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Benjamin Bittschi
Astrid Pennerstorfer
Ulrike Schneider

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Does the substitution effect exist?

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Institut für SOZIALPOLITIK

About us:
Institute for Social Policy
Department of Socioeconomics
Vienna University of Economics and Business Administration
Nordbergstraße 15
A-1090 Wien
Tel: +43-1-31336/5871, +43-1-31336/5880
Fax: +43-1-31336/905879
http://www.wu.ac.at/sozialpolitik

Paid and unpaid labor in nonprofit organizations: Does the substitution effect exist?

Benjamin Bittschi[1]
Astrid Pennerstorfer
Ulrike Schneider

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Benjamin Bittschi is Research Assistant at the Vienna University of Economics and Business Administration.

Astrid Pennerstorfer is Head of the European Master Degree Programme "Social Economy and Social Work" at the FH Campus Wien.

Ulrike Schneider is Professor of Economics and Social Policy and Director of the Research Institute for Economics of Aging at the Vienna University of Economics and Business Administration.

[1] corresponding author e-mail: benjamin.bittschi@wu.ac.at

Paid and unpaid labor in nonprofit organizations: Does the substitution effect exist?

Abstract

In nonprofit organizations (NPOs) volunteers often work alongside paid workers. Such a coproduction setting can lead to tension between the two worker groups. This paper examines for the first time if and how volunteers influence the separation of paid employees, and thus it contributes to the debate over whether volunteers can substitute paid workers. Using Austrian data on an organizational level we find a significant impact of volunteers on the separations of paid workers in NPOs facing increased competition. These findings support the assumption that a partial substitution effect exists between paid workers and volunteers.

JEL-Classification: J21, J23, L31

Keywords: volunteer labor, coproduction, nonprofit organizations

1 Introduction

In comparison to public and for-profit enterprises, nonprofit organizations (NPOs) can rely more intensely on unpaid labor in the form of volunteer work. Given the growing importance of service delivery by NPOs in many countries[1] and the fact that these services are labor intensive, it is astonishing how little is known about the relationship between paid and unpaid labor. In some organizations, such as self-help groups, volunteers are vital for the very existence of the organizations, whereas in other organizations they merely constitute an additional input factor, whereas other NPOs do not have volunteers at all.

This phenomenon of collaboration between paid and unpaid employees has been described as "coproduction" in the literature (see Brudney and England 1983). While the concept was originally applied to the public sector, it can be easily generalized into a nonprofit context (Handy et al. 2008). Coproduction implies that a NPO has to decide whether volunteers should be involved in the production of goods and services, and if so, which tasks should be performed by paid professionals and which by volunteer workers. In practice, we find volunteer workers being active in all kinds of work.

The coproduction setting in NPOs can lead to tension between paid and unpaid labor. While Brudney and Gazley (2002) find no evidence for an adversarial relationship or a replacement of paid personnel by volunteers, Handy et al. (2008) as well as Simmons and Emanuele (2010) address this topic by describing unionized workplaces with provisions in collective agreements that try to protect paid workers against their replacement by unpaid workers, or workplaces preclude volunteer involvement entirely. So the question of a substitution effect on paid employees by volunteers remains thus far unresolved, especially as none of these studies is able to address directly the influence of volunteers on the separations of paid employees.

In light of this, the following paper aims to shed light on this potentially tense relationship between paid and unpaid workers, and investigates whether the presence of volunteers increases separations for paid employees in NPOs to scrutinize the replacement fears expressed by the above mentioned unions. More specifically, we examine for the first time the direct influence of volunteer presence on separations of paid employees with nonprofit sector-wide data on an organizational - and thus, demand - level. In our analyses we compare organizations that face increased competition and those that operate under unchanged or even reduced competition.

We make this distinction to account for various circumstances in the economic climates in which the NPOs operate and which influence separations of paid staff.

Section 2 discusses existing literature concerning the relation between the two worker groups before positing hypotheses in section 3. Section 4 describes the econometric specification as well as the data used for the analyses. We apply robustness checks to our results in section 5, present and discuss our findings in section 6 and provide a brief conclusion in section 7.

2 Background and existing literature

Volunteers' roles are diverse and not necessarily distinct from paid workers' roles (Handy et al. 2008; Netting et al. 2005). Volunteers could either serve as complements or substitutes to paid employees. In the first case, paid and unpaid workers assume different tasks within the organization, whereas in the second case, paid employees and volunteers perform similar duties so that volunteers can basically replace paid staff or vice versa.

In practice, volunteer workers are engaged in managerial or organizational core tasks, as well as in auxiliary activities, which suggests that paid work and volunteer work can in fact be interchangeable. However, not all NPOs make use of volunteer labor, while others choose a mix of paid and unpaid labor to deliver their services, which points to incomplete substitution. Otherwise, economic logic would suggest using unpaid work exclusively - provided that access to volunteer work is unlimited. This is a typical assumption made in the study of volunteer labor supply (see Menchik and Weisbrod 1987). Assuming that both types of work are only partial substitutes, NPOs' decisions regarding both task assignments and the levels of paid and unpaid labor inputs would in theory account for the marginal productivity of each type of labor. Volunteer labor would then be used until the change in output resulting from a unit change in volunteer labor equals the contribution of an additional unit of paid labor (Handy et al. 2008).

So far, a few studies have examined the relationship between paid and unpaid personnel. Essentially, the existing literature seeks to answer two questions. First, there is the aforementioned discussion if volunteers (mainly) complement paid employees or if the substitution effect prevails. Second, given that a substitutional relation between the two worker groups does exist, can we observe an increased displacement of volunteer labor over time or the other way round? The evidence from the studies examining these two questions is mixed.

To date, hardly any study has directly examined the changes in firm level demand for paid workers when volunteer labor is used. Stine (2008) applies a translog cost function to estimate cross-elasticities in order to determine whether paid and unpaid workers can be considered substitutes or complements. He finds that volunteers in public libraries act as complements rather than substitutes to paid staff. However, the approach via cost functions seems to be particularly difficult in a nonprofit sector context. As Stine noted, it is already difficult to determine appropriate output variables to estimate translog cost functions for a homogeneous group like libraries. Accordingly, it seems almost impossible to specify meaningful output variables for the NPO sector as a whole, given the difficulty in determining the "mission" (target function) of NPOs. (James and Rose-Ackerman (1986) or Steinberg (2006) provide a discussion of different NPO objective functions).

Thus, other approaches are prevalent when the focus is on the entire nonprofit sector. Simmons and Emanuele (2010) investigate the association between the amount of donated volunteer labor and state minimum wage regulations to answer the "substitutability-complementarity" question. Using individual-level data from volunteers they find that a higher minimum wage in a state is associated with a higher supply of volunteer labor and infer that volunteers supplant workers who work on minimum wages. However, the data only reflects volunteer supply and not specifically the organizational demand. Is more volunteer time offered by individuals because the NPOs have a higher demand for it? An alternative interpretation, in our view, is that people offer more volunteer time because higher minimum wages make labor donations more affordable for individuals.

Regarding the second question, whether paid employees crowd out volunteers over time or vice versa, both possibilities have been argued. Some authors observe a tendency towards specialization, professionalization and formalization in organizations which makes the employment of volunteers harder (see Seippel 2002), while others assume that volunteer work will be even more significant in the future because of an expected decline of continuity and importance of traditional paid full-time employment (e.g., Beck 2001) and declining budgets. (For a discussion, see Hustinx, 2007). Handy et al. (2008) report results from two national online surveys of Canadian nonprofits and a case study of two Canadian hospitals. Based on a case study and simple correlation analysis using the data from their online surveys, they find different patterns

of volunteer and paid worker employment. On the one hand, NPOs report a tendency towards professionalization and thus towards a replacement of volunteers through paid employees, i.e. a rise in paid staff leads to a decline in the need for volunteers. On the other hand, volunteers also replace paid workers, especially in times of financial stress. This latter result provides the first hints that the organizational development of NPOs is an important factor in how volunteer work is used. Unfortunately, Handy et al. (2008) do not ground their evidence in a multivariate, econometric framework.

Handy et al. (2008) assert that the replacement process between paid and unpaid work is complex, oscillates, and is not necessarily stable over time. This, however, is exactly what can be read from Emanuele (1996), who finds that organizations remain stable over time in the way they use volunteer input.

In a study of Norwegian sports organizations, Seippel (2002) finds that paid employment rises with both augmenting organization size and increasing sales returns. The importance of volunteer work decreases in relation to paid work but not necessarily the time donated by volunteers.

Additionally, there are two other strands of literature that are worth mentioning for the purpose of this paper, although they do not discuss the aforementioned questions directly. The first is concerned with NPO's demand for voluntary labor in general (Emanuele 1996; Ferris 1988; Handy and Srinivasan 2005). One important finding is that voluntary labor comes at some cost for NPOs, e.g., for supervising volunteers, providing equipment or office space. Using data from four US cities (Chicago, Minneapolis, Pittsburgh, Phoenix) in 1982 and 1984, Emanuele (1996) presents evidence that NPOs have a consistent and downward sloping demand curve for volunteer labor over time and hence that the organizations do not accept all proffered volunteer labor.

The second strand of literature is concerned with paid employees' attitudes toward volunteers and the optimal mix between the two worker groups (e.g., Netting et al. 2004; Netting et al. 2005; Rogelberg et al. 2010). Rogelberg et al. (2010) show that poor relations between the two groups of workers and augmented employee stress and discontent are interrelated. Employees that show a positive attitude toward volunteers show more organizational commitment and are less likely to quit.

Summing up, only a few studies so far have investigated the production-related relationship and interchangeability over time between paid employees and volunteers. Evidence from existing research is mixed. We learn from the studies that substitutional as well as complementary volunteer employment can be found in organizations, depending on the nature of the organization and the specific tasks to be performed. However, from existing research, it is reasonable to believe that especially low-paid workers have reason to feel threatened by volunteer presence, because unpaid workers can substitute them more easily.

Against this backdrop, our own empirical analysis investigates for the first time directly whether the use of volunteers influences separations of paid labor in NPOs. By doing so, we observe changes in employment in NPOs and possible substitution effects. In order to be accurate about the organizational demand for workers, we use data on an organizational level. Moreover, our study is concerned with the nonprofit sector as a whole, in order to supply information on a more general level. In section 3, we will now lay out our hypotheses concerning the influence of volunteers on paid employees' separations.

3 Hypotheses

We want to analyze in greater detail the question whether volunteers act as substitutes to paid employees, and thus examine the influence of volunteer presence on the separations of paid employees in Austrian NPOs.

In our analyses we use competition as an indicator to distinguish the economic conditions under which the NPOs operate. Therefore, we differentiate between NPOs facing increased competition in the five years prior to the survey (i.e. the time period from 2000 to 2005) and those NPOs facing a stable or favorable economic environment, i.e. observing unchanged or even decreased competition in that period of time. We argue that the question whether volunteers act as substitutes or complements might be more pressing in NPOs with increased competition, which means that paid and unpaid labor can be seen as "conditional" substitutes. This "conditional substitution hypothesis" is formulated below in two parts.

The Austrian nonprofit sector can be described as "service-dominant", which means that most nonprofit employees are active in health and social services.[5] NPOs in Austria are often heavily dependent financially on public funding (e.g., Neumayr et al. 2007; Salamon et al. 2003)

which presents a serious challenge in times of fiscal austerity. Furthermore, health and social service providers face increasing competition and tight budgets. Governments have sought to limit spending on social services by way of introducing new public management and opening service markets to competition (e.g., Bonoli et al. 2000; Kautto 1997; Starke 2008).

Consequently, NPOs have to seek alternative ways to finance their activities and to maintain service at a certain level. As a result, NPOs could resort to using volunteer work more heavily in order to cut labor costs when facing an unfavorable economic environment. Especially in times of increased competition, replacing paid staff by unpaid workers might be a viable solution in order to maintain service levels and/or quality while avoiding service disruption. As for paid employees, they might feel more threatened by a volunteer presence in such a situation, as the organizations are more prone to lay off paid staff. This could result in a higher propensity to leave an NPO facing increased competition.

Therefore, our first hypothesis (H1) can be stated as follows: In NPOs facing increased competition the presence of volunteers leads to higher separations among paid staff in NPOs using volunteer labor than in those not using volunteer labor. This could be seen as an indicator for a substitution effect between paid employees and volunteers.

As NPOs have per definition a non-distribution constraint of profits (e.g., Anheier and Salamon 2006), it is quite plausible to assume that NPOs operating in a stable or favorable economic environment have a higher probability of reinvesting its profits to help sustain the NPO or improve their employees' working conditions. As a consequence, possible positive effects for the relationship between paid and unpaid workers could emerge. For instance, in such a working environment the presence of unpaid co-workers could even be seen as positive. Leete (2006, 166) mentions that nonprofit employees working together with volunteers are perhaps more gratified than their for-profit counterparts. This must especially be the case in organizations where volunteers can basically perform the same tasks as paid workers, and ease perhaps the pressures on paid workers, e.g. through workload sharing. As working conditions are an important predictor of labor turnover (see Böckerman and Ilmakunnas 2009 for recent evidence) this can have a positive influence on retention.

Therefore, we argue that in NPOs facing no competition or even decreased competition volunteers are perceived more positively by paid employees. Therefore, our second hypothesis

(H2) can be stated as follows: In NPOs facing no competition the presence of volunteers leads to lower separations even if volunteers act as substitutes for paid employees.

4 Data and econometric specification

Research in the nonprofit sector is often hindered by insufficient data concerning paid and unpaid labor due to a lack of compulsory and/or systematic statistical reporting, in contrast to other established sectors of the economy.

Our work is based on a unique data set for Austria. Data were gathered in 2006 by means of a mail survey that was sent to all Austrian NPOs with at least one paid employee. We have information for a myriad of industries that are relevant to the non-profit world, and the questionnaire placed particular emphasis on employment, income, expenditure and organizational activities. In total, 5,104 organizations were contacted, and 947 questionnaires were returned, yielding a response rate of 18.55 per cent. (See Haider et al. (2008) for a more detailed description of the data). In the following we use a subset of 540 organizations for which we have full information concerning the variables used in the econometric analysis.

As dependent variables we use firm level separations, which are defined as the sum of quits ("voluntary separations") and layoffs ("involuntary separations"). To adjust for scale effects we build the separations rate (SR), by dividing the absolute number of separations of paid employees through the sum of all paid employees at the end of the year 2005.

The independent variables used are summarized by the vector X. Our main focus lies in the influence of volunteers on separations of paid staff. This is measured with a dummy variable taking the value one if the NPO uses volunteers and zero otherwise. In order to control for the task area of volunteers, four dummy variables are included indicating whether the volunteers are engaged in managerial tasks, the core tasks of the NPO, administrative tasks, or other tasks.

In addition, further control variables are added to the vector X to explain the separations of paid employees. We include the logarithm of total employment of the NPOs to control for size effects in the SR. To cover the employment structure and different employment policies that are important for separations at the company level, we include the ratio of atypical employees, measured as workers with a contract for services plus independent contractors ("freie Dienstnehmer") on total employment, as well as the share of employees with an employment duration

greater than five years. We assume that, on an organizational level, a higher share of atypical employees reduces hirings and the separations of paid staff. We explain this by the fact that the presence of atypical employees allows the NPOs to adjust to demand fluctuations without the need for hiring or separating existing staff, as the workload of atypical employees can be shifted relatively easily.[3] Especially for those NPOs operating in an uncertain funding environment, this can be an important strategy. In the same way, but for different reasons, we expect the share of long term employees (employees with employment duration of 5 or more years on total employees) to reduce separations. Plenty of evidence shows that long term employees exhibit a reduced probability of terminating an employment contract. Accordingly, this variable can be considered as a proxy for the existence of employer- or match-specific capital. (see e.g., Farber 1999)

To control for the dependency on public funding, we add a dummy variable that captures the reliance on public funding. Table 5 in the appendix reveals that 28.3% of all NPOs do not receive public funding. Moreover, Table 1 shows that the percentage of "no public funding" in NPOs facing increased competition is 31.1%, approximately five percentage points higher than the value in NPOs facing no competition (26.3%). A dummy for the existence of work councils is included to control for the exit-voice hypothesis as proposed by Freeman (1980). We expect work councils to reduce the separations of paid employees as it offers, aside from the standard arguments about that hypothesis, a possibility to uncover potential problems in the collaboration of paid employees and volunteers.

To capture the economic development of the NPOs under observation, we additionally control whether the development of revenues and expenditures in the five years prior to the survey have decreased, increased or remained unchanged. Additionally, we include dummy variables to control for industry affiliation on a 2-digit level. A detailed overview of the summary statistics for the relevant variables is given in Table 1.

Table 1: Summary statistics of dependent and independent variables

Variables	**Variable description**	NPOs (increased competition)			NPOs (decreased/stable comp.)		
		Mean(SD)	Min	Max	Mean(SD)	Min	Max
Dependent Variable							
Separation rate (SR)	Separations in 2005 / total employment in 2005	0.120 (0.188)	0	1	0.099 (0.200)	0	1
Independent variables							
Employment related							
Volunteer dummy	Dummy variable indicating whether volunteers work in the NPO, yes=1	0.548 (0.499)	0	1	0.622 (0.486)	0	1
Managerial tasks	Dummy variable indicating whether volunteers are engaged in managerial tasks, yes=1	0.355 (0.480)	0	1	0.494 (0.501)	0	1
Main tasks	Dummy variable indicating whether volunteers are engaged in main tasks, yes=1	0.250 (0.434)	0	1	0.266 (0.443)	0	1
Administrative tasks	Dummy variable indicating whether volunteers are engaged in administrative tasks, yes=1	0.281 (0.450)	0	1	0.365 (0.482)	0	1
Other tasks	Dummy variable indicating whether volunteers are engaged in other tasks, yes=1	0.193 (0.396)	0	1	0.196 (0.397)	0	1
Employer size	Ln of total employment	2.332 (1.390)	0	8.097	1.820 (1.240)	0	7.365
Atypical employees	Ratio: Contract for services workers + independent contractors ("freie Dienstnehmer") / total employment	0.629 (2.354)	0	21.250	0.318 (1.488)	0	17.000
Long term employees	Employees with firm duration of more than 5 years / total employment	0.414 (0.303)	0	1	0.435 (0.331)	0	1
Work council	Dummy variable, yes=1	0.171 (0.377)	0	1	0.112 (0.316)	0	1
Economic environment							
Public funding	Dummy variable indicating whether a NPO obtains public funding, no=1	0.311 (0.464)	0	1	0.263 (0.441)	0	1
Increased revenues	Dummy variable, yes=1 if NPO experienced an increased revenue development over the last 5 years	0.658 (0.475)	0	1	0.577 (0.495)	0	1
Unchanged revenues	Dummy variable, yes=1 if NPO experienced an unchanged revenue development over the last 5 years	0.219 (0.415)	0	1	0.279 (0.449)	0	1
Reduced revenues	Dummy variable, yes=1 if NPO experienced a reduced revenue development over the last 5 years, reference category	0.123 (0.329)	0	1	0.144 (0.352)	0	1
Increased expenditures	Dummy variable, yes=1 if NPO experienced an increased expenditure development over the last 5 years	0.833 (0.373)	0	1	0.776 (0.418)	0	1

Table continued on next page

Table 1: Summary statistics of dependent and independent variables

Variables	**Variable description**	NPOs (increased competition)			NPOs (decreased/stable comp.)		
		Mean(SD)	Min	Max	Mean(SD)	Min	Max
Unchanged expenditures	Dummy variable, yes=1 if NPO experienced an unchanged expenditure development over the last 5 years	0.110 (0.313)	0	1	0.176 (0.382)	0	1
Reduced expenditures	Dummy variable, yes=1 if NPO experienced a reduced expenditure development over the last 5 years, reference category	0.057 (0.232)	0	1	0.048 (0.214)	0	1
Industry affiliation							
Nace 80	Education, dummy variable, yes=1	0.382 (0.487)	0	1	0.417 (0.494)	0	1
Nace 85	Health and social work, dummy variable, yes=1	0.294 (0.457)	0	1	0.202 (0.402)	0	1
Nace 91	Activities of membership organizations, dummy variable, yes=1	0.246 (0.431)	0	1	0.298 (0.458)	0	1
Nace 92	Recreational, cultural and sporting activities, dummy variable, yes=1, reference value	0.057 (0.232)	0	1	0.061 (0.240)	0	1
N	Sample size	228			312		

The dependent variable, SR, has a natural lower bound at zero and contains a nontrivial number of zeros (307 observations, i.e. 56.85% of all cases), thus a Tobit regression for corner solution is our starting point.[4] We estimate the Tobit regressions, separately for NPOs facing increased competition and NPOs facing no increased competition:

$$SR_i^* = \beta X_i + u_i \text{ with } u_i \mid X_i \sim Normal(0, \sigma) \tag{1}$$

and

$$SR_i = max(0, SR_i^*) \tag{2}$$

The Tobit regressions in (1) is estimated for a latent variable (SR^*), conceivable as a propensity to separate, which is difficult to interpret in corner solution applications and not of direct interest to the analysis of separation rates. Of greater interest therefore is the unconditional expected value of the SR, $E[SR_i \mid X_i]$, which consists of the probability of being above the limit and the expected value conditional on being above the limit:

$$E(SR_i \mid X_i) = P(SR_i > 0 \mid X_i) \cdot E(SR_i \mid X_i,\ SR_i > 0) \tag{3}$$

As McDonald and Moffit(1980) have shown, a decomposition obtained by a partial derivation of the unconditional expected value, $E[SR_i \mid X_i]$, given in (3) yields the

i) marginal effects on the probability of being above zero,
$\partial P(SR_i > 0 \mid X_i)/\partial X_i$

ii) marginal effects conditional on being above zero,
$\partial E[SR_i \mid X_i,\ SR_i > 0]/\partial X_i$

which both have an interesting economic interpretation.

$$\begin{aligned} \frac{\partial E(SR_i \mid X_i)}{\partial X_i} = {} & \frac{\partial P(SR_i > 0 \mid X_i)}{\partial X_i} \cdot E(SR_i \mid X_i,\ SR_i > 0) + \\ & + P(SR_i > 0 \mid X_i) \cdot \frac{\partial E(SR_i \mid X_i,\ SR_i > 0)}{\partial X_i} \end{aligned} \tag{4}$$

For our purposes, this means that we concentrate firstly on the effect of the change in the probability of separating paid staff when a NPO would change their volunteer policy from not using volunteers to using volunteers, as given by the first product on the right hand side of (4). And secondly, we will respond to the effect of volunteer presence on separations for those NPOs that actually lay off paid staff, as given by the second product on the right hand side of (4).

5 Robustness checks

As Tobit regressions are often criticized for not being very robust to a violation of the underlying assumptions, (e.g., Angrist and Pischke 2009) we conduct several checks concerning the robustness of our results. First of all, Tobit regressions heavily require normality and homoskedasticity of the error term. Thus, we conduct a conditional moment (CM) test to control for the normality of the error term using the *tobcm* command implemented in STATA (Drukker 2002). Additionally, we also apply an LM-test to test the Tobit specification against the alternative of a model with non-linear regressors and a heteroskedastic or non-normally distributed error term. As the results for both tests (see table 2 and table 3) show problems with the assumptions of normality and homoskedasticity of the error term, we furthermore compare the Tobit estimates divided by the standard error of the regression, σ, with the probit estimates of the same regression to obtain "a rough idea of the appropriateness of the Tobit model" (Wooldridge 2010, 687). For the probit regression, we design a binary dependent variable with the following property:

$$SR_{\mathrm{i}} = \begin{cases} 1 & if\ SR_i > 0 \\ 0 & if\ SR_i = 0 \end{cases} \tag{5}$$

This comparison reveals that the coefficients of both models are relatively similar and that there are no significant sign changes between the Tobit/σ model and the probit model. Therefore, we conclude that the econometric specification is roughly appropriate and thus classify our results as credible even if the CM and LM tests reject the requirements for a properly specified Tobit error term. For the results of the coefficient comparisons see table 6 in the appendix.

To further check the robustness of our results and to circumvent the problems with the

strong assumptions that the Tobit model places on the error term, u, we additionally estimate a linear probability model (LPM). The LPM has the advantage that although its error term is heteroskedastic by definition, it can account for the heteroskedasticity by using robust standard errors as obtained by White (1980) so that the LPM model will definitely report unbiased point estimates. Furthermore, the parameters of the LPM can directly be interpreted as marginal effects. For the LPM we use on the one hand the SR as constructed in (5) and on the other hand convert the SR additionally into a binary variable with the following property:

$$SR_{\mathrm{i}} = \begin{cases} 1 & if\ SR_i \geq \mu(SR) \\ 0 & if\ SR_i < \mu(SR) \end{cases} \tag{6}$$

at which μ is the mean of SR. Hence, we estimate the influence of the volunteer presence of receiving a SR at/above or below the mean value of the SR. This is done again separately for NPOs under increased competition and those with decreasing or stable competition. The results of the Tobit models for NPOs facing increased competition can be found in table 2, the results of the Tobit models for NPOs with decreased or unchanged competition are given in table 3. The results of the LPM for both types of NPOs are given in table 4.

To conduct a further check whether our results are robust irrespective of the choice of the functional form and the estimation method used, we will also apply a method particularly suitable for rates or fractions as dependent variables, as this is the case with the SR. One possibility of dealing with rates in the dependent variable is a beta regression framework which builds on the beta distribution. The beta distribution can handle various distributional shapes, assuming that the dependent variable can be regarded as continuous and bounded in an interval with two known endpoints. Therefore, beta regressions are very flexible concerning the problem of nonnormality in the error term or heteroskedasticity, a problem both in Tobit and LPM models. The beta density with the shape parameters p and q is given by:

$$\pi(y; p, q) = \frac{\Gamma(p+q)}{\Gamma(p)\Gamma(q)} y^{p-1}(1-y)^{q-1} \tag{7}$$

with 0<y<1, p, q > 0, and $\Gamma(\cdot)$ denoting the gamma function. As the shape parameters are difficult to interpret with regard to conditional expectations in a regression framework,

an alternative parametrization of the beta regression was independently proposed by Paolino (2001), Ferrari and Cribari-Neto (2004) and Smithson and Verkuilen (2006). To achieve a "regression friendly" version of the beta distribution in (7) these authors reparameterize the shape parameters p and q into location and dispersion (or precision) parameters. For this purpose, they let $p = \mu\phi$ and $q = (1-\mu)\phi$. Then the beta density in (7) can be rewritten as:

$$f(y;\mu,\phi) = \frac{\Gamma(\phi)}{\Gamma(\mu\phi)\Gamma((1-\mu)\phi)} y^{\mu\phi-1}(1-y)^{(1-\mu)\phi-1} \tag{8}$$

with 0<y<1 and $\phi > 0$. The dependent variable y is now $y \sim B(\mu,\phi)$ and $E(y) = \mu$ with $var(y) = \frac{\mu(1-\mu)}{1+\phi}$. If Y is a random variable with $y_i \sim B(\mu_i,\phi)$ and $i = 1,...,n$ the beta regression model is

$$g(\mu_i) = x_i\beta \tag{9}$$

where β is a vector of regression parameters and x_i is the vector of covariates. Using a logit link function for $g(\cdot)$ it is assured that the dependent variable lies in the unit interval and equation (9) becomes, $ln(\frac{\mu}{1-\mu}) = x_i\beta$, which is estimated in our application.[5] To shift the observations at the margins 0 and 1 into the unit interval we use the transformation $y' = [y(N-1)+0.5]/N$ as proposed by Smithson and Verkuilen (2006). Results for the beta regression can be found in table 4 and a discussion of all results follows in section 6.

Table 2: Tobit regression for NPOs with increasing competition

	(1) SR*	(2) $\partial E[SR\|X]/\partial X$	(3) $\partial Pr[SR>0\|X]/\partial X$	(4) $E[SR\|X, SR>0]/\partial X$
Volunteer dummy	0.168**	0.076**	0.244**	0.057**
	(0.067)	(0.031)	(0.099)	(0.023)
Managerial tasks	-0.020	-0.009	-0.030	-0.007
	(0.065)	(0.030)	(0.095)	(0.022)
Main tasks	-0.126**	-0.052*	-0.181**	-0.040**
	(0.059)	(0.027)	(0.087)	(0.020)
Administrative tasks	-0.098	-0.042	-0.143	-0.032
	(0.061)	(0.028)	(0.090)	(0.021)
Other tasks	-0.032	-0.014	-0.047	-0.011
	(0.063)	(0.029)	(0.093)	(0.022)
Employer size	0.093***	0.043***	0.137***	0.032***
	(0.021)	(0.010)	(0.031)	(0.007)
Atypical employees	-0.073***	-0.034***	-0.108***	-0.025***
	(0.022)	(0.010)	(0.032)	(0.007)
Long term employees	-0.334***	-0.154***	-0.493***	-0.114***
	(0.085)	(0.039)	(0.125)	(0.029)
Work council	-0.123*	-0.050*	-0.175*	-0.039*
	(0.064)	(0.029)	(0.094)	(0.022)
Public funding	0.047	0.022	0.069	0.016
	(0.047)	(0.021)	(0.069)	(0.016)
Increased revenues	0.014	0.006	0.020	0.005
	(0.083)	(0.038)	(0.122)	(0.028)
Unchanged revenues	-0.006	-0.003	-0.009	-0.002
	(0.088)	(0.041)	(0.130)	(0.030)
Increased expenditures	0.136	0.054	0.193	0.042
	(0.129)	(0.060)	(0.191)	(0.044)
Unchanged expenditures	0.127	0.068	0.186	0.049
	(0.140)	(0.064)	(0.206)	(0.048)
Sector affiliation	YES	YES	YES	YES
Constant	-0.196			
	(0.135)			
Observations	228	228	228	228
McKelvey/Zavoina Pseudo R^2	0.396			
BIC	243.279			
CM Test	33.167**			
LM Test	24.812***			
Log likelihood	-70.061			

Marginal effects in columns (2), (3) and (4).
Marginal effects are evaluated at the mean for continuous variables and for discrete change of 0 to 1 for dummy variables.
Following Veall and Zimmermann (1994) we use the pseudo R^2 of McKelvey and Zavoina (1975) for Tobit regressions. Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Tobit regressions for NPOs with decreasing/stable competition

	(1) SR*	(2) $\partial E[SR\|X]/\partial X$	(3) $\partial Pr[SR>0\|X]/\partial X$	(4) $\partial E[SR\|XSR>0]/\partial X$
Volunteer dummy	-0.066	-0.023	-0.065	-0.019
	(0.096)	(0.032)	(0.094)	(0.027)
Managerial tasks	0.111	0.037	0.108	0.031
	(0.083)	(0.028)	(0.081)	(0.023)
Main tasks	0.047	0.016	0.047	0.013
	(0.074)	(0.025)	(0.072)	(0.021)
Administrative tasks	-0.020	-0.007	-0.019	-0.006
	(0.070)	(0.023)	(0.068)	(0.020)
Other tasks	0.168**	0.065***	0.171**	0.051**
	(0.072)	(0.024)	(0.070)	(0.020)
Employer size	0.100***	0.033***	0.098***	0.028***
	(0.026)	(0.009)	(0.025)	(0.007)
Atypical employees	-0.015	-0.005	-0.014	-0.004
	(0.017)	(0.006)	(0.017)	(0.005)
Long term employees	-0.378***	-0.126***	-0.369***	-0.106***
	(0.092)	(0.031)	(0.090)	(0.026)
Work council	0.019	0.006	0.019	0.005
	(0.088)	(0.029)	(0.086)	(0.025)
Public funding	-0.071	-0.023	-0.068	-0.019
	(0.062)	(0.021)	(0.060)	(0.017)
Increased revenues	0.119	0.039	0.115	0.033
	(0.108)	(0.036)	(0.106)	(0.030)
Unchanged revenues	0.007	0.002	0.006	0.002
	(0.119)	(0.040)	(0.116)	(0.033)
Increased expenditures	-0.470***	-0.221***	-0.471***	-0.166***
	(0.150)	(0.050)	(0.146)	(0.042)
Unchanged expenditures	-0.390**	-0.090	-0.305*	-0.091*
	(0.168)	(0.056)	(0.164)	(0.047)
Sector affiliation	YES	YES	YES	YES
Constant	0.215			
	(0.137)			
Observations	312	312	312	312
McKelvey/Zavoina Pseudo R^2	0.252			
BIC	388.503			
CM Test	22.832**			
LM Test	39.152***			
Log likelihood	-139.693			

Marginal effects in columns (2), (3) and (4).
Marginal effects are evaluated at the mean for continuous variables and for discrete change of 0 to 1 for dummy variables.
Following Veall and Zimmermann (1994) we use the pseudo R^2 of McKelvey and Zavoina (1975) for Tobit regressions. Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Regression results for the robustness checks

	NPOs increasing competition			NPOs decreasing/stable competition		
	(1) LPM at 0	(2) LPM at μ	(3) Beta Reg.	(4) LPM at 0	(5) LPM at μ	(6) Beta Reg.
Volunteer dummy	0.210**	0.221**	0.050*	-0.023	-0.053	-0.018
	(0.083)	(0.099)	(0.025)	(0.085)	(0.087)	(0.032)
Managerial tasks	-0.040	-0.045	-0.017	0.123	0.064	0.024
	(0.084)	(0.091)	(0.023)	(0.075)	(0.075)	(0.027)
Main tasks	-0.062	-0.055	-0.016	-0.002	0.029	0.005
	(0.077)	(0.083)	(0.021)	(0.067)	(0.069)	(0.024)
Administrative tasks	-0.078	-0.042	-0.024	-0.027	0.021	0.001
	(0.081)	(0.086)	(0.021)	(0.063)	(0.066)	(0.023)
Other tasks	-0.008	-0.046	-0.005	0.124*	0.122*	0.043
	(0.073)	(0.081)	(0.022)	(0.068)	(0.067)	(0.027)
Employer size	0.194***	0.124***	0.033***	0.199***	0.072***	0.023***
	(0.025)	(0.027)	(0.008)	(0.022)	(0.025)	(0.009)
Atypical employees	-0.067***	-0.058***	-0.014***	-0.015	-0.029***	-0.004
	(0.011)	(0.012)	(0.004)	(0.020)	(0.009)	(0.006)
Long term employees	-0.333***	-0.319***	-0.085***	-0.228***	-0.201***	-0.050*
	(0.094)	(0.096)	(0.029)	(0.067)	(0.065)	(0.026)
Work council	-0.068	-0.155	-0.031	0.047	0.093	0.016
	(0.078)	(0.096)	(0.021)	(0.083)	(0.091)	(0.032)
Public funding	0.001	0.060	0.009	-0.017	0.002	-0.010
	(0.059)	(0.066)	(0.017)	(0.053)	(0.054)	(0.018)
Increased revenues	0.032	0.002	0.003	0.026	0.026	0.017
	(0.102)	(0.099)	(0.028)	(0.081)	(0.077)	(0.029)
Unchanged revenues	0.031	-0.041	-0.005	-0.033	0.010	-0.006
	(0.120)	(0.117)	(0.031)	(0.089)	(0.084)	(0.032)
Increased expenditures	0.155	0.101	0.012	-0.275*	-0.375**	-0.109*
	(0.119)	(0.120)	(0.037)	(0.157)	(0.150)	(0.065)
Unchanged expenditures	0.158	0.152	0.012	-0.259	-0.342**	-0.071*
	(0.160)	(0.159)	(0.048)	(0.172)	(0.164)	(0.041)
Sector affiliation	YES	YES	YES	YES	YES	YES
Constant	0.034	0.106	-2.396***	0.338**	0.554***	-1.278
	(0.122)	(0.126)	(0.380)	(0.158)	(0.154)	(0.379)
Observations	228	228	228	312	312	312
BIC			-687.402			-1236.541
Log likelihood			395.280			672.829
R-squared	0.378	0.206		0.305	0.118	

Marginal effects for beta regressions; Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6 Empirical results and discussion

From the regression results in table 2, it becomes apparent that concerning the first hypothesis, H1, regarding NPOs facing increased competition, we can corroborate this hypothesis. Indeed, the presence of volunteers increases significantly the separations of paid staff. Column (3) of table 2 reveals that the probability of separations for NPOs under increased competition is 24.4% higher if the NPOs can use volunteers in their operations. The LPM gives a similar result for NPOs under increased competition as it states that the probability of separations is 21.0% higher if NPOs have access to volunteers (column (1), table 4). Moreover, NPOs with volunteers are also more likely to have separations at or above the mean of the SR (column (2), table 4). Concerning those NPOs that actually lay off paid employees the Tobit regression result shows that the SR increases by 5.7% points if the NPOs make use of volunteers (column (4), table 2). This is comparable to the result of the beta regression for NPOs with increasing competition. Column 3 in table 4 states that for a NPO with a SR of 12% (i.e. at the sample mean) the involvement of volunteers increases the SR by 5% points, which is an increase in the SR of more than 40% for NPOs with volunteers compared to NPOs without volunteers. The Tobit regression results for NPOs with increasing competition show that the higher SR due to volunteer involvement is attenuated by the opposite effect of a reduced SR when volunteers are engaged in main tasks. However, as the robustness checks reject the statistical significance of this effect we dismiss the significant influence of this attenuating effect. The logarithmic size is the only other variable influencing the separations positively on a relevant statistical level. Further statistical significant control variables reducing the SR are, as expected, the share of atypical employees, the share of employees with a length of employment of more than five years, and the work council.

The second hypothesis, H2, relating to the separations of paid staff in NPOs facing decreasing or stable competition, cannot be corroborated. Although the coefficient goes in the expected direction the volunteer presence has no statistically significant influence on the SR of paid staff in those NPOs (see results table 3). The only exception are NPOs with volunteers engaged in other tasks. In that case, the SR increases significantly, contrary to our hypothesis, even when a NPO faces a stable or decreasing competition. The LPM again delivers similar results as the Tobit regressions since it also shows no significant influence of the volunteer dummy on the SR.

Concerning the further control variables, it becomes apparent that the atypical employees (only in the LPM at μ) as well as the employees with length of service of more than five years again significantly reduces the separations in these NPO, for reasons described in section 4. Unlike in the case for NPOs with increased competition, the expenditure variable becomes significant for NPOs facing decreasing or stable competition. Compared to decreased expenditures, increased and unchanged expenditures reduce the SR for NPOs facing decreasing or stable competition. As previously explained, the Austrian NPO sector is "service-dominant", which implicates that the services offered are mostly labor intensive. In addition, with the non-distribution constraint of profits for NPOs, we can assume that the NPOs facing stable or declined competition are capitalizing on a friendly economic environment to reinvest money in working conditions, leading to a reduced SR.

In summary, our findings point to the existence of a conditional substitution effect. NPOs facing increased competition have higher separations when volunteers are involved in the NPO operations. It seems apparent from our results that volunteers in these NPOs may be used in order to replace paid workers. In NPOs with stable or decreased competition we find no statistically significant influence of volunteers on separations of paid employees with the exception of an increasing effect in the case of volunteers engaged in other tasks.

7 Conclusion

Volunteer work is a major labor source for NPOs. Nevertheless, comparatively little research exists concerning relations between volunteers and paid staff. In this paper, we analyzed the influence of volunteer workers on separations of paid employees in NPOs. Previous studies have either analyzed only specific sectors and/or public organizations or used individual-level data to investigate the relation between paid work and volunteer work. By contrast, in this paper we studied the volunteer presence with sector-wide data on an organizational – and thus demand – level. We also distinguished between organizations in a different competitive environment. By doing so we emphasized the importance of the economic environment when looking at the relationship between volunteers and paid employees.

The results show that volunteer presence leads to more separations in NPOs facing increased competition, but has no influence on separations in NPOs with stable or decreased competition.

We interpret our findings with the existence of a conditional substitution effect of volunteers on paid workers that has been discussed previously in the literature. Paid workers seem indeed to be replaced by volunteer workers especially in times of economic adverse conditions such as increased competition. This can lead to possible tensions between the two worker groups.

Against the backdrop of public austerity policies, the funding environment of NPOs is expected to become ever more challenging. At the same time, the political rhetoric encourages civic engagement and volunteer work. Thus, indications are that NPOs will continue, and maybe revive, their use of volunteer labor in order to sustain the level and quality of services they provide to society, especially in social care and health care. Policy makers and organizations alike should be aware of possible tensions between volunteers and paid staff when employing both worker groups. Research on the relation between both types of workers is highly relevant and should therefore continue.

However, due to the relatively small sample size, our results on the substitution of paid staff and volunteers must be interpreted with caution and should be understood as a starting point for further research on that topic. Moreover, we also suggest using panel data for future analyses.

8 Endnotes

1.) For a sample of 35 countries Salamon et al. (2003) find that the total workforce for the nonprofit sector for the years 1995-1998 is 39.5 million fulltime equivalent workers. As a consequence, the nonprofit sector employs on average 4.4% of the economically active population. In comparative figures for the investigated countries (inter alia, the USA, Japan, and Germany) this means tenfold higher employment than the utilities and textile industries and fivefold more workers than the food manufacturing industry and 20% more workers than the transportation industry (Salamon et al. 2003: 13f.)

2.) It is interesting to note that there are no statutory minimum wages in Austria. Minimum wages, among other regulations, are part of collective bargaining agreements that apply to specific industries. In May 2006, a collective bargaining agreement regulating labor issues was introduced to health and social service industries, two of the most important industries in

the Austrian nonprofit sector. There are no federal or regions statutes concerning the use of volunteers in Austria.

3.) See, for example Bentolila and Saint-Paul (1992) for a dynamic model concerning the influence of flexible labor contracts on employment. Boockmann and Hagen (2005) provide empirical evidence for Germany on that phenomenon.

4.) Wooldridge (2010, Ch. 17) clarifies the distinction between corner solution responses and the problem of censored data, which both make use of the Tobit model structure.

5.) For a detailed discussion of the beta regression we refer to the cited authors. To conduct the beta regressions in STATA we use the module *betafit* written by Buis et al. (2012).

9 References

Angrist, J. D. and Pischke, J.-S. (2009). *Mostly Harmless Econometrics. An Empiricist's Companion.* Princeton: Princeton University Press.

Anheier, H. K. and Salamon, L. M. (2006). 'The Nonprofit Sector in Comparative Perspective.' In W. W. Powell and R. Steinberg (ed.), *The Nonprofit Sector. A Research Handbook.* New Haven, London: Yale University Press, pp. 89-114.

Beck, U. (2001). *The brave new world of work.* Cambridge: Polity Press.

Bentolila, S. and Saint-Paul, G. (1992). 'The macroeconomic impact of flexible labor contracts, with an application to Spain.' *European Economic Review* 36(5): 1013-1047.

Böckerman, P. and Ilmakunnas, P. (2009). 'Job Disamenities, Job Satisfaction, Quit Intentions, and Actual Separations: Putting the Pieces Together.' *Industrial Relations: A Journal of Economy and Society* 48(1): 73-96.

Bonoli, G., George, V. and Taylor-Gooby, P. (2000). *European Welfare Futures.* Cambridge: Blackwell Publishers.

Boockmann, B. and Hagen, T. (2005). 'Befristete und andere 'atypische' Beschäftigungsverhält-

nisse: Wird der Arbeitsmarkt funktionsfähiger?' *Zeitschrift für Arbeitsmarktforschung* 38(2/3): 305-324.

Brudney, J. L. and England, R. E. (1983). 'Toward a definition of the coproduction concept.' *Public Administration Review* 43(1): 59-65.

Brudney, J. L. and Gazley, B. (2002). 'Testing the Conventional Wisdom Regarding Volunteer Programs: A Longitudinal Analysis of Service Corps of Retired Executives and the U.S. Small Business Administration.' *Nonprofit and Voluntary Sector Quarterly* 31(4): 525-548.

Buis, M. L., Cox, N. and Jenkins, S. P. (2012). 'BETAFIT: Stata module to fit a two-parameter beta distribution.'

Drukker, D. M. (2002). 'Bootstrapping a conditional moments test for normality after tobit estimation.' *Stata Journal* 2(2): 125-139.

Emanuele, R. (1996). 'Is there a (downward sloping) demand curve for volunteer labour?' *Annals of Public and Cooperative Economics* 67(2): 193-208.

Farber, H. S. (1999). 'Mobility and stability: The dynamics of job change in labor markets.' In O. C. Ashenfelter and D. Card (ed.), *Handbook of Labor Economics*. Amsterdam: Elsevier, pp. 2439-2483.

Ferrari, S. L. P. and Cribari-Neto, F. (2004). 'Beta Regression for Modelling Rates and Proportions.' *Journal of Applied Statistics* 31(7): 799-815.

Ferris, J. M. (1988). 'The Use of Volunteers in Public Service Production: Some Demand and Supply Considerations.' *Social Science Quarterly* 69(1): 3-23.

Freeman, R. B. (1980). 'The Exit-Voice Tradeoff in the Labor Market: Unionism, Job Tenure, Quits, and Separations.' *The Quarterly Journal of Economics* 94(4): 643-673.

Haider, A., Leisch, R., Schneider, U. and Stöger, K. (2008). 'Neue Datengrundlagen für den Non-Profit Bereich.' *Statistische Nachrichten*. 63(8): 754-761.

Handy, F., Mook, L. and Quarter, J. (2008). 'The Interchangeability of Paid Staff and Volunteers in Nonprofit Organizations.' *Nonprofit and Voluntary Sector Quarterly* 37(1):

76-92.

Handy, F. and Srinivasan, N. (2005). 'The Demand for Volunteer Labor: A Study of Hospital Volunteers.' *Nonprofit and Voluntary Sector Quarterly* 34(4): 491-509.

Hustinx, L. (2007). 'Brave New Volunteers? The Value of Paid and Unpaid Work for Flemish Red Cross Volunteers.' *Voluntas* 18(1): 73-89.

James, E. and Rose-Ackerman, S. (1986). *The Nonprofit Enterprise in Market Economies.* Chur, London, Paris: Harwood.

Kautto, M., ed. (1997). *European Social Services – Policies and Priorities to the Year 2000.* Saarijärvi: Stakes.

McDonald, J. F. and Moffitt, R. A. (1980). 'The Uses of Tobit Analysis.' *Review of Economics and Statistics* 62(2): 318-321.

McKelvey, R. D. and Zavoina, W. (1975). 'A statistical model for the analysis of ordinal level dependent variables' *The Journal of Mathematical Sociology* 4(1): 103-120.

Leete, L. (2006). 'Work in the Nonprofit Sector.' In W. W. Powell and R. Steinberg (ed.), *The Nonprofit Sector. A Research Handbook.* New Haven, London: Yale University Press, pp. 159-179.

Netting, F. E., Nelson Jr., H. W., Borders, K. and Huber, R. (2004). 'Volunteer and Paid Staff Relationships: Implications for Social Work Administration.' *Administration in Social Work* 28(3-4): 69-89.

Netting, F. E., O'Connor, M. K., Thomas, M. L. and Yancey, G. (2005). 'Mixing and Phasing of Roles Among Volunteers, Staff, and Participants in Faith-Based Programs.' *Nonprofit and Voluntary Sector Quarterly* 34(2): 179-205.

Neumayr, M., Schneider, U., Meyer, M. and Haider, A. (2007). 'The Non-profit Sector in Austria – An economic, legal and political appraisal.' Institute for Social Policy, Working Paper No. 1/2007. Vienna: Vienna University for Economics and Business Administration.

Paolino, P. (2001). 'Maximum Likelihood Estimation of Models with Beta-Distributed Dependent Variables.' *Political Analysis* 9(4): 325-346.

Rogelberg, S. G., Allen, J. A., Conway, J. M., Goh, A., Currie, L. and McFarland, B. (2010). 'Employee experiences with volunteers. Assessment, description, antecedents, and outcomes.' *Nonprofit Management and Leadership* 20(4): 423-444.

Salamon, L. M., Sokolowski, S. W. and List, R. (2003). *Global Civil Society. An Overview.* Baltimore: Center for Civil Society Studies, Johns Hopkins University.

Seippel, O. (2002). 'Volunteers and Professionals in Norwegian Sport Organizations.' *Voluntas* 13(3): 253-270.

Simmons, W. O. and Emanuele, R. (2010). 'Are volunteers substitute for paid labor in nonprofit organizations?' *Journal of Economics and Business* 62(1): 65-77.

Smithson, M. and Verkuilen, J. (2006). 'A Better Lemon Squeezer? Maximum-Likelihood Regression With Beta-Distributed Dependent Variables.' *Psychological Methods* 11(1): 54-71.

Starke, P., ed. (2008). *Radical Welfare State Retrenchment. A Comparative Analysis.* Basingstoke, New York: Palgrave Macmillan.

Steinberg, R. (2006). 'Economic Theories of Nonprofit Organizations.' In W. W. Powell and R. Steinberg (ed.), *The Nonprofit Sector. A Research Handbook.* New Haven, London: Yale University Press, pp. 117-139.

Stine, W. F. (2008). 'An empirical analysis of the effect of volunteer labor on public library employment.' *Managerial and Decision Economics* 29(6): 525-538.

Veall, M. R. and Zimmermann, K. F. (1994). 'Goodness of Fit Measures in the Tobit Model.' *Oxford Bulletin of Economics and Statistics* 56(4): 485-499.

White, H. (1980). 'A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity.' *Econometrica* 48(4): 817-838.

Wooldridge, J.M. (2010). *Econometric analysis of cross section and panel data.* Cambridge, MA: MIT Press.

10 Appendix

Table 5: Summary statistics all NPOs

	Mean	sd	Min	Max
Separations Rate	0.108	0.195	0.000	1.000
Volunteer dummy	0.591	0.492	0.000	1.000
Mangerial tasks	0.435	0.496	0.000	1.000
Main tasks	0.259	0.439	0.000	1.000
Administrative tasks	0.330	0.471	0.000	1.000
Other tasks	0.194	0.396	0.000	1.000
Employer size	2.036	1.329	0.000	8.097
Atypical employees	0.449	1.907	0.000	21.250
Long term employees	0.426	0.319	0.000	1.000
Work council	0.137	0.344	0.000	1.000
Public funding	0.283	0.451	0.000	1.000
Increased revenues	0.611	0.488	0.000	1.000
Unchanged revenues	0.254	0.436	0.000	1.000
Reduced revenues	0.135	0.342	0.000	1.000
Increased expenditures	0.800	0.400	0.000	1.000
Unchanged expenditures	0.148	0.356	0.000	1.000
Reduced expenditures	0.052	0.222	0.000	1.000
Education	0.402	0.491	0.000	1.000
Health and social work	0.241	0.428	0.000	1.000
Activities of membership organizations	0.276	0.447	0.000	1.000
Recreational, cultural and sporting activities	0.059	0.236	0.000	1.000
Observations	540			

Table 6: Tobit/σ – probit coefficient comparison

	Increased competition		Decreased competition	
	(1)	(2)	(3)	(4)
	Tobit/σ	Probit	Tobit/σ	Probit
Volunteer dummy	0.625**	0.881**	-0.177	-0.223
Managerial tasks	-0.078	-0.334	0.298	0.520*
Main tasks	-0.468**	-0.082	0.126	0.100
Administrative tasks	-0.364	-0.288	-0.054	-0.113
Other tasks	-0.119	-0.083	0.450**	0.590**
Employer size	0.346***	0.883***	0.268***	0.852***
Atypical employees	-0.271***	-0.349***	-0.040	-0.081
Long term employees	-1.242***	-1.447***	-1.013***	-1.110***
Work council	-0.457*	-0.331	0.051	0.186
Public funding	0.175	0.107	-0.190	-0.140
Increased revenues	0.052	0.026	0.319	0.164
Unchanged revenues	-0.026	0.048	0.019	-0.065
Increased expenditures	0.506	0.748	-1.260***	-1.140**
Unchanged expenditures	0.472	0.785	-1.046**	-1.117**
Industry affiliation	YES	YES	YES	YES
Constant	-0.196	-1.932***	0.215	-0.912
Observations	228	228	312	312

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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