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ABSTRACT

Does It Pay to Work for Free? Wage Returns and Gender Differences in the Market for Volunteers

Working as a volunteer is a widespread phenomenon that has both individual and societal benefits. In this paper, we identify the wage returns to working for free by exploiting exogenous variation in rainfall across local area districts in England, Scotland and Wales. Instrumental variables estimates reveal large returns for both men and women. However, the returns are differentially greater for men and account for a substantial proportion of the gender earnings gap. A comparison of OLS and IV estimates also indicates negative selection into volunteering for both genders. In a model of optimal volunteering, negative selection implies that a reduction in the cost of volunteering will lead to an expanded and higher-skilled pool of volunteers, and greater societal benefits. A policy that has the effect of reducing the cost relatively more for women may also narrow the gender earnings gap.

JEL Classification: C26, D64, H41, J16, J31, J71

Keywords: volunteering, altruism, gender differences, discrimination, instrumental variables, rainfall, negative selection

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1 Introduction

Working as a volunteer is a widespread phenomenon that has both individual and societal benefits. Because volunteering is a form of work, it is likely to provide individual benefits beyond the "warm glow" associated with pro-social behavior. Working for free may enable one to accumulate human capital, expand networks and signal productive characteristics to employers. Therefore, volunteering should have investment value and lead to higher wage offers in paid work opportunities.

Despite the prevalence of working for free in many advanced economies (see OECD (2011)), there are very few studies that have credibly measured the economic returns to volunteer experience. In this paper, we provide the first instrumental variables (IV) estimates of the effect of volunteer experience on mean annual earnings. Earnings equations for both men and women are estimated using longitudinal data from the British Household Panel Study (BHPS) between the years 1996 and 2008. The BHPS data are supplemented with district-level panel data on daily rainfall in England, Scotland and Wales.

With data on rainfall in the UK, we are able to construct two separate instruments for volunteer experience. The first instrument is a rain "shock" defined as the average yearly rainfall in a district divided by the average yearly rainfall in that district between 1996 and 2008. The second instrument is the district's yearly rain variance. After controlling for a detailed set of observables and individual fixed effects, our rainfall instruments are plausibly exogenous to the unobserved determinants of earnings. Thus, the wage returns to working for free are identified free of biases due to nonrandom selection.

Weather outcomes such as rainfall have been used before as instruments. For example, Angrist, Graddy and Imbens (2000) construct a stormy weather instrument for estimating a demand curve for fish. Stormy weather drives up the cost of fishing, which shifts supply, but leaves the demand for fish largely unaffected. In studies related to pro-social and anti-social behavior, Knack (1994) and Gomez, Hansford and Krause (2007) explore the effect of rainfall (and snow) on the cost of voting and voter turnout. Rainfall has also been linked to the cost of participating in outdoor activities such as 4th of July celebrations, political rallies and riots (Collins and Margo (2007), Madestam and Yanagizawa-Drott (2011) and Medestam, Shoag, Veuger and Yanagizawa-Drott (2013)).[1]

In a similar vein, our weather instruments aim to capture exogenous variation in the cost of volunteering. A rain shock that brings greater annual rainfall is likely to lower the opportunity cost of volunteering, as outdoor leisure activities become less attractive. In

[1]Weather outcomes have also been used in studies of economic growth and development (see Paxson (1992), Miguel, Satyanath, and Sergenti (2004), Maccini and Yang (2009) and Bruckner and Ciccone (2011)).

contrast, a greater variance in rainfall implies less information and predictability, and a possibly higher opportunity cost of committing to volunteer work, for fear of missing good weather days. Although individuals might also be induced to work more hours in a paid job when outdoor leisure activities become less attractive, we can flexibly control for hours of paid work to alleviate this potential threat to identification.

According to pooled OLS estimates, the wage returns to volunteer experience are a precisely estimated 3.5% for men and an imprecisely estimated -.1% for women. However, fixed effects estimates yield more substantial estimated returns of 12.5% for men and 11.8% for women. Pooled IV estimates that exploit the rainfall instruments produce still higher returns of 63.6% and 41.8% for men and women, respectively. IV estimates that incorporate individual effects yield returns of 94.7% for men and 87.5% for women. All of these latter returns are very precisely estimated.

In all of our specifications, men have larger returns to volunteer experience than women. Using a standard decomposition technique, we show that the differentially larger returns for men account for a at least 23.8% of the gender earnings gap. The differential returns to volunteer experience are more important in explaining the gender earnings gap than are the differential returns to race and education.

In order to explore possible mechanisms underlying the large returns to volunteering for both men and women, we also examine data from the UK Citizenship Survey (UKCS). The UKCS does not reveal strong descriptive evidence in favor of a human capital or networking explanation for the wage returns. The most likely source of the large returns is signaling. In addition, there is little evidence in the UKCS of substantial gender differences in the types of volunteering organizations, activities, motivations or sources of satisfaction that could justify the differential wage returns. This increases the plausibility that there is a non-negligible element of gender discrimination in the market for volunteers.

The large returns to volunteering that we find, compared to the few previous estimates that exist, is likely related to the fact that we are identifying a different parameter than previous studies. Our IV estimates isolate a local average treatment effect, or the returns to volunteer experience among individuals who would not have volunteered had the weather been different (see Angrist, Graddy and Imbens (2000)). The smaller estimates that Day and Devlin (1997,1998) find are not corrected for nonrandom selection and are roughly similar to our pooled OLS results. The relatively lower returns reported in Sauer (2012) are corrected for nonrandom selection, but are not directly comparable since they are produced from a dynamic programming model that accumulates volunteer experience over the life cycle.

In order to give a more structural interpretation to the OLS and IV estimates estimated in this paper, we also develop a model of optimal volunteering. The theory is linked to

the empirical work by showing what OLS and IV are estimating according to the model. The model implies that when IV estimates exceed OLS estimates, a reduction in the cost of volunteering will lead to an expanded and higher-skilled pool of volunteers, and greater societal benefits. In addition, a policy that has the effect of reducing the cost of volunteering relatively more for women has the potential to narrow the gender earnings gap.

The rest of the paper is organized as follows. The next section formulates the model of optimal volunteering. Section 3 describes the data, reports pooled OLS and fixed effects estimates, and explains construction of the weather instruments. Section 4 outlines the IV estimation strategy. Section 5 reports reduced-form and IV estimates in pooled and fixed effects specifications. Section 6 decomposes the gender earnings gap, explores possible mechanisms underlying the large wage returns, and the differential returns by gender, and discusses the policy implications of negative selection. Section 7 summarizes and concludes.

2 Model

The model of optimal volunteering is similar in spirit to the general model of training in Heckman, LaLonde and Smith (1999), and builds on the model of credentials acquisition in Kugler and Sauer (2005). It differs from a pure model of training or certification by incorporating simultaneous paid and unpaid work, and non-pecuniary benefits.

2.1 Decision Problem

The model assumes a continuum of workers of skill type η, where η is drawn from a distribution $F(\cdot)$ with support $\left[\underline{\eta}, \overline{\eta}\right]$. η is conceived of as a general skill that is applicable to both paid and unpaid jobs. Individuals live for two periods and have subjective discount rate r. In the first period, individuals work for pay and choose whether to also engage in volunteer work. In the second period, individuals only work for pay.

Volunteering in the first period generates non-pecuniary benefits referred to as warm glow (Andreoni (1989,1990)). Let $g_1(\eta)$ denote warm glow, where $g_1(\eta)$ can either increase or decrease with skill level. Volunteering in the first period also involves disutility of work effort and out-of-pocket costs. The disutility of work effort is equivalent to foregone leisure. The out-of-pocket costs include commuting and childcare expenses. These latter costs are in addition to those incurred from having a paid job.

Let $\frac{C_1}{\eta}$ denote the monetary equivalent of additional foregone leisure and out-of-pocket costs when choosing to volunteer. These costs decrease with skill level, reflecting the as-

sumption that higher-skilled individuals have differentially lower disutility of work effort and greater assets (less liquidity constrained).

Volunteering may also have opportunity costs in terms of foregone earnings if it leads to less hours being devoted to paid work. In contrast to the disutility of work effort and out-of-pocket costs, foregone earnings increase with skill level since wages increase with η. Note that less hours devoted to paid work also implies less disutility of work effort, while adding a volunteer job implies more. Hence, C_1 should be interpreted as the net change in the disutility of work effort. It is the variation in the disutility of work effort, out-of-pocket costs and foregone earnings with skill level η that generates selection into volunteering.

Individuals seek to maximize lifetime income by choosing whether or not to volunteer in the first period. The value functions are

$$V_1^{nv}(\eta) = w_1^{nv}(\eta) + \left(\frac{1}{1+r}\right) w_2^{nv}(\eta) \tag{1}$$

$$V_1^{v}(\eta) = w_1^{v}(\eta) + g_1(\eta) - \frac{C_1}{\eta} + \left(\frac{1}{1+r}\right) w_2^{v}(\eta) \tag{2}$$

where $V_1^k(\eta)$, $k = nv, v$ are the present discounted values of lifetime income in the non-volunteering and volunteering options, respectively. $w_t^k(\eta)$, $k = nv, v$, $t = 1, 2$, are the corresponding earnings in each option and time period.[2]

Individuals choose to volunteer when $V_1^v(\eta) > V_1^{nv}(\eta)$, or when

$$\frac{w_2^v(\eta) - w_2^{nv}(\eta)}{(1+r)} + g_1(\eta) > \frac{C_1}{\eta} + \left(w_1^{nv}(\eta) - w_1^v(\eta)\right). \tag{3}$$

Equation (3) states that volunteering is optimal when the discounted wage returns to volunteering plus warm glow exceed the costs of volunteering. The costs include the disutility of work effort, out-of-pocket expenses and foregone wages.

The decision rule can also be expressed in terms of the maximum C_1 that an individual of type η is willing to pay to volunteer. This is denoted by $C_{max}(\eta)$ and is found by solving for the C_1 that equates $V_1^v(\eta)$ and $V_1^{nv}(\eta)$, i.e.,

$$C_{max}(\eta) = \eta\left[\frac{w_2^v(\eta) - w_2^{nv}(\eta)}{(1+r)} - \left(w_1^{nv}(\eta) - w_1^v(\eta)\right) + g_1(\eta)\right]. \tag{4}$$

Individuals choose to volunteer when $C_{max}(\eta) > C_1$ and do not volunteer otherwise. For a

[2]Note that η might increase in period 2 to $\eta' > \eta$ if there is skill acquisition in period 1. Modeling this process and taking into account possible differential skill acquisition between paid and unpaid work would not change anything of substance. This is also true for explicitly adding an unemployment option to the model.

given η, $C_{max}(\eta)$ decreases with a smaller discounted wage premium and a larger first period wage loss. $C_{max}(\eta)$ increases with the extent of warm glow.

2.2 Selection into Volunteering

Selection into volunteering can be characterized by determining how $C_{max}(\eta)$ varies with η. Differentiating equation (4) with respect to η yields

$$\frac{\partial C_{max}(\eta)}{\partial \eta} = \frac{C_{max}(\eta)}{\eta} + \eta \left[\frac{\frac{\partial \left(w_2^v(\eta) - w_2^{nv}(\eta) \right)}{\partial \eta}}{(1+r)} - \frac{\partial \left((w_1^{nv}(\eta) - w_1^v(\eta)) \right)}{\partial \eta} + \frac{\partial g_1(\eta)}{\partial \eta} \right]. \quad (5)$$

As can be readily seen in equation (5), the sign of $\frac{\partial C_{max}(\eta)}{\partial \eta}$ is theoretically ambiguous. It depends on how the discounted wage premium, the first period wage loss and warm glow vary with skill level. If the signs and magnitudes of the derivatives on the right hand side are such that $\frac{\partial C_{max}(\eta)}{\partial \eta} > 0$, then higher-skilled individuals are willing to pay more to volunteer, and there is positive selection into volunteering. In this case, individuals with $\eta \in \left(\underline{\eta}, \eta^\star\right)$ do not volunteer and individuals with $\eta \in (\eta^\star, \overline{\eta})$ volunteer. $\eta^\star$ is the point in the skill distribution where $C_{max}(\eta) = C_1$. If $\frac{\partial C_{max}(\eta)}{\partial \eta} < 0$, then higher-skilled individuals are willing to pay less to volunteer, and there is negative selection into volunteering. In this latter case, individuals with $\eta \in \left(\underline{\eta}, \eta^\star\right)$ volunteer and individuals with $\eta \in (\eta^\star, \overline{\eta})$ do not volunteer.

The type of selection into volunteering has important implications for the effects of policy interventions in the market for volunteers. Consider a policy aimed at encouraging work for free, say through a tax credit for childcare expenses incurred while volunteering. This corresponds in the model to a decrease in C_1. If there is positive selection into volunteering, a smaller C_1 implies $C_{max}(\eta) = C_1$ at a lower $\eta^\star$. Hence, more low-skilled individuals choose to become volunteers. An expanded pool of volunteers increases societal benefits but the average quality of the volunteer pool, or the average quality of privately-provided social services, will be lower. Under negative selection, a decrease in C_1 leads to $C_{max}(\eta) = C_1$ at a higher $\eta^\star$ and more high-skilled individuals enter the pool of volunteers. This means there will be an expanded pool of volunteers, a higher average quality of social services, and unambiguously greater societal benefits.[3]

[3]The model abstracts from any social costs of providing tax relief and focuses only on the social gains derived from a greater number of volunteers and their productivity as captured by η. For studies on the relationship between taxation, government expenditures and charitable giving/volunteering, see Brown and Lankford (1992), Andreoni (1993), Duncan (1999), Auten, Sieg and Clotfelter (2002), Andreoni and Payne (2003), Feldman (2010), Andreoni and Payne (2011), and Bartels, Cozzi and Mantovan (2012).

2.3 Identification

Identification of the wage returns to volunteering can be understood by establishing a link between the decision model and the population means estimated by OLS and IV. The decision model characterizes a volunteer as having $C_{max}(\eta) > C_1$ and a wage $w_2^v(\eta)$, while a non-volunteer has $C_{max}(\eta) \leq C_1$ and a wage $w_2^{nv}(\eta)$. OLS yields a regression-adjusted estimate of

$$\begin{aligned} E\left(w_2^v(\eta) \mid C_{max}(\eta) > C_1\right) - E\left(w_2^{nv}(\eta) \mid C_{max}(\eta) \leq C_1\right) &= \\ E\left(w_2^v(\eta) - w_2^{nv}(\eta) \mid C_{max}(\eta) > C_1\right) &+ \\ \left(E\left(w_2^{nv}(\eta) \mid C_{max}(\eta) > C_1\right) - E\left(w_2^{nv}(\eta) \mid C_{max}(\eta) \leq C_1\right)\right). & \end{aligned} \tag{6}$$

The term to the left of the equals sign in equation (6) is the difference in mean wages between volunteers and non-volunteers according to the model's selection rule. The first term after the equals sign is the mean return to volunteering amongst individuals who choose to volunteer. It is the effect of treatment on the treated. The second term is the difference in mean non-volunteer wages between those who select into volunteering and those who do not. This term is the selection bias. Clearly, OLS does not identify the causal effect of volunteer experience on mean wages.

In contrast to OLS, IV yields a regression-adjusted estimate of the local average treatment effect (LATE), which is a causal expression (Angrist, Imbens and Rubin (1996)). In terms of the model, LATE is

$$E\left(w_2^v(\eta) - w_2^{nv}(\eta) \mid C_1^{''} > C_{max}(\eta) > C_1^{'}\right) \tag{7}$$

where $C_1^{''}$ and $C_1^{'}$ are exogenously high and low costs of volunteering, respectively. In the empirical work, our rainfall instruments serve as the exogenous cost shifters.

Assuming that the rainfall instruments are valid, and LATE yields a good approximation to the effect of treatment on the treated, i.e.,

$$E\left(w_2^v(\eta) - w_2^{nv}(\eta) \mid C_1^{''} > C_{max}(\eta) > C_1^{'}\right) \approx E\left(w_2^v(\eta) - w_2^{nv}(\eta) \mid C_{max}(\eta) > C_1\right), \tag{8}$$

the difference between IV and OLS estimates is the selection bias. If IV exceeds OLS, selection bias is negative, and according to the model, the least-skilled individuals choose to volunteer. The opposite holds true if OLS exceeds IV. Selection bias is positive and individuals who choose to volunteer are the highest-skilled.

3 Data

The individual level longitudinal data are drawn from the British Household Panel Survey (BHPS). The BHPS began in 1991 with a representative sample of 5,500 households (10,300 individuals) residing in 250 different regions in England, Scotland and Wales. Each adult member of the original sample (aged 16 and over) is interviewed face-to-face and re-interviewed annually. Wave 1 sample members are "followed" into new households if they move out or their original household breaks up. The BHPS ended with wave 18 in 2008.[4]

The BHPS contains detailed demographic and employment information. In 1996, the BHPS began asking about voluntary activities. The exact wording of the question is, "We are interested in the things people do in their leisure time. I'm going to read out a list of some leisure activities. Please look at the card and tell me how frequently you do each one...unpaid voluntary work." The options on the card are, i) at least once a week, ii) at least once a month, iii) several times a year, iv) once a year or less and v) never/almost never.

Since the volunteering question was asked only every two years, there are seven waves of volunteering responses between 1996 and 2008. The sample is restricted to these seven waves and to respondents between the ages of 20 and 60. Full-time students, retirees, the long-term sick and disabled, and individuals who did not reply to the employment questions are excluded from the analysis. Women and men on maternity or paternity leave are kept in the sample as long as they provide information on usual employment status (part-time or full-time). The estimation sample contains 4,542 men and 5,265 women, corresponding to 12,061 man-years and 14,779 woman-years.

In the regression analysis, we define the volunteering dummy in each year to be equal to one if the the individual reported doing any unpaid voluntary work in that year or in any previous year, and zero otherwise. This definition allows volunteering to affect both current and future earnings as in the theoretical model. However, it does not distinguish between the number of years (greater than one) that an individual volunteers over the sample period. This implicitly assumes no depreciation of volunteer experience and zero effects of further accumulation.

Note that assigning a value for accumulated years of volunteer experience is problematic because of unobserved initial conditions and missing data during the sample period (bien-

[4]The set of followed households was expanded in 1999 to include 1,500 additional households residing in Wales and 1,500 additional households living in Scotland. Further expansion took place in 2001 with the addition of 1,900 households residing in Northern Ireland. The BHPS was also augmented with 1,000 low-income households interviewed between 1997 and 2001 as part of the European Community Household Panel. Because there is relatively little information available on the volunteering outcomes of residents of Northern Ireland, they are eliminated from the sample.

nial survey questions). An alternative definition is to ignore the past completely and set the volunteer dummy according to current year volunteer status. However, this implicitly assumes full depreciation of volunteer experience and only contemporaneous effects on wages. Not surprisingly, it also produces larger estimates of the returns to volunteering in all our specifications. The persistent volunteering definition is a more theoretically reasonable and conservative strategy. Below, we use the contemporaneous volunteering definition in several places only for descriptive purposes.[5]

3.1 Descriptive Statistics

Table (1) reports information on the frequency of volunteering by year and gender, using the contemporaneous definition of volunteering. Pooled over all years, the mean volunteering rate is 17.7% for men and 20.7% for women. Amongst the volunteers, women work for free slightly more frequently than men. Between the years 1996 and 2008, the yearly volunteering rate fluctuates in a fairly tight range, except for a noticeable jump in volunteering amongst both genders in the 2002 wave. The jump is fully reflected in the increase in the volunteer "once a year or less" category. In the regression analysis, a full set of year dummies sufficiently captures this anomaly.

The differences in the characteristics of volunteers and non-volunteers by gender is shown in Table (2). In the top panel, the persistent volunteering definition is used. Note that throughout the analysis, earnings and spousal income are measured in thousands of constant 1987 pounds and earnings for the unemployed are set to zero.

The figures show that both male and female volunteers are more educated, more likely to be employed in a paid job, have higher earnings and spousal income, are slightly older, more likely to be married and have older children than non-volunteers of the same gender. Male volunteers are more likely to be employed full-time while female volunteers are more likely to be employed part-time compared to non-volunteers of the same gender. Differences-in-differences estimates by characteristic show significant gender differentials between volunteers and non-volunteers in full-time paid employment, earnings and spousal income. These patterns are highly consistent with previous findings in the volunteering literature (see Menchik and Weisbrod (1987) and Freeman (1997)).

The distribution of accumulated volunteer experience by gender is displayed in the bottom

[5]Day and Devlin (1997,1998) also use the persistent volunteering definition. In contrast, Sauer (2012) accumulates volunteer experience by explicitly modeling the initial conditions problem and the missingness/non-response process during the sample period in the PSID. We do not use BHPS supplied weights or otherwise attempt to adjust for possible biases due to non-response, which is common practice in multivariate regression studies using the BHPS (see Jenkins (2010)).

panel of Table (2). The contemporaneous volunteering definition is used for the accumulation. The figures show that 66.2% of men never volunteered, compared to 56.3% of women. These are upper bound figures due to the initial conditions problem and missing data during the sample period. Amongst those who are observed to volunteer at least one year, 72.4% of men volunteered at least one or two years. The corresponding figure for women is 66.7%. Thus, there is no strong evidence that women are more persistent in their volunteering behavior than men.

3.2 Pooled OLS and Fixed Effects Estimates

Pooled OLS and fixed effects estimates of the increase in mean annual earnings due to volunteer experience are reported in Table (3). In the pooled regressions, standard errors are heteroskedasticity-robust, and in the fixed effects regressions, standard errors are clustered at the individual level. With year and region dummies included, OLS produces an estimated coefficient on volunteering for men of 1,831 pounds (column (1)). The percentage impact is 17.3%. The percentage impact is calculated as the median ratio of the coefficient on volunteering to the fitted value of earnings, with the volunteering dummy set to zero, amongst individuals that have volunteering experience.

Column (2) includes employment, education and ethnicity variables as well as other covariates, including the number of children, spousal income and dummies for age, marital status, age of children, belonging to a union, being a professional/manager, working for a nonprofit organization, and the size of the firm. The OLS coefficient on volunteering decreases to 454 pounds. The percentage impact is 3.5%.

Fixed effects estimates of the returns to volunteering for men are larger in magnitude. With no controls, the coefficient on volunteering is 1,731 pounds, corresponding to a percentage impact of 16.4% (column (3)). Adding employment controls and other regressors yields a coefficient of 1,454 pounds for a percentage impact of 12.5% (column (4)). All of these volunteer experience returns for men are precisely estimated.

The OLS and fixed effects estimates of the returns to volunteering are consistently lower for woman than for men. With year and region dummies, the OLS volunteering coefficient is 509 pounds (column (5)). Adding other regressors the volunteering coefficient decreases to -11 pounds and loses statistical and economic significance (column (6)). The percentage impacts are 9.1% and -.1%, respectively.

The fixed effects coefficients for women are larger in magnitude and precisely estimated. With no controls, the volunteering coefficient is 787 pounds, corresponding to a percentage impact of 14.5% (column (7)). Adding the other controls, the coefficient is 696 pounds,

implying a percentage impact of 11.8% (column (8)). The results also indicate that the employment, education and ethnicity variables are particularly important controls for both men and women. The age of children dummies (not shown in the table) have a strong impact on the earnings of women but not men.

3.3 The Weather Instruments

The OLS and fixed effects estimates reported in the previous subsection do not exploit exogenous variation in the cost of volunteering. We conjecture that weather outcomes influence the cost of volunteering, and hence the propensity to volunteer, but have no direct effect on earnings after controlling for a detailed set of observables and individual fixed effects. Thus, weather outcomes can be used to obtain instrumental variables estimates of the returns to volunteer experience.

In order to construct the weather instruments, we obtained data from the Met Office Integrated Data Archive System (MIDAS), accessed through the British Atmospheric Data Centre. For each even year between 1996 and 2008, daily rainfall information was gathered for every available weather station in England, Scotland and Wales. Only measurements from weather stations operating during the entire year were considered. Measurements were obtained from a yearly average of 2,027 weather stations.

Figure (1), obtained from the Met Office website, illustrates that there is considerable variation in average yearly rainfall levels across the UK. In the south, the southeast (including London) and East Anglia, less than 700 millimeters of rain usually fall per year. In Essex, rainfall can be below 450 millimeters annually, which is less than the average annual rainfall in Jerusalem and Beirut. The mountains of Wales, Scotland, the Pennines and the moors of southwest England are the wettest parts of the UK. As much as 4,500 millimeters of rain can fall annually in these areas, making them some of the wettest locations in all of Europe.

The BHPS contains information on the Local Authority District (LAD) in which a respondent lives, and weather stations in the UK can be linked to a postcode district. Using GeoConvert, a service available from the UK Data Service, it is possible to match LADs to postcode districts. After merging the BHPS and the MIDAS dataset, we obtained 26,840 person-year observations distributed across 321 different LADs. We then constructed two weather instruments for each individual. The first instrument is the average yearly rainfall in the individual's LAD divided by the average rainfall in that LAD between the year 1996 and 2008. We refer to this instrument as the rain shock. The second instrument is the yearly rain variance in the individual's LAD. The 321 LADs correspond to the number of clusters

in the calculation of clustered standard errors.[6]

4 Estimation Strategy

The estimation framework that we consider is a linear, constant-effects model that connects the earnings of individual i at time t, Y_{it}, with volunteer experience, V_{it}, a vector of individual characteristics, X_{it}, an individual time-invariant effect, u_i, and a random error component specific to individuals at time t, ϵ_{it}:

$$Y_{it} = X_{it}\beta + V_{i,t-1}\alpha + u_i + \epsilon_{it} \tag{9}$$

The interpretation of equation (9) is that it describes the earnings of individuals under alternative assignments of volunteer experience, controlling for any effects of X_{it} and u_i. X_{it} contains a large set of observables described earlier. u_i captures unobserved time-invariant skill and preference characteristics while ϵ_{it} represents unobserved time-varying skill and preference shocks.

As equation (4) in the decision model makes explicit, V_{it} is not randomly assigned. V_{it} is likely to be correlated with ϵ_{it}, even after controlling for X_{it} and u_i, due to time-varying shocks to η, or warm glow $g_1(\eta)$. Therefore, OLS and fixed-effects estimates of equation (9) do not have a causal interpretation. IV estimates will have a causal interpretation as long as it is reasonable to assume that, after controlling for X_{it} and u_i, the association between the weather and earnings is solely due to the association between the weather and volunteer experience (through the cost of volunteering).

In IV estimation, the first-stage relationship between volunteer experience, X_{it}, u_i and the vector of weather instruments, W_{it}, is

$$V_{it} = X_{it}\pi_0 + W_{it}\pi_1 + u_i + \xi_{it}. \tag{10}$$

The error term ξ_{it} is defined as the residual from the population regression of V_{it} on X_{it}, u_i and the instrument vector W_{it}. This residual captures other factors that are correlated with volunteer experience and may be correlated with ϵ_{it}, such as unobserved skill and warm glow preference shocks.

The key identifying assumption that underlies estimation using weather instruments is

[6] We eliminated a small number of outliers with a rain shock greater than the 96.5th percentile in the distribution. A few additional outliers were eliminated when weekly hours worked exceeded the 99.95th percentile, or earnings exceeded the 99.96th percentile.

that rainfall affects the cost of volunteering but does not directly influence earnings. Our conjecture is that a positive yearly rain shock is likely to lower the opportunity cost of volunteering as outdoor leisure activities become less attractive. In addition, a greater variance in the weather implies less information and predictability, and a possibly higher opportunity cost of committing to volunteer work, for fear of missing good weather days.

Note that volunteering in the UK is mainly an indoor activity. From the volunteering websites do-it.org.uk and volunteering.co.uk, one can readily examine the range of volunteer job openings. While a few volunteer posts do involve outdoor work, for example serving as a summer camp counselor, the overwhelming majority of posts are associated with indoor work. Obvious examples include volunteer posts in museums and libraries.

One potential threat to identification is that inclement weather may also directly affect earnings through the choice to work more hours in a paid job, rather than devote time to volunteer work. However, we are able to include several controls for hours of paid work to partially address this concern. As in the OLS and fixed effects estimates, X_{it} contains the reported number of hours of paid work as well as dummies for part-time and full-time paid employment.

Another potential threat to identification is that highly-skilled individuals may sort to better weather locations. For this reason, we construct the weather instruments as a rain shock and a rain variance, which are presumably less predictable or prominent in location decisions. Inclusion of the individual fixed effect u_i also helps address this potential source of endogeneity.

5 Estimation Results

5.1 Reduced-Form Estimates

Reduced-form estimates of the effect of rainfall are reported in Table (4). Standard errors are clustered at the LAD level in the pooled regressions and at the individual level in the fixed effects specifications. Clustering at the LAD level in the pooled regressions produces the most conservative estimates of the standard errors. The same is true for the fixed effects specifications when clustering at the individual level. It is not possible to cluster at the LAD level in these latter regressions because some individuals switch LADs over time.

Columns (1), (3), (5) and (7) show coefficients for the first stage described in equation (10). Estimates of both pooled and fixed effects linear probability models reveal that a positive rain shock (more rainfall) increases the probability of having volunteer experience amongst both men and women, while an increase in the variance of rainfall decreases the

probability. The F-statistics at the bottom of the table indicate that the instruments are jointly significant in all specifications. The F-statistics are relatively smaller in value in the pooled specifications. Robustness checks are reported below.

The signs of the coefficients are consistent with the conjecture that a positive rain shock decreases the opportunity cost of volunteering, while an increase in the variance increases the opportunity cost. The pooled results also show that the probability of having volunteer experience increases sharply with education level for both men and women. The relationship between paid employment status, hours worked in a paid job and volunteering becomes somewhat more imprecise in the the fixed effects specifications.

Columns (2), (4), (6) and (8) report reduced-form effects of the rain instruments on mean annual earnings. A positive rain shock increases mean earnings and an increase in the variance decreases mean earnings in all specifications. The rainfall instruments influence mean earnings and the probability of having volunteer experience in the same direction. The F-statistics indicate joint significance of the instruments in all specifications. The rainfall instruments have a relatively stronger impact on mean earnings in the fixed effects specifications for both men and women. Other results reveal that mean earnings substantially increase with education and hours worked for both men and women. Non-white men and women have substantially lower mean earnings than their white counterparts.

5.2 Instrumental Variables Estimates

IV estimates of the effect of volunteer experience on mean annual earnings are reported in Table (5). Volunteer experience is instrumented with the rain shock and rain variance variables. Columns (1) and (2) show that the coefficients on volunteering for men are 6,727 and 8,492 in the pooled and fixed effects specifications, respectively. Both earnings effects are precisely estimated and imply percentage impacts of 63.6% and 94.7%.

Columns (3) and (4) report the IV estimates for women. A similar pattern emerges. The coefficient in the pooled specification is 3,072. It increases to 4,028 with fixed effects included. The earnings effects are precisely estimated and imply percentage impacts of 41.8% and 87.5%. Correcting for nonrandom selection yields returns to volunteering for both men and women that are much larger than the corresponding estimates in Table (3). Even though the returns to volunteering are substantial for women, they are consistently smaller than for men.

The large returns to volunteer experience that we uncover, compared to the few previous estimates that exist, is most likely due to the fact that we are identifying a different parameter than other studies. Our estimates isolate local average treatment effects. These

are the returns to volunteering among individuals who would not have volunteered had the weather been different. Individuals who are the most sensitive to rainfall (the cost of volunteering) contribute the most to the average causal response (see Angrist, Graddy and Imbens (2000)). Note that the additional monetary costs of volunteering, e.g., additional childcare expenses, can be considerable, requiring large returns in current and future paid jobs to make volunteering economically viable.[7]

In contrast to our estimates, Day and Devlin (1997,1998) obtain returns to volunteer experience of 6.6%. By gender, the returns are 9% for men and zero for women. These estimates are not corrected for biases due to nonrandom selection and are roughly similar to our pooled OLS estimates. Sauer (2012) estimates returns for women that are 8.2% in part-time work and 2.4% in full-time work. These latter estimates are corrected for nonrandom selection but are less comparable because they are obtained from estimating structural wage offer functions embedded in a dynamic programming model.

In the context of estimating the wage returns to re-licensing as a physician in a new country, Kugler and Sauer (2005) employ a comparable empirical strategy to ours. Their IV estimates are also much larger than OLS estimates, and they calculate percentage impacts in a similar way. Their percentage impacts, which are also derived from local average treatment effects, range between between 180% and 340%. The large percentage impacts are likely due to the high monetary and psychological costs of re-training for a medical license.

5.3 Alternative IV Estimates

Table (6) reports several additional IV results of interest. The first two rows reproduce the 2SLS estimates from Table (5). The next two rows display limited information maximum likelihood (LIML) estimates. 2SLS and LIML produce very similar estimates of the coefficients and standard errors. However, the percentage impact is somewhat sensitive to the relatively small change in the coefficient in the fixed effects specification for men. LIML yields a percentage impact of 123.8% in comparison to 94.7% from 2SLS.

The table also reports just-identified IV estimates using each rainfall instrument individually. The rain shock is a strong instrument only in the specifications with fixed effects. The percentage impact falls from 94.7% to 78.8% for men and from 87.5% to 77.3% for women The returns remain quite large and the coefficients are precisely estimated. The rain variance is a strong instrument only in the pooled regressions. The percentage impact increases from 63.6% to 89.1% for men and from 41.8% to 42.9% for women. The returns are precisely

[7]Sauer (2012) estimates the additional annual childcare costs incurred as a result of volunteering to be $5,106 per-child.

estimated. The just-identified estimates with the rain shock alone provide an overall lower bound for the returns to volunteering.

The last reported robustness check is a pooled specification with all variables aggregated up to the LAD level. As shown at the bottom of the table, the percentage impact increases substantially from 63.6% to 146.4% for men and from 41.8% to 104.1% for women. The returns are precisely estimated. These latter estimates provide an overall upper bound on the returns to volunteer experience.

There are several additional IV results worth mentioning, but not shown in the table for sake of brevity. First, there are no significant interactions between volunteer experience and other covariates. Second, the returns to volunteering do not substantially change when the unemployed (zero earnings) are excluded, or when individuals residing in London are eliminated from the sample. Third, defining volunteering according to the contemporaneous definition produces consistently higher returns (all precisely estimated) than the persistent definition. Fourth, using the contemporaneous definition of volunteering, and lagging by two years, the length of time between volunteering questions, produces several non-sensical magnitudes that are imprecisely estimated. This may be due to the loss in sample size.

6 Discussion

6.1 The Gender Earnings Gap

Although the IV estimates indicate large returns to volunteer experience for both men and women in all specifications, the returns are consistently greater for men than for women. In order to assess the extent to which gender differences in the returns to volunteer experience contribute to the gender earnings gap, we compute the standard Blinder (1973) and Oaxaca (1973) earnings decomposition. The decomposition is,

$$\overline{Y}^m - \overline{Y}^f = \widehat{\beta}^m \left(\overline{X}^m - \overline{X}^f \right) + \left(\widehat{\beta}^m - \widehat{\beta}^f \right) \overline{X}^f \tag{11}$$

where $\overline{Y}^j$ is mean earnings, $\widehat{\beta}^j$ is a row vector of IV estimates, and $\overline{X}^j$ is a column vector of sample means, for $j = m, f$ (males and females, respectively).

The first term after the equals sign in (11), referred to as the endowments effect, is the part of the gender earnings gap attributable to differences in characteristics. The second term after the equals sign, referred to as the coefficients effect, is the part of the gap attributable to differences in the returns to those characteristics. The coefficients effect is also called the unexplained component, and is often associated with discrimination. Although alternative

decomposition methods have been explored in the literature, e.g., Juhn, Murphy and Pierce (1993), Chernozhukov Fernandez-Val and Melly (2013) and Card, Cardoso, and Kline (2013), these methods are either not appropriate in our context or do not readily extend to a detailed decomposition into individual components.

Table (7) reports selected endowment and coefficients effects, as well as the percentage of the earnings gap due to the coefficients effect, using the IV estimates from the pooled specifications. We only discuss the decomposition results using the IV pooled estimates because they yield more conservative estimates of the importance of volunteer experience. The decomposition reveals that 59% of the mean earnings gap of 5,306 pounds is attributable to the coefficients effect (column (3)). The differential returns to volunteer experience account for 40.3% of this unexplained component, or 23.8% of the total gap.

It is interesting to note that the differential returns to volunteering is more important in explaining the overall gap than the differential returns to race and education. Only the differential returns to hours worked has a greater contribution than volunteer experience. These latter comparisons come with the caveat that the returns to education and hours worked in paid jobs are not corrected for nonrandom selection.[8]

The result that 59% of the mean earnings gap is unexplained may seem large. However, it is consistent with the wider literature on gender differences which suggests that differences in endowments (skills) have become increasingly less important (see, e.g., Blau and Kahn (1997), Goldin and Rouse (2000), Andreoni and Vesterlund (2001), Gneezy, Niederle and Rustichini (2003) and Niederle and Vesterlund (2007)). It is also consistent with previous studies on the gender earnings gap in the UK. In particular, Wright and Ermish (1991) estimate that 48.8% of the gender earnings gap in the UK, in 1980, is unexplained. Considering that skill differences have generally become less important, the unexplained component should now be larger, as we indeed find.

6.2 Mechanisms

The decomposition results illustrate the importance of the differential returns to volunteer experience in explaining the gender earnings gap. However, they do not shed much light on why women receive lower returns to volunteer experience than men. In order to explore possible sources of the returns to volunteering, and possible reasons for gender differentials in the returns, we examine data from the UK Citizenship Survey (UKCS).

[8]The results in Table (7) are robust to changes in the base category for the categorical variables and to using the female earnings structure, rather than the male's, as the counterfactual (see Fortin, Lemieux and Firpo (2011)).

The UKCS ran every two years from 2001 until 2007. It was subsequently conducted on a quarterly basis until its cancellation in 2011. In each wave, approximately 15,000 adults living in England and Wales were interviewed. The UKCS contains more comprehensive questions on volunteering than the BHPS, and has information on personal characteristics such as income (in categories), age, gender and employment status. However, the survey has drawbacks. It is purely cross-sectional and the volunteering questions tend to vary substantially each wave. Nonetheless, it is quite useful for descriptive purposes. In order to mimic the BHPS sample as much as possible, we focus on individuals aged 20 to 60 years old, between 2001 and 2007.[9]

Table (8) reports the types of organizations for which people volunteer. The most frequent organizations are those involved in education, sports, religion, the arts and social activities. A substantial proportion also choose the "other/none of these" category. Women engage more in educational activities, while men are more involved in sports related activities. However, gender differences are not strong.

The top panel of Table (9) displays information on the types of formal volunteering activities in which individuals engage. The most common activities are fundraising, organizing activities, giving advice or counseling and other practical help. The most frequent choice is "none of the above". Women are involved somewhat more in other practical help, while men provide more transportation services. However, this latter activity is not a frequent one. Strong gender differences are not apparent.

The middle panel of the table shows the distribution of informal volunteering activities. The most common categories are giving advice, looking after property, caring for children, and helping those who have difficulty shopping, paying bills, writing letters and getting out and about. Women do more shopping and paying bills and men engage more in home or car repairs. However, this latter category is not a frequent one. Gender differences are negligible. The bottom panel of the table shows that informal volunteering is more frequent than formal volunteering. But there are no substantial gender differences.

The top panel of Table (10) lists a set of volunteering motivations. The most common categories are wanting to help people and the cause being important. Among the least common categories are getting on in one's career and having a chance to acquire a recognized qualification. Men are slightly more motivated if friends or family volunteered in the past, while women care more if the volunteering activity is connected with the needs of family or friends. Gender differences in motivations are small.

[9]Full-time students, retirees, the long-term sick and disabled, and individuals who do not reply to the employment questions are excluded from the sample. The 2003 wave is excluded entirely because of substantial differences in the types of questions asked on formal and informal volunteering. The total number of observations is 58,062.

The bottom panel of the table lists various types of satisfaction derived from volunteering. The frequencies indicate that gaining a recognized qualification or improving employment prospects is not a main motivation. Volunteers are more satisfied by meeting people, making friends, seeing results, having a sense of personal achievement and enjoying themselves. Women gain more satisfaction if they meet people, make friends and feel needed, while men are more interested in having a chance to do things at which they excel. Gender differences are small in magnitude.

Overall, analysis of UKCS data does not reveal strong evidence in favor of a career concerns explanation for the wage returns to volunteer experience. Volunteering as a means of acquiring human capital or expanding networks does not figure prominently in the responses of volunteers. Thus, the most likely source of the large returns to volunteering for both men and women is signaling. Volunteers appear to be individuals with social concerns that are motivated to help people and help correct perceived social problems. These may also be productive characteristics that are attractive to employers.

Importantly, there is little evidence in the UKCS that substantial differences exist in the types of volunteer organizations, activities, motivations or sources of satisfaction between genders that would help justify the large gender differentials in the wage returns to working for free. This increases the plausibility that an element of gender discrimination underlies the differential returns to volunteer experience.

6.3 Negative Selection

The results in Tables (3) and (5) show that IV estimates of the returns to volunteer experience are consistently larger than in corresponding specifications estimated by OLS. This indicates negative selection into volunteering amongst both men and women. By negative selection, we mean that individuals who volunteer have lower intrinsic earnings potential (in the absence of volunteering) than those who do not.

The theoretical model of optimal volunteering presented earlier characterizes negative selection as a state in which those with intrinsic earnings potential $\eta \in \left(\underline{\eta}, \eta^{\star}\right)$ volunteer and those with $\eta \in (\eta^{\star}, \overline{\eta})$ do not. Under negative selection, $\frac{\partial C_{max}(\eta)}{\partial \eta} < 0$, or the maximum an individual is willing to pay to volunteer decreases with skill level. As equation (5) clearly illustrates, the sign of $\frac{\partial C_{max}(\eta)}{\partial \eta}$ depends on how the discounted wage premium, the monetary costs and warm-glow from volunteering vary with η. $\frac{\partial C_{max}(\eta)}{\partial \eta} < 0$ can arise when the wage loss from volunteering and warm glow increase with η, but the discounted wage premium decreases with η. Sauer (2012) finds empirical support for this particular configuration of the derivatives.

Within the context of the theoretical model, negative selection has important implications for the effects of policy interventions in the market for volunteers. This is especially relevant in the UK, where successive governments have been searching for ways to promote voluntary activities as part of a "Big Society" initiative. Consider a policy aimed at encouraging voluntary activity via a tax credit for childcare expenses incurred while volunteering. This translates into a decrease in C_1, which leads to $C_{max}(\eta) = C_1$ at a higher $\eta^\star$. This implies that more highly-skilled individuals would enter the pool of volunteers. In addition to the expanded pool of volunteers, there would also be a higher average quality of social services flowing from increased voluntary activities.

Note that a childcare tax credit might also lead to a narrowing of the gender earnings gap. This could occur if the tax credit had the effect of reducing C_1 relatively more for women than for men. The increase in $\eta^\star$ would then be relatively greater for women, resulting in a composition effect that increased mean annual earnings for women by more than it increased mean annual earnings for men.

Note that there is evidence in the UKCS that suggests women may indeed be relatively more sensitive to a childcare tax credit policy. The top panel of Table (11) lists various barriers to volunteering amongst individuals that do not volunteer. The two most common barriers are work commitments and looking after children/the home. The frequencies by gender show that 72% of the men choose work commitments as a barrier in comparison to 57% of the women. In contrast, only 29% of the men identify looking after children/the home as a barrier, while 51% of the women do. Thus, a tax credit for childcare expenses may affect the volunteering decisions of women relatively more than men.

The bottom panel of Table (11) lists various incentives that might cause non-volunteers to reconsider and choose to engage in volunteering. The most common responses are being asked directly to get involved (see Freeman (1997)) and doing it together with friends or family. While only 10% of the respondents choose having expenses paid, 26.7% would like to do volunteer work from home. The only substantial gender difference is in this latter category. Women choose this option much more than men (31.4% vs. 20.8%). This can be interpreted as additional descriptive evidence that the costs of childcare are more of a barrier for women than they are for men.

7 Conclusion

This study measures the wage returns to volunteer experience by exploiting exogenous variation in rainfall in England, Scotland and Wales. Pooled OLS estimates of the wage returns

are a precisely estimated 3.5% for men and an imprecisely estimated -.1% for women. Fixed effects estimates yield more substantial and precisely estimated returns of 12.5% for men and 11.8% for women. Pooled IV estimates that instrument volunteer experience with a district level rain "shock" and a measure of the variance in yearly rainfall produce substantially higher returns of 63.6% and 41.8% for men and women, respectively. IV estimates that incorporate individual effects yield estimated returns of 94.7% for men and 87.5% for women. All of the IV returns are precisely estimated.

In all of our specifications men have larger returns to volunteer experience than women. Using a standard decomposition technique, we show that the differentially larger returns for men account for at least 23.8% of the gender earnings gap. The differential returns to volunteer experience are more important in explaining the gender earnings gap than are the differential returns to race and education.

Analysis of an additional data set, the UK Citizenship Survey, suggests that the most likely source of the large returns for both men and women is signaling. Volunteers appear to be individuals with social concerns that are motivated to help people and help correct perceived social problems. These may also be productive characteristics that are attractive to employers. The UKCS does not contain strong descriptive evidence of substantial differences in the types of volunteer organizations, activities, motivations or sources of satisfaction between genders. This increases the plausibility that there is a non-negligible element of gender discrimination in the market for volunteers.

The large IV estimates of the returns to volunteering, compared to OLS, suggest that there is negative selection into volunteering for both genders. In order to give a structural interpretation to the OLS and IV estimates, we develop a model of optimal volunteering. According to the model, negative selection (IV estimates that exceed OLS estimates) implies that a reduction in the cost of volunteering will lead to an expanded and higher-skilled pool of volunteers, and greater societal benefits. A policy that has the effect of reducing the cost of volunteering relatively more for women, for example a childcare tax credit for expenses related to volunteering, also has the potential to narrow the gender earnings gap.

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Table 1: Volunteering by Year and Gender

Year	Never/ Almost Never	Once a year or less	Several times a year	At least once a month	At least once a week	N
1996	.813	.045	.045	.038	.059	3,562
Men	.838	.042	.043	.031	.045	1,613
Women	.793	.047	.047	.043	.070	1,949
1998	.837	.040	.042	.032	.049	3,869
Men	.862	.033	.038	.031	.034	1,722
Women	.817	.045	.046	.033	.060	2,147
2000	.836	.035	.043	.036	.50	5,017
Men	.856	.035	.039	.031	.040	2,250
Women	.820	.035	.047	.040	.058	2,767
2002	.703	.163	.047	.033	.053	4,240
Men	.698	.179	.042	.033	.048	1,910
Women	.706	.153	.052	.033	.057	2,330
2004	.835	.047	.041	.030	.046	4,107
Men	.845	.051	.042	.027	.036	1,846
Women	.828	.044	.041	.034	.054	2,261
2006	.824	.045	.051	.029	.051	2,941
Men	.848	.050	.048	.024	.039	1,318
Women	.811	.050	.048	.024	.039	1,623
2008	.801	.049	.064	.054	.033	3,100
Men	.832	.046	.050	.044	.028	1,400
Women	.776	.051	.075	.062	.036	1,700
Pooled	.807	.062	.047	.036	.049	26,836
Men	.823	.064	.043	.032	.039	12,059
Women	.793	.061	.051	.039	.057	14,779

Note: The figures are row proportions. N is the number of male and female respondents aged 20-60 that answered the volunteering question in the corresponding year that it was asked.

Table 2: Characteristics of Volunteers and Non-Volunteers by Gender

	Men				Women				
	Full Sample (1)	Vol (2)	Non-Vol (3)	Diff (2) - (3) (4)	Full Sample (5)	Vol (6)	Non-Vol (7)	Diff (6) - (7) (8)	Diff-in-Diff (8) - (4) (9)
Age	37.483 (.168)	38.491	36.985	1.505 (.356)	37.680 (.154)	38.679	37.091	1.588 (.319)	.083 (.478)
Married	.503 (.007)	.573	.468	.105 (.015)	.501 (.007)	.568	.461	.107 (.013)	.002 (.020)
Children	.631 (.014)	.683	.606	.077 (.029)	.766 (.013)	.842	.722	.120 (.028)	.043 (.041)
Young 0-4	.152 (.005)	.143	.156	-.013 (.010)	.175 (.004)	.179	.173	.007 (.009)	.020 (.013)
Young 5-11	.149 (.004)	.176	.135	.041 (.009)	.184 (.004)	.207	.171	.036 (.009)	-.004 (.013)
Young 12-18	.093 (.003)	.103	.088	.015 (.007)	.109 (.003)	.129	.097	.032 (.007)	.017 (.010)
Employed	.896 (.004)	.923	.882	.041 (.009)	.909 (.004)	.924	.900	.025 (.008)	-.016 (.012)
Part-time	.039 (.002)	.050	.034	.016 (.005)	.241 (.005)	.262	.230	.032 (.011)	.016 (.013)
Full-time	.847 (.005)	.864	.839	.024 (.010)	.504 (.006)	.493	.511	-.019 (.013)	-.043 (.017)
Hours	34.355 (.198)	34.711	34.180	.531 (.422)	22.691 (.206)	22.379	22.875	-.497 (.426)	-1.027 (.606)
Earnings	10.325 (.096)	11.792	9.600	2.192 (.201)	5.441 (.066)	6.028	5.095	.934 (.136)	-1.258 (.236)
Spouse Inc.	2.800 (.066)	3.519	2.445	1.073 (.140)	5.878 (.115)	7.712	4.796	2.916 (.236)	1.842 (.289)
Lower Edu	.061 (.004)	.032	.075	-.042 (.008)	.075 (.004)	.054	.088	-.034 (.008)	.008 (.011)
High School	.306 (.007)	.249	.332	-.084 (.015)	.330 (.007)	.288	.353	-.065 (.014)	.019 (.021)
Higher Edu	.488 (.008)	.637	.418	.219 (.016)	.422 (.007)	.561	.344	.217 (.014)	-.002 (.022)
Non-white	.028 (.002)	.022	.032	-.010 (.005)	.034 (.002)	.031	.035	-.004 (.005)	.006 (.007)
Years Vol									
zero	60.62	-	100		56.33	-	100		
one	21.59	50.88	-		21.79	45.62	-		
two	8.11	21.54	-		8.85	21.10	-		
three	3.89	10.46	-		5.36	13.16	-		
four	2.45	7.07	-		3.19	8.19	-		
five	1.75	5.23	-		2.34	6.14	-		
six	.085	2.58	-		1.08	2.92	-		
seven	.074	2.24	-		1.06	2.87	-		
N	4,452	1,472	2,980	4,452	5,265	1,953	3,266	5,265	9,717
NT	12,061	4,906	7,155	12,061	14,779	6,693	8,086	14,779	26,840

Note: The figures are individual proportions (or averages) over time, averaged over the number of individuals. Robust standard errors are in parentheses. N is the number of individuals and NT is the number of person-year observations. The sample includes all male and female respondents aged 20-60 between the years 1996 and 2008. Volunteering data are available every other year starting in 1996. Earnings and spousal income are in thousands of constant 1987 pounds.

Table 3: Pooled OLS and Fixed Effects Estimates of the Returns to Volunteering

	Men				Women			
	Pooled		Fixed Effects		Pooled		Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Volunteer	1.831 (.209)	.454 (.166)	1.731 (.188)	1.454 (.174)	.509 (.151)	-.011 (.094)	.787 (.127)	.696 (.105)
% Impact	17.3%	3.5%	16.4%	12.6%	9.1%	-.1%	14.5%	11.8%
Part-time		1.384 (.450)		1.999 (.512)		-.142 (.181)		.461 (.178)
Full-time		3.276 (.579)		3.173 (.607)		1.596 (.297)		1.339 (.252)
Hours		.049 (.013)		.0246 (.012)		.119 (.009)		.079 (.007)
Low Edu		.869 (.250)				.271 (.101)		
High School		1.253 (.186)				.353 (.087)		
Higher Edu		2.559 (.192)				1.405 (.108)		
Non-white		-.967 (.580)				-.509 (.219)		
Year and Region Effects	Yes	Yes	No	No	Yes	Yes	No	No
Other Regressors	No	Yes	No	Yes	No	Yes	No	Yes
$\overline{R}^2$	.052	.433	.018	.152	.034	.629	.007	.296
NT	13,278	12,061	13,278	12,289	17,080	14,779	17,080	15,062

Note: The dependent variable is earnings measured in thousands of constant 1987 pounds. Earnings are zero for the non-employed. The volunteering dummy is an indicator for having volunteered during the survey year or anytime in the past. Standard errors in parentheses. In the pooled regressions, standard errors are robust, and in the fixed effects regressions, standard errors are clustered at the individual level. Other regressors include number of children, spousal income and dummies for age, marital status, age of children, belonging to a union, being a professional/manager, working for non profit organization, and firm size.

Figure 1: Average Annual Rainfall in the UK 1981-2010

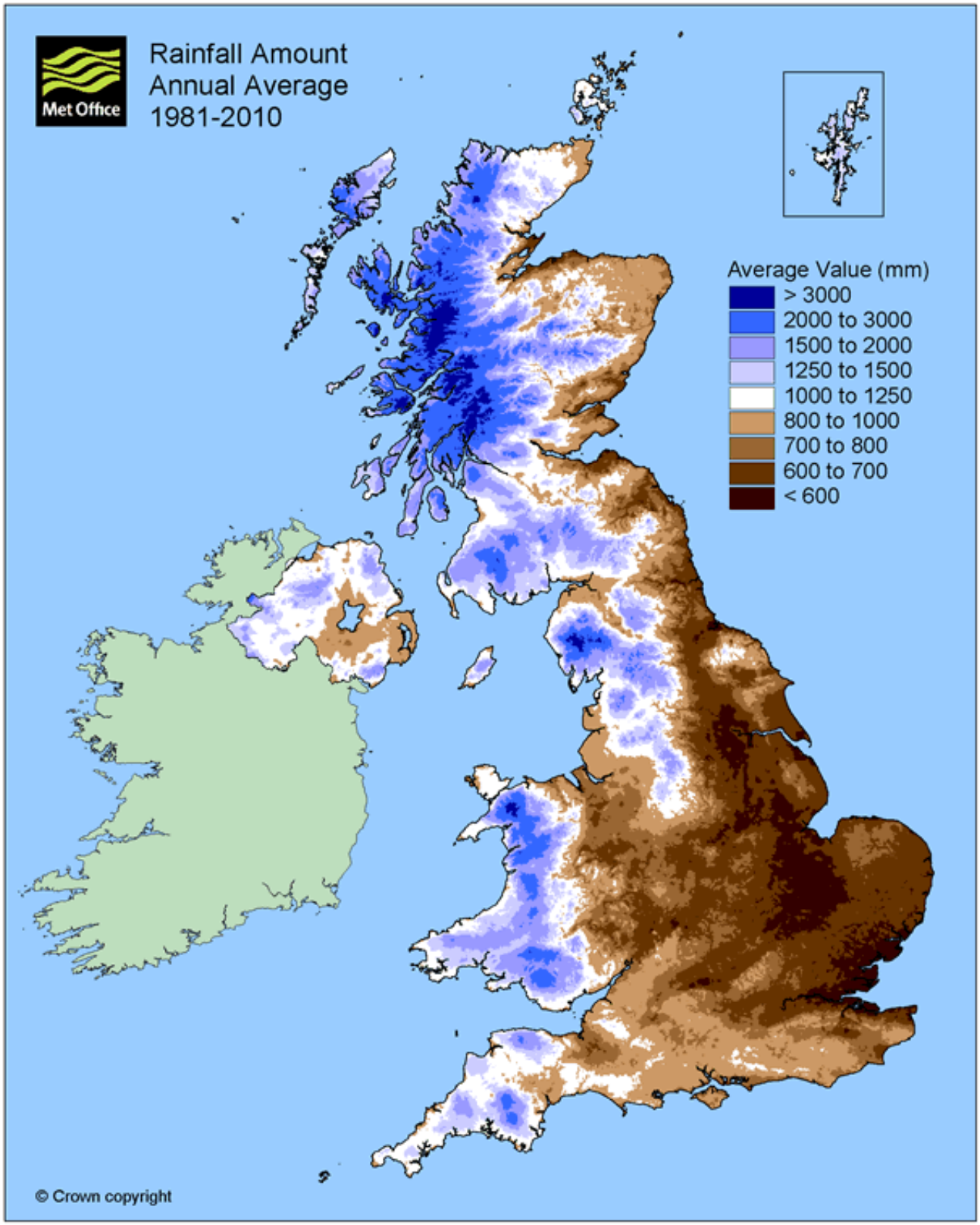

Table 4: Reduced Form Estimates of the Effect of Rain on Volunteering and Earnings

	Men				Women			
	Pooled		Fixed Effects		Pooled		Fixed Effects	
	Volunteer	Earnings	Volunteer	Earnings	Volunteer	Earnings	Volunteer	Earnings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rain Shock	.022 (.008)	.106(.077)	.038 (.006)	.364 (.068)	.026 (.008)	.074 (.048)	.043 (.005)	.190 (.039)
Rain Var.	-.093 (.035)	-.707 (.245)	-.088 (.033)	-1.302 (.335)	-.146 (.046)	-.452 (.215)	-.104 (.026)	-.669 (.213)
Part-time	.099 (.039)	1.444 (.440)	.036 (.035)	2.062 (.507)	.056 (.024)	-.144 (.198)	.071 (.020)	.514 (.178)
Full-time	.091 (.048)	3.331 (.505)	.027 (.043)	3.197 (.601)	.063 (.036)	1.596 (.337)	.035 (.026)	1.369 (.252)
Hours	-.002 (.001)	.048 (.012)	-.001 (.001)	.024 (.012)	-.003 (.001)	.119 (.010)	-.001 (.001)	.079 (.007)
Low Edu	.011 (.025)	.879 (.257)			.043 (.023)	.268 (.101)		
High School	.085 (.018)	1.292 (.165)			.122 (.021)	.352 (.087)		
Higher Edu	.168 (.019)	2.640 (.185)			.230 (.020)	1.398 (.110)		
Non-white	-.080 (.039)	-1.001 (.171)			-.007 (.033)	-.511 (.204)		
Year and Region Effects	Yes	Yes	No	No	Yes	Yes	No	No
Other Regressors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-stat	4.37 (.013)	4.38 (.013)	22.00 (.000)	14.25 (.000)	6.18 (.002)	2.50 (.084)	38.53 (.000)	11.66 (.000)
R^2	.118	.435	.047	.143	.119	.630	.066	.294
NT	12,061	12,061	10,763	10,763	14,779	14,779	15,062	15,062

Note: The dependent variables are an indicator for having volunteered during the survey year or anytime in the past, and earnings measured in thousands of constant 1987 pounds. Earnings are zero for the non-employed. Standard errors in parentheses. In the pooled regressions, standard errors are clustered at the LAD level, and in the fixed effects regressions, standard errors are clustered at the individual level. Other regressors include number of children, spousal income and dummies for age, marital status, age of children, belonging to a union, being a professional/manager, working for non profit organization, and firm size. The F-stat is for the test of excluded instruments (p-values in parentheses).

Table 5: IV Estimates of the Returns to Volunteering

	Men		Women	
	Pooled	Fixed Effects	Pooled	Fixed Effects
	(1)	(2)	(3)	(4)
Volunteer	6.727 (3.203)	8.492 (1.868)	3.072 (1.486)	4.028 (.921)
% Impact	63.6%	94.7%	41.8%	87.5%
Part-time	.769 (.591)	1.750 (.604)	-.317 (.241)	.228 (.200)
Full-time	2.703 (.626)	2.975 (.714)	1.403 (.384)	1.230 (.267)
Hours	.061 (.014)	.030 (.014)	.128 (.012)	.082 (.007)
Low Edu	.803 (.289)		.135 (.135)	
High School	.722 (.338)		-.024 (.203)	
Higher Edu	1.513 (.577)		.693 (.340)	
Non-white	-.460 (.704)		-.489 (.214)	
Year and Region Effects	Yes	No	Yes	No
Other Regressors	Yes	Yes	Yes	Yes
J-stat	.667 (.414)	2.176 (.140)	.019 (.891)	1.638 (.201)
NT	12,061	10,763	14,779	13,365

Note: The dependent variable is earnings measured in thousands of constant 1987 pounds. Earnings are zero for the non-employed. The volunteering dummy is an indicator for having volunteered during the survey year or anytime in the pats, instrumented by rain shock and rain variance. Standard errors in parentheses. In the pooled regressions, standard errors are clustered at the LAD level, and in the fixed effects regressions, standard errors are clustered at the individual level. Other regressors include number of children, spousal income and dummies for age, marital status, age of children, belonging to a union, being a professional/manager, working for non profit organization, and firm size. The J-stat is for the over-identification test of all instruments (p-value in parentheses).

Table 6: Alternative IV Estimates of the Returns to Volunteering

	Men		Women	
	Pooled	Fixed Effects	Pooled	Fixed Effects
	(1)	(2)	(3)	(4)
2SLS	6.727 (3.203)	8.492 (1.868)	3.072 (1.486)	4.028 (.921)
% Impact	63.6%	94.7%	41.8%	87.5%
LIML	6.870 (3.310)	8.725 (1.949)	3.073 (1.486)	4.070 (.935)
% Impact	65.3%	123.8%	41.9%	82.3%
Rain Shock Only		7.536 (1.841)		3.632 (.939)
% Impact		78.8%		77.3%
Rain Variance Only	8.798 (4.188)		3.168 (1.684)	
% Impact	89.1%		42.9%	
LAD level	7.079 (.183)		3.212 (.067)	
% Impact	146.4%		104.1%	

Note: Alternative estimates of the returns to volunteering. Standard errors in parentheses. In the pooled regressions, standard errors are clustered at the LAD level, and in the fixed effects regressions, standard errors are clustered at the individual level. The LAD level aggregate regressions are estimated by weighted least squares. The rain shock alone is not significant in the first stage of the pooled regressions and the rain variance alone is not significant in the first stage of the fixed effects regressions. Hence, these latter results are not reported. The same covariates are included as in Table (5).

Table 7: Gender Wage Gap Decompositions

	IV Pooled		
	Endowments Effect (1)	Coefficients Effect (2)	Coefficients % (3)
Volunteering	-.289 (.143)	1.263 (1.220)	23.8
% Contribution			
Part-time	-.172 (.133)	.280 (.165)	5.3
Full-time	1.006 (.233)	.665 (.376)	12.5
Hours	.753 (.172)	-1.558 (.426)	-29.4
Low Edu	-.017 (.007)	.056 (.027)	1.1
High School	-.023 (.011)	.248 (.131)	4.7
Higher Edu	.113 (.044)	.372 (.304)	7.0
Non-white	.002 (.004)	.001 (.023)	.001
Constant		.203 (.475)	3.8
Total	1.991	3.315	59.0
Mean Differential		5.306	

Note: The endowments and coefficients effects are in thousands of constant 1987 pounds. Standard errors in parentheses. The coefficients % is the percentage contribution to the gender wage gap due to the coefficients effect. The total sums all components of the decomposition, including those not reported in the table. The IV estimates used to calculate the decompositions are the same as those (partially) reported in Table (5).

Table 8: Volunteer Organizations

	Full Sample (1)	Men (2)	Women (3)	Diff (3)-(2) (4)
Children/Education/Schools	.279	.195	.347	.152
Youth/children activities	.186	.170	.198	.027
Education for adults	.139	.109	.163	.053
Sports/exercise	.381	.438	.334	-.104
Religion	.290	.271	.305	.034
Politics	.030	.040	.021	-.019
The elderly	.079	.064	.092	.027
Health, Disability and Social welfare	.132	.099	.159	.060
Safety, First Aid	.076	.075	.076	.002
The environment, animals	.097	.092	.100	.008
Justice and Human Rights	.049	.051	.048	-.003
Local community or neighbourhood groups	.124	.122	.126	.004
Citizens Groups	.032	.034	.031	-.003
Hobbies, Recreation/Arts/Social clubs	.226	.250	.207	-.043
Trade union activity	.074	.086	.065	-.021
Other/none of these	.349	.351	.348	-.002
N	37,727	16,829	20,897	

Note: Data from the UK Citizenship Survey. The question is, "Which of the following groups, clubs or organizations have you been involved with during the last 12 months? That's anything you've taken part in, supported, or that you've helped in any way, either on your own or with others. Please exclude giving money and anything that was a requirement of your job." Individuals can choose more than one option.

Table 9: Formal and Informal Volunteering Activities

	Full Sample (1)	Men (2)	Women (3)	Diff (3)-(2) (4)
Formal Volunteering				
Raising or handling money/taking part in sponsored events	.193	.178	.205	.027
Leading the group/member of a committee	.092	.096	.089	-.007
Organising or helping to run an activity or event	.178	.169	.186	.018
Visiting people/befriending/mentoring people	.087	.080	.092	.012
Giving advice/information/counselling	.127	.132	.123	-.009
Secretarial, admin or clerical work	.056	.047	.063	.016
Providing transport/driving	.082	.093	.072	-.021
Representing	.049	.059	.042	-.017
Campaigning	.034	.038	.032	-.006
Other practical help	.130	.096	.157	.061
Any other help	.041	.040	.041	.001
None of the above/No volunteering	.613	.629	.599	-.030
N	58,058	26,156	31,900	
Informal Volunteering				
Keeping in touch with someone who has difficulty getting out and about	.158	.139	.173	.035
Doing shopping, collecting pension or paying bills	.143	.114	.167	.053
Cooking, cleaning, laundry, gardening or other routine household jobs	.115	.098	.129	.031
Decorating, or doing any kind of home or car repairs	.091	.147	.045	-.102
Baby sitting or caring for children	.204	.114	.277	.164
Sitting with or providing personal care	.033	.020	.043	.023
Looking after a property or a pet for someone who is away	.196	.180	.209	.029
Giving advice	.292	.305	.282	-.023
Writing letters or filling in forms	.173	.163	.180	.017
Representing someone	.057	.058	.057	-.001
Transporting or escorting someone	.178	.184	.173	-.012
Anything	.030	.036	.026	-.011
No help given in last 12 months	.337	.350	.326	-.024
N	58,062	26,163	31,897	
Formal vs. Informal Volunteering				
Formal Volunteering	.387	.371	.401	.030
Informal Volunteering	.663	.650	.674	.024
N	58,062	26,163	31,897	

Note: Data from the UK Citizenship Survey. The formal volunteering question is, "In the last 12 months, have you given unpaid help to any groups, clubs or organisations in any of the following ways?" The informal volunteering question is, "In the last 12 months have you done any of the following things, unpaid, for someone who was not a relative? This is any unpaid help you, as an individual, may have given to other people, that is apart from any help given through a group, club or organisation. This could be help for a friend, neighbour or someone else but not a relative." Individuals can choose more than one option.

Table 10: Volunteering Motivation and Satisfaction

	Full Sample (1)	Men (2)	Women (3)	Diff (3)-(2) (4)
Volunteering Motivation				
I wanted to improve things/help people	.592	.595	.589	-.006
I wanted to meet people/make friends	.267	.258	.274	.016
The cause was really important to me	.387	.378	.393	.015
My friends / family did it	.202	.228	.182	-.045
It was connected with the needs of my family/friends	.266	.228	.295	.067
I felt there was a need in my community	.269	.285	.256	-.029
I thought it would give me a chance to learn new skills	.180	.169	.189	.019
I thought it would give me a chance to use my existing skills	.250	.266	.237	-.029
It helps me get on in my career	.087	.074	.098	.023
It's part of my religious belief to help people	.182	.184	.181	-.002
It's part of my philosophy of life to help people	.224	.230	.220	-.009
It gave me a chance to get a recognised qualification	.025	.020	.029	.010
I had spare time to do it	.234	.234	.234	.000
I felt there was no one else to do it	.089	.091	.087	-.003
None of these	.040	.044	.037	-.008
N	7,269	3,211	4,058	
Volunteering Satisfaction				
I meet people and make friends through it	.439	.416	.457	.041
I get satisfaction from seeing the results	.623	.631	.617	-.014
It gives me a chance to do things I'm good at	.255	.268	.245	-.023
It makes me feel less selfish as a person	.219	.222	.217	-.005
I really enjoy it	.559	.540	.574	.033
It broadens my experience of life	.283	.280	.284	.004
It gives me a sense of personal achievement	.303	.299	.306	.008
It gives me the chance to learn new skills	.125	.110	.136	.027
It gives me a position in the community	.070	.071	.070	.000
It gets me "out of myself"	.094	.097	.093	-.004
It gives me the chance to get a recognised qualification	.019	.017	.021	.003
It gives me more confidence	.112	.098	.123	.026
It makes me feel needed	.103	.081	.121	.041
It gives me the chance to improve my employment prospects	.043	.035	.049	.014
It makes me feel less stressed	.089	.099	.081	-.018
It improves my physical health	.099	.130	.074	-.056
None of these	.028	.031	.025	-.006
N	7,263	3,211	4,052	

Note: Data from the UK Citizenship Survey. The motivation question is, "Thinking about all of the groups, clubs or organisations you have helped over the last 12 months did you start helping them for any of the reasons on this card." The satisfaction question is, "Thinking about the things that you do for all of the groups, clubs or organisations you have helped in the last year, would you tell me which of things on this card are most important to you." Only those who volunteer formally or informally respond. Individuals can choose more than one option.

Table 11: Volunteering Barriers and Incentives

	Full Sample (1)	Men (2)	Women (3)	Diff (3)-(2) (4)
Volunteering Barriers				
I have work commitments	.636	.718	.570	-.148
I have to look after children/ the home	.411	.287	.511	.224
I have to look after someone elderly or ill	.064	.048	.077	.029
I have to study	.113	.111	.115	.003
I do other things with my spare time	.225	.270	.189	-.081
I'm too old	.007	.008	.006	-.002
I'm too young	.005	.007	.004	-.002
I don't know any groups that need help	.131	.132	.129	-.003
I haven't heard about opportunities to help	.163	.166	.160	-.006
I'm new to the area	.091	.094	.089	-.005
I've never thought about it	.079	.093	.067	-.026
I have an illness or disability that prevents me	.032	.026	.036	.010
Family commitments	.004	.002	.006	.004
Lack of transport	.001	.001	.001	.001
No opportunities have attracted me	.002	.003	.001	-.002
Away/ Travel a lot	.002	.002	.001	-.001
Need to do paid work	.003	.003	.002	-.001
Other reason	.036	.037	.036	-.001
None	.002	.002	.002	.000
N	13,335	5,934	7,401	
Volunteering Incentives				
If someone asked me directly to get involved	.427	.432	.424	-.008
If friends or family got involved with me	.348	.346	.349	.003
If someone already involved was there to get me started	.258	.235	.276	.041
If more information was available	.255	.241	.266	.025
If I knew I could get my expenses paid	.097	.095	.099	.004
If someone could provide transport	.078	.058	.094	.036
If I could do it from home	.267	.208	.314	.106
If I knew it would help improve my skills or get qualifications	.235	.219	.247	.028
If I knew it would benefit my career or improve my job prospects	.213	.204	.219	.015
Less work commitments/ employer encouragement or support	.004	.005	.003	-.002
Time	.028	.028	.028	.000
If my health improved	.001	.001	.001	.000
If I knew it would make a difference	.006	.008	.004	-.004
If it was of interest	.006	.007	.005	.-002
If I could use my skills or experience	.013	.011	.014	.003
Other/None of these	.161	.177	.148	-.029
N	17,896	7,876	10,018	

Note: Data from the UK Citizenship Survey. The barriers and incentives questions are, "Which are the reasons why you don't give unpaid help to groups or organisations?" and "Which might make you likely to get involved in the future?" Only non-volunteers respond. Individuals can choose more than one option.