Opportunity costs of volunteers (2.6 million h; 8.19 €/h)	21.30
'Total cost'	80.38

[a] Source: RC Upper Austria, own calculations.

(health-related) services run up to € 52.83 mio, the majority of which is provided by the public either through social insurance contributions (€ 11.63 mio.) or through direct payments by the provincial government and Upper Austrian communities (€ 25.22 mio.). Moreover, funds exist through income from nursing allowances, blood donation services and the provision of education- and training facilities in all Red Cross areas (€ 15.98 mio.). In addition to these service-related revenues the organization receives donations of approximately € 6.25 mio. per year raised by collections, contributions of Red Cross members and other private persons and by several charity events. Including all private donations total revenues of the organization amount to € 59.08 mio. per year.

Opportunity costs of volunteer services can be calculated on the basis of market wages for professional paramedics. Austrian ambulance men working with the Red Cross on a regular base earn on average € 8.19 per hour, and all Red Cross volunteers provide 2.6 million h per year. Therefore, total opportunity costs of time for all 13,000 Upper Austrian Red Cross volunteers amount to € 21.3 mio. Since the Austrian Red Cross makes zero profits we sum up these opportunity costs and total revenues and interpret the sum of € 80.83 mio. as 'Total cost' of current Red Cross service provision.

The aggregation of willingness to pay for all households in Upper Austria runs up to figures between € 76.64 mio. and € 87.63 mio. (see Section 2). The comparison of aggregated benefits with total cost of provision indicates that even under consideration of opportunity costs societal willingness to pay for Red Cross services is more or less equal to current private and public financial contributions. Moreover, current Red Cross revenues also contain services that have

not been covered by the CV study.[13] And finally, we present conservative welfare measures as relatively low truncation values have been chosen. Recapitulating the results we argue that societal WTP figures are equal or higher than current financial contributions. Therefore, aggregated benefits of Red Cross emergency treatment, transportation services and disaster relief balance or slightly exceed aggregated cost of provision. Red Cross emergency and health services are provided at comparably low cost, and the taxpayers realize consumer surpluses.

5. Policy conclusions

This paper analyzes supply and demand side characteristics of (voluntary) Red Cross services in Austria. The demand side analysis is based on a CV study in Austria on people's willingness to pay for emergency treatment, transportation services and disaster relief activities. The acceptance of monetary payments for these "health services" depends on the bid amount, on the last grade of formal education, and on whether a person held a club membership during his or her youth years. Other significant determinants of WTP are the age of respondents, whether a person has directly benefited from Red Cross services in the past 3 years, past donations for the Red Cross organization, and whether a person is volunteering in any kind of non-profit organization. Based on a closed-ended double-bounded model the per household and month mean willingness to pay figures lie in a range between € 11.48 and € 13.13.

The high percentage of volunteers in the Red Cross organization makes the provision of health-related services at low cost possible. A closer look at the supply side indicates that Red Cross volunteers are on average significantly younger than the population in Upper Austria. Moreover, they are well-educated and earn above average incomes from their regular occupation. They volunteer 18 h per month, and the most important individual motives for volunteering are: 'fun with voluntary activity', 'a social attitude', and 'the sensible management of leisure time'.

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[13] For example, the item 'Nursing allowances, blood donation and education' was not included in the WTP question.

A Logit (Probit) analysis shows that the probability to volunteer depends positively on the level of education and dissatisfaction in the job, on whether a person has been personally addressed, on whether he or she volunteers with other non-profit organizations, and on whether the respondent works regularly in shifts. Negative determinants for volunteering are the respondent's age, whether a person is currently employed, and the number of persons in household below 27 years old.

Recruitment policy: Intrinsic motivation is important for the decision to volunteer, and financial incentives play a minor role for those who have been volunteering for any length of time. Therefore, an increase in compensation payments is no guarantee for a higher labor supply of current volunteers. However, the young Red Cross activists work voluntarily for self-realization reasons and to continue their own education. The social attitude of this group is not in the center of their volunteering decisions. Both the comparably low age of Red Cross volunteers and their changing motives over time will influence future recruitment of voluntary employees in the social area. Red Cross and similar rescue organizations should consider these aspects of voluntary work in their campaigning strategies for the acquisition of new volunteers. Therefore, age-specific strategies of recruitment seem promising. Campaigns for younger candidates should emphasize egoistic motives: volunteering enhances the accumulation of human capital and makes the access to social networks possible.[14] In contrast the hiring of older volunteers should rather stress social and altruistic motives. Based on our empirical results we argue that word-of-mouth advertising seems to be the most efficient communication strategy in the recruitment process since people who have been personally addressed have a significantly higher probability to volunteer. Moreover, it seems worth while in the recruitment process to address people who actually volunteer for other organizations and/or partners of current Red Cross volunteers. Again, both groups indicate ceteris paribus a higher probability to volunteer for the Red Cross. Finally, the positive influence of job dissatisfaction on the decision to volunteer requires a personnel policy which fosters the volunteers' need for acknowledgment, reputation and self-esteem.

Funding policy: A comparison of aggregated willingness to pay measures with actual cost of the Red Cross system indicates that overall benefits equal or slightly exceed current financial contributions for the services. From the perspective of the public the provision of emergency treatment for injury, transportation services for the sick and national and international disaster relief offered by the Red Cross organization is economically justifiable. In the absence of marginal cost and benefits this result does not allow the conclusion that the offered service amount of Red Cross services should either be increased or decreased from a welfare perspective. However, we have not found evidence that respondents would like the service amount to be extended or cut. As long as the volunteering character of Red Cross services will be maintained in the future and cost of production will not go up an increase of funds does not seem necessary. Hence, people could be charged at rates below their willingness to pay and thereby realize consumer surpluses especially if Red Cross services are provided by volunteers with zero out of pocket cost for the organization.

Current funding consists of social security contributions, subsidies at the provincial and municipal level and private donations. As an alternative the whole funding system could be changed by completely integrating emergency help into the public social security insurance. As a consequence direct social security contributions would have to be increased in exchange for a complete cancellation of all other financial resources.[15] Even though this reorganization may increase transparency and simplify financial administration this change might also negatively affect the intrinsic motivation of volunteers. Donations and the supply of voluntary work are the results of the high social reputation and esteem of the Red Cross organization in Austria. A radical change in the structure of funding may crowd out both the amount of donations and the size of voluntary work. In return a reduction of voluntary labor supply would increase the cost of emergency help in the long run. Against this

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[14] Hackl et al. [17] find that volunteers in different areas (not restricted to the Red Cross) earn ceteris paribus higher wages as compared to non-volunteers indicating the importance of volunteering as an investment in future career opportunities.

[15] Other broad-based payment instruments such as income taxes with small welfare distortions are also conceivable. The debate of different distortions associated with alternative financial instruments is, however, beyond the scope of this paper.

background we argue for a prolongation of the current system the more so as benefits exceed cost of provision.

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