The Happiness Gains From Sorting and Matching in the Labor Market

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Abstract

Sorting of people on the labor market not only assures the most productive use of valuable skills but also generates individual utility gains if people experience an optimal match between job characteristics and their preferences. Based on individual data on reported satisfaction with life it is possible to assess these latter gains from matching. We introduce a two-equation ordered probit model with endogenous switching and study self-selection into government and private sector jobs. In an analysis with data from the European Social Survey, we find considerable gains from matching amounting to an increase in the fraction of very satisfied workers from 53.8 to 58.8 percent relative to a hypothetical random allocation of workers to the two sectors. A companion analysis of data from the German Socio-Economic Panel shows that selection on unobservables is reduced once we include additional controls for preference heterogeneity.

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1 Introduction

The wealth and happiness of nations depend on the efficient allocation of labor. In order to get the most out of the resources available in an economy, people must find their proper employer and vice versa. Market forces are expected to bring about that skills are employed in their most productive use so that goods and services are supplied at lowest costs. Sorting thus increases the wealth of nations. This is the usual view about the importance of sorting and matching in the labor market and its benefits for society. There is, however, another important consequence of sorting for the happiness of nations. As the marginal worker determines the compensation for labor in its many specificities, other workers individually get a rent if they experience an optimal match between job characteristics and their preferences. They benefit from a utility premium, i.e. they get more utility than what they require to stay in their current job. These private benefits from sorting and matching are the larger the more heterogeneous the preferences are in a society ceteris paribus.[1]

Imagine the case of an individual for whom the service for society is close to her heart. She might enjoy great satisfaction from working in a specific government position. To the extent that she would be willing to do the job for a lower compensation than the actual salary received (in order to guarantee the provision of government services at large) she benefits from a utility premium due to optimal matching.

These arguments about the gains from self-selection involve fundamental aspects of individual well-being and utility maximization. On the one hand, rents from matching are seen as a substantive source of well-being. On the other hand, self-selection and accordingly assortative matching are claims about individual rational decision-making. Both claims are inherently difficult to evaluate based on revealed behavior and compensating wage differentials. What are the job characteristics people have formed preferences about? How can these characteristics be measured and how are the respective preferences distributed?

In this paper, we take advantage of the recent revolution in economics: the measurement of

[1] An excellent account of the theory of equalizing differences in the labor market is provided in Rosen (1986).

individual subjective well-being and its application as a proxy measure for utility (e.g. Frey and Stutzer 2002b). Reported life satisfaction is an "all-inclusive" measure or assessment of a situation based on individuals' subjective evaluation and weighting. This allows for directly studying the consequences of individual self-selection. In particular, it is possible to assess people's potential gains in well-being from working in their job rather than in some alternative one.[2]

We proceed in two stages. First, an econometric model is developed to study self-selection with data on reported subjective well-being which are ordinal in nature. The model we introduce is a two-equation ordered probit model with endogenous switching. Our model formalizes the idea that (i) the well-being experienced from working in a particular job is individual specific, and that (ii) people may select the job they work in based on relative advantage (i.e., maximize subjective well-being). The potential of the model in research on the determinants of individual well-being (and elsewhere) goes far beyond the application in this paper.

Second, the gains from matching in the labor market are quantified for the specific sorting of workers into either government or private sector jobs. In our paper, the sorting is based on a full utility comparison, taking into account all relevant job attributes. This broader view is different from, and complementary to, the traditional focus on public-private sector wage differentials and related sorting issues (Gregory and Borland, 1999, Borjas, 2002). We assume that firms cannot perfectly wage-discriminate between workers and that well-being rents accrue thus to workers. Furthermore, we assume that switching between sectors is relatively low cost, so that it is meaningful to compare the present day allocation of workers and well-being levels even though many of these workers have made their actual career choices many years in the past.

The gains in individual well-being from matching are obtained by comparing the actual distribution in reported life satisfaction with a hypothetical one, where workers are randomly allocated to government or private sector jobs, keeping the size of the two sectors equal to the actual size.

In our empirical analysis based on the first two waves of the European Social Survey and the

[2]How specific job characteristics are evaluated by workers is studied in a rich related literature on job satisfaction (for a review, see Warr 1999).

2004 wave of the German Socio-Economic Panel, we find strong evidence for self-selection. The observed pattern is one of selection based on comparative advantage. Government sector workers are those who gain the most from being in that sector. As a consequence, there are considerable gains in subjective well-being from matching. The actual allocation increases the overall fraction of "very satisfied" workers (reporting a life satisfaction score of 8 or above on a 0-10 response scale) by five percentage points relative to a hypothetical random allocation of workers to the two sectors.

In the next section, we present further motivation as to the importance os sorting of public and private sector employment. Section 3 introduces the empirical framework. At the core is a structural ordered probit model with endogenous switching, the parameters of which can be estimated by maximum likelihood. A discussion of general issues regarding the measurement of well-being, and of the data used from the European Social Survey and the German Socio-Economic Panel are part of Section 4. The results are presented in Sections 5. Section 6 offers concluding remarks.

2 Heterogeneous Preferences and Sorting in the Labor Market

The sorting of workers into government and private sector jobs is a prominent research question in labor economics for several reasons. In many countries, a substantial part of economic activity takes place in the government sector. More importantly, however, the government and private sector differ in various institutional and structural aspects with profound consequences for the workers in these two sectors. First, public agencies have some special features, most notably the multiplicity of principals and tasks and the non-market nature of their output, which prevent the use of explicit incentives. Instead, the government sector is characterized by low powered incentives, a flat wage structure and promotions based on the principle of seniority (e.g. Dixit 2002). Second, mission-oriented occupations, i.e. occupations connected to the provision of collective goods, are highly concentrated in the public sector (Besley and Ghatak 2005). Finally, public sector employees enjoy a higher job security than their private sector counterparts. In most countries public servants

are better protected against dismissal and the threat of bankruptcy is virtually absent. Therefore, it stands to reason that the government sector attracts workers with strong preferences for job security and a strong sense of responsibility for the society, but, probably less career concerns.[3]

Circumstantial evidence on heterogeneity in job characteristics and job holders' preferences in the public and private sector is provided in the International Social Survey Program on Work Orientations in 1997. It elicits respondents' preferences for various job characteristics. Figure 1 shows that government sector employees rate opportunities for advancement as less important, and job security and usefulness of their work to the society as more important on a six point scale than private sector employees. Figure 1 also reveals a second important fact. Public employees not only have different preferences regarding these job characteristics, they also perceive their jobs as more secure and more useful to society but with less prospects for advancement than employees in the private sector. It is exactly this match between preferences and job characteristics that entails potentially important gains in happiness.

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Figure 1 about here

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Given that many forces aggravate the proper sorting of people into government and private jobs, at least four different outcomes are possible. First, despite the obstacles in market adjustment and in workers' self-selection, an almost optimal sorting might be observed. Second, most people might be better off in the government sector but only a fraction of people can actually work there. This might be due to rationing and indicates general sector specific rents. Third, the opposite might occur and almost everybody might be better off in the private sector. This might, for example be the case

[3]The literature has, indeed, documented that civil servants are more risk averse than private sector employees (Bellante and Link 1981; Hartog et al. 2002) and show a specific public service motivation (e.g. Kelman 1987, Crewson 1997). Clark and Postel-Vinay (2005) find that workers in permanent public sector jobs report the highest perceived job security.

if efficiency wages in the private sector create advantages for the insiders but generate involuntary unemployment, and reduce the attractiveness of public sector employment. Finally, some people might be in their preferred sector while others are not. Thus there is a partial mismatch involving costs in terms of well-being.

3 The Model

The empirical framework is developed in two stages. First, the well-being functions of public and private sector workers are analysed in the context of a pure Roy model. In such a model, the selection effect is always non-negative. Second, the model is augmented by a generalized selection equation and extended to the case of ordinal dependent variables.

3.1 A switching regression model of public and private sector well-being

There are two sectors in our model, the government sector ($s = 1$), and the private sector ($s = 0$). The sector-specific equations for individual well-being in the two sectors are

$$y_s^* = x'\beta_s + u_s\,, \qquad s = 0, 1 \tag{1}$$

where x is a $(k \times 1)$ vector of explanatory variables that is the same in both equations, and β_s are conformable sector-specific parameter vectors. We do not impose that $\beta_0 = \beta_1$ as the well-being returns to certain characteristics (such as education or being female) may be higher in one sector than in the other.

The sector specific error term u_s measures preference heterogeneity. Such heterogeneity arises since workers differ in their implicit valuation of the attributes of public and private sector jobs. For example, for workers with a strong preference for job security and a strong sense of responsibility for society, attributes typically associated with the public sector, we would observe in the framework of this model that $u_1 > u_0$.[4]

[4] A broader concept of preference heterogeneity allows for heterogeneity in the slope parameters β_s as well. In a polar case, $\beta_{si} = \beta_i$, i.e., differences in slopes across sectors are entirely due to worker heterogeneity. Such

This is a typical switching regression framework. We observe either individual well-being in sector 1 (for workers who decided to work in sector 1), or individual well-being in sector 0 (for workers who decided to work in sector 0), but never both. It is a logical impossibility to know for sure what the well-being of workers in sector 1 would be if they worked in sector 0, and vice versa. However, the difference in an individual's well-being between the two sectors, one observed and one unobserved, is precisely the worker specific potential utility premium from matching we are interested in.

Under some additional identifying assumptions, it becomes possible to reconstruct the counterfactual well-being using econometric techniques. In particular, assume that

$$u_0 \sim N(0,1)$$

$$u_1 \sim N(0,1)$$

$$\text{corr}(u_0, u_1) = \rho$$

The normalization of the variances is introduced already at this stage in anticipation of the fact that only class membership of a partition of the real line is observed, i.e. the estimable model will have an ordered probit structure. Otherwise, the model has all the features of the standard Roy model for two continuous outcomes (see Roy, 1951, Borjas, 1987). If $\rho > 0$, then workers with an above average well-being in sector 1 also enjoy above average well-being in sector 0. The extreme case would be a perfect positive correlation, such that $\rho = +1$. In this case, $u_0 = u_1$ and there are no idiosyncratic gains to matching; in this case people differ in their unobserved intrinsic well-being level (e.g., personality), but these differences are unrelated to the sector they might work in. If ρ is less than one, there are sector specific gains to be made, i.e., people have comparative well-being gains in one of the sectors, and we would expect that people self-select into sectors based on comparative advantage. Workers with a positive preference for sector 1 will end up in sector 1, and workers with a positive preference for sector 0 will work in sector 0.

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heterogeneity would have some effect on the interpretation, as indicated in the results section below, but would not invalidate the model structure *per-se*.

This idea can be formalized by assuming that individuals self-select into sectors 0 and 1 based on maximization of well-being. In its strictest form, the maximization hypothesis implies that we observe workers in sector 1 whenever $y_1^* > y_0^*$, and in sector 0 whenever $y_0^* > y_1^*$. In this case, the selection equation is

$$s = \begin{cases} 1 & \text{if } u_1 - u_0 > x'(\beta_0 - \beta_1) \\ 0 & \text{if } u_1 - u_0 \leq x'(\beta_0 - \beta_1) \end{cases} \tag{2}$$

To answer the question whether workers who chose to work in sector s have a higher or lower well-being than workers randomly assigned to that sector, i.e., whether they are positively or negatively selected, the key parameter is the correlation between $u_1 - u_0$ and u_s. As is well known, in this set-up,

$$\begin{aligned} \mathrm{E}(y_s^*|x, s=1) &= x'\beta_1 + \mathrm{E}(u_1|u_1 - u_0 > x'(\beta_0 - \beta_1)) \\ &= x'\beta_1 + \mathrm{corr}(u_1, u_1 - u_0)\frac{\phi(x'(\beta_1 - \beta_0)/\sigma)}{\Phi(x'(\beta_1 - \beta_0)/\sigma)} \end{aligned} \tag{3}$$

and

$$\begin{aligned} \mathrm{E}(y_s^*|x, s=0) &= x'\beta_0 + \mathrm{E}(u_0|u_1 - u_0 \leq x'(\beta_0 - \beta_1)) \\ &= x'\beta_0 - \mathrm{corr}(u_0, u_1 - u_0)\frac{\phi(x'(\beta_1 - \beta_0)/\sigma)}{1 - \Phi(x'(\beta_1 - \beta_0)/\sigma)} \end{aligned} \tag{4}$$

where $\sigma = \sqrt{\mathrm{Var}(u_1 - u_0)}$. Under the assumptions of the model,

$$\mathrm{corr}(u_s, u_1 - u_0) = (2s-1)\sqrt{(1-\rho)/2} \qquad s = 0, 1$$

If $s = 1$, the correlation is bounded from below at zero and the overall selection effect is nonnegative. Those more likely to select into sector 1 have an above average well-being in that sector. For example, for $\rho = 0$, $\mathrm{corr}(u_1, u_1 - u_0) = 1/\sqrt{2}$.

If $s = 0$, the correlation is bounded from above at zero. Again, the overall selection effect is nonnegative. Those less likely to select into sector 1, and more likely into sector 0, have above average well-being in sector 0. Hence, both groups are positively selected for all interior values of

ρ. Only if $\rho = +1$ does the correlation, and thus the self-selection bias, disappear.[5]

In important ways, this selection model is likely to be too restrictive. At an empirical level, we would prefer a model that does not restrict the selection effect to be non-negative *a priori*. At a theoretical level, individual maximization of well-being may not be the only determinant of sector allocation, for example due to demand constraints. If the number of people wanting to work in a given sector (the labor supply) exceeds the number of available jobs (the labor demand), the selection rule is affected by the rationing mechanism. While we do not model this mechanism explicitly, we allow for the possibility that selection is affected in both observed and unobserved ways. Let z denote observed characteristics that relate to selection into the public sector, and let ν denote the unobserved characteristics. Then, a generalized selection rule can be based on the inequality $u_1 - u_0 + \nu > x'(\beta_0 - \beta_1) - \tilde{z}'\tilde{\gamma}$, or, in general form

$$s = \begin{cases} 1 & \text{if } \varepsilon > -z'\gamma \\ 0 & \text{if } \varepsilon \leq -z'\gamma \end{cases} \tag{5}$$

where $\varepsilon = u_1 - u_0 + \nu$. z should include all variables that determine well-being (i.e., x). In addition, it can include variables $\tilde{z}$ that affect the demand for workers in a given sector, but not the supply. One example would be citizenship if, as is the case in many countries, citizens have preferential access to all or part of government sector employment. Moreover, assume that $\varepsilon \sim N(0,1)$, and denote the correlation between ε and u_1, u_0 as ρ_1 and ρ_0, respectively.

The model allows for very general patterns of selection on unobservables. The treatment effects in the latent model are

$$\mathrm{E}(y_1^*|x, s=1) - \mathrm{E}(y_0^*|x, s=1) = x'(\beta_1 - \beta_0) + (\rho_1 - \rho_0)\frac{\phi(z'\gamma)}{\Phi(z'\gamma)}$$

for public sector workers, and

$$\mathrm{E}(y_0^*|x, s=0) - \mathrm{E}(y_1^*|x, s=0) = x'(\beta_0 - \beta_1) + (\rho_1 - \rho_0)\frac{\phi(z'\gamma)}{1 - \Phi(z'\gamma)}$$

[5]This result differs from the Roy model, where negative selection is possible. Negative selection in sector 0 requires that $\rho > 0$ and $\sigma_0^2 < \sigma_1^2$, where σ_0^2 and σ_1^2 are the error variances of sector 0 and sector 1, respectively. With variances normalized to one, this case is precluded in the present setup.

for private sector workers. The following cases can be distinguished:

a) There is self-selection based on comparative advantage. This occurs whenever $\rho_1 > \rho_0$. In this case, $\varepsilon > 0$ (an above average probability of being in the public sector) implies that $\mathrm{E}(u_1 - u_0|\varepsilon) = (\rho_1 - \rho_0)\varepsilon > 0$.

b) There is self-selection based on comparative disadvantage. This occurs for $\rho_1 < \rho_0$.

c) There is no self-selection based on comparative advantage or disadvantage. This occurs whenever $\rho_1 = \rho_0 = 0$.

d) An intermediate case arises when $\rho_1 = \rho_0 \neq 0$. While the well-being of private sector workers is not a valid counterfactual for the well-being of public sector worker in the private sector, there are no gains from matching: moving a sector 1 worker to sector 0 leads to a well-being change that is just equal to minus the well-being change of moving a sector 0 worker to sector 1, and aggregate well-being is unchanged.

3.2 An ordered response model with endogenous switching

We now present an extension of the standard regression model to ordinal dependent variables.[6] This is necessary since the outcomes y_0^* and y_1^*, in our case people's true well-being, are unobserved. Instead, we observe the ordered discrete responses $y_s = 0, \ldots, 10$, i.e., people's judgments about their subjective well-being, such that

$$y_s = j \quad \text{if and only if} \quad \kappa_{s,j} < y_s^* \leq \kappa_{s,j+1} \tag{6}$$

where $y_s^* = x'\beta_s + u_s$, $s = 0, 1$, and the threshold values $\kappa_{s,j}$, $j = 0, 1, \ldots, 10$ form a partition of the real line i.e., $\kappa_0 = -\infty$, $\kappa_{11} = \infty$, and $\kappa_{s,j+1} > \kappa_{s,j}$ $\forall j$. This is not an ordinary ordered probit model since the probability of observing $y_s = j$ depends on the outcome of the selection variable s,

[6] A closely related model was developed independently by DeVaro (2006) where the outcome variable is an ordered indicator of the financial performance of a firm as a function of team production.

and s and y_s are not independent. We have

$$\begin{aligned} P(y_1 = j, s = 1|x, z) &= P(\kappa_{1,j} - x'\beta_1 < u_1 \leq \kappa_{1,j+1} - x'\beta_1, \varepsilon > -z'\gamma) \\ &= P(\kappa_{1,j+1} - x'\beta_1 < u_1, -\varepsilon < z'\gamma) - P(\kappa_{1,j} - x'\beta_1 < u_1, -\varepsilon < z'\gamma) \end{aligned}$$

$$\begin{aligned} P(y_0 = j, s = 0|x, z) &= P(\kappa_{0,j+1} - x'\beta_0 < u_0 \leq \kappa_{0,j} - x'\beta_0, \varepsilon \leq -z'\gamma) \\ &= P(\kappa_{0,j+1} - x'\beta_0 < u_0, \varepsilon \leq -z'\gamma) - P(\kappa_{0,j} - x'\beta_0 < u_0, -\varepsilon \leq -z'\gamma) \end{aligned}$$

If u_1 and u_0 were both uncorrelated with ε, the joint probabilities could be factored into a standard ordered probit part and a standard probit part. With correlation, such a factorization is not possible. Then, for $\varepsilon \sim N(0,1)$, $u_1 \sim N(0,1)$, $u_0 \sim N(0,1)$, $\text{corr}(\varepsilon, u_1) = \rho_1$, and $\text{corr}(\varepsilon, u_0) = \rho_0$,

$$P(y_1 = j, s = 1|x, z) = \Phi_2(\kappa_{1,j+1} - x'\beta_1, z'\gamma, -\rho_1) - \Phi_2(\kappa_{1,j} - x'\beta_1, z'\gamma, -\rho_1)) \quad (7)$$

$$P(y_0 = j, s = 0|x, z) = \Phi_2(\kappa_{0,j+1} - x'\beta_0, -z'\gamma, \rho_0) - \Phi_2(\kappa_{0,j} - x'\beta_0, -z'\gamma, \rho_0) \quad (8)$$

where Φ_2 denotes the cumulative density function of the bivariate standard normal distribution.[7] The parameters of the model, $\theta = (\kappa_1, \kappa_0, \beta_1, \beta_0, \gamma, \rho_1, \rho_0)'$, can be estimated by maximum likelihood without much difficulty. Given an independent sample of observation tuples (y_i, s_i, x_i, z_i), the likelihood function is simply

$$L(\theta; y, s, x, z) = \prod_{i=1}^{n} P(y_s, s|x, z) \quad (9)$$

Under the assumptions of the model, the ML estimator has the desirable large sample properties.

3.3 Implementation Issues

To obtain starting values, we first estimate for each sector a cardinalized ordered probit model by OLS, as suggested by van Praag and Ferrer-i-Carbonell (2004). Based on this method, the threshold

[7] The trivariate normal assumption for the errors in the latent model, if combined with a threshold mechanism, allows for very general distributions for the discrete outcomes, including skewed and multi-model distributions. The main restriction implied by the normal assumption is the linearity of the conditional expectation function (cef) of the outcome error given the selection error. Linear cef's are routinely used in econometrics.

values κ_1-κ_{10} are obtained from the marginal distribution of y. Let p_k denote the proportion of observations in the sample with $y < k$. Then $\tilde{\kappa}_k = \Phi^{-1}(p_k)$. Moreover, the conditional expectation $\mathrm{E}(y^*|y = k)$ can be estimated as $(\phi(\tilde{\kappa}_k) - \phi(\tilde{\kappa}_{k+1}))/(\Phi(\tilde{\kappa}_{k+1}) - \Phi(\tilde{\kappa}_k))$. The slope parameters are obtained by regressing these conditional expectations on x, separately for the two sectors. Finally, the starting values for the selection equation are obtained from a few Newton-Raphson steps of a Logit model. The resulting parameters are divided by 1.6 to approximate the probit coefficients.

The full simultaneous log-likelihood function is then maximized using the BFGS algorithm with numerical first and second derivatives as implemented in GAUSS. We experienced no convergence difficulties.

4 Data

For our empirical analysis, we selected two recent datasets, both cross-sectional in nature. The first dataset was extracted from the first (2002) and second (2004) waves of the European Social Survey (ESS). The ESS is a repeated cross-section survey covering more than 20 European countries. The second dataset was generated from the 2004 wave of the German Socio-Economic Panel (GSOEP).

For the question at hand, each of the datasets has some advantages and some disadvantages, which makes the inclusion of results from both informative. The advantage of the ESS is the relatively large sample size; moreover, it covers a majority of European countries which makes it possible – at least in principle – to study questions about the effect of institutions on the well-being of public and private sector workers. While we don't report such results in this paper, this is an important area of future work. One disadvantage of the ESS is that public sector status is not directly available in the data. It has to be inferred from the industry classification, which may lead to classification error.

The GSOEP does not have this limitation, since a direct question on working in the public sector is available. Our main motivation to include the GSOEP is a different one, however: the 2004 wave (and only this wave - hence the restriction to a single cross-section) includes a number of

questions on preference heterogeneity that may be related to public and private sector well-being. The possibility to directly control for such preference effects will provide differentiated insigths into the sorting of workers based on observed and unobserved characteristics.

4.1 Reported Subjective Well-Being

In order to study the welfare gains from matching directly (as proposed in our model), individual well-being has to be measured. We take advantage of extensive prior research in psychology where a simple instrument for measuring well-being has been developed and validated, namely the people's reports of their satisfaction with life or happiness.[8] Job satisfaction is one component, or domain, feeding into overall life satisfaction.

Following the economic tradition of not second guessing the judgment of the persons directly involved, it appears only reasonable to consider people as best judges of the overall quality of their life. With the help of representative surveys, it is possible to get indications of individuals' evaluation of their life satisfaction. Behind the score indicated by respondents lies a cognitive assessment on the extent to which they judge the overall quality of their lives in a favorable way. This includes the match between their preferred characteristics of a job and the ones they actually experience. Measures of life satisfaction and happiness passed a series of validation exercises and seem to significantly correlate with true positive inner feelings (see Frey and Stutzer 2002a;b for introductions to the economics of happiness and references to the validation literature in psychology).

Various contributions demonstrate that the study of data on domain satisfaction, life satisfaction and happiness can provide new and complementary insights in economics. Recent findings are with regard to the macro-economic determinants of individual well-being (e.g. Di Tella, MacCulloch and Oswald 2003), the relationship between income and happiness (e.g. Clark et al. 2006, Frijters et al. 2004, Stutzer 2004, Luttmer 2005), the valuation of public goods (e.g. Frey, Luechinger and Stutzer 2004, van Praag and Baarsma 2005) or the evaluation of public policy (e.g. Gruber and

[8] A comprehensive review is provided in the edited volume titled *Well-Being: The Foundations of Hedonic Psychology* (Kahneman et al. 1999).

Mullainathan 2005).

Data on reported subjective well-being are ordinal in nature. By this we mean that the particular numerical labels attached to the response scale, here $y \in \{0, 1, \ldots, 10\}$, indicate only an ordering. Any monotonic transformation $z = g(y)$, $g'(y) > 0$, conveys the same information. A direct consequence is that, strictly speaking, expected values and regression models are not meaningful for such data. Since there are only 11 discrete outcomes, it is better to model the response probabilities directly, accounting for the ordering. The ordered probit model provide such a framework. Our model with endogenous switching outlined in subsection 2.2 is a generalization of the standard ordered probit model.

4.2 European Social Survey

The ESS data were extracted from the first (2002) and second (2004) waves of the European Social Survey (ESS). Our definition of government sector includes people working either in the public administration, defense, or in education. The dummy variable is constructed on the basis of information on the respondents' industry (according to the EU industry classification, NACE Rev. 1). Other employed or self-employed people are in the reference category; respondents that were neither employed nor self-employed in the week preceding the interview or whose main income source is neither wage nor income from self-employment are excluded. In order to increase the homogeneity of the sample, the analysis is restricted to non-transformation countries, leaving us with a total of 29,584 observations from people active on the labor market.[9] The sample averages of the explanatory variables are displayed in the first column of Table 2: the proportion of public sector workers is 16 percent, the average age is 41 years, 45 percent are women, 58 percent are married, and the average education level corresponds to 12.9 years of schooling.

The dependent variable is overall satisfaction with life, elicited with the following question:

[9]The sample includes observations from the following countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

'All things considered, how satisfied are you with your life as a whole nowadays?' Individuals are asked to state their life satisfaction on a scale from 0 (extremely dissatisfied) to 10 (extremely satisfied). For our sample of European workers, average satisfaction with life is 7.42 score points with a standard deviation of 1.93 . Almost 60 percent report a satisfaction score of 8 or above.

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Figure 2 about here

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Figure 2 shows that there are some sector specific well-being differences: a higher proportion of government sector employees responds with values 8, 9 or 10. Whether this is a causal effect, in the sense of a treatment effect on the treated, is yet to be seen.

4.3 German Socio-Economic Panel

The GSOEP data have been frequently used in prior well-being research. Here, our interest focuses on a single cross-section, the 2004 wave of the data. In that year, participants were asked a number of questions on risk attitudes as well as other values they hold. In particular, they were asked about the importance they place on the following three aspects of life: having a successful career; helping other people; being engaged in social and political activities. Our conjecture is that career oriented individuals and those willing to take higher risks are more likely found in the private sector, whereas individuals who put more importance on helping and public service tend to be matched to the public sector.[10] Table 1 shows, for a sample of 4,181 employed men from the West German sample, that our conjecture finds some support in the data.

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Table 1 about here

[10]Such a reasoning supposes that such preferences are stable over time, a claim that we cannot verify with the data, as we only have a single cross-section. The same correlation would result if individuals adjusted their preferences after being matched to a particular sector, in order to avoid cognitive dissonance.

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The importance questions are asked on a four point scale, with responses "unimportant / not very important / important / very important". Table 1 shows the proportion of individuals in each sector reponding with "important" or "very important". We find significant differences for the proportion of individuals looking for a successful career (more prevalent in the private sector) and for the proportion of individuals finding active citizenship to be important (more prevalent in the public sector). Private sector workers are also more willing to take risks. The difference is statistically significant, although rather small (a 0.2 difference on the 0-10 scale).

There are some other noteworthy aspects that distinguish our GSOEP sample from the ESS data. First, we use job satisfaction, rather than overall satisfaction with life, as outcome variable. Arguably, the selection into private and public sector employment should be most directly linked to job satisfaction. Again, this variable is measured on a 0-10 scale. Because of low responses in the 0-2 range, we combined them into a single outcome, using 8 ordered outcome categories (instead of 11). Second, we use an "objective" measure of health which is a caseness score generated from an eight items list of ailments (difficulties of climbing stairs, impairment in daily activities, job, or social contacts due to physical or emotional problems, strong pain). Last but not least, we mentioned already before that the GSOEP has a direct question on public sector employment. Therefore, we do not need to use an industry based definition for these data.

5 Results

The empirical findings are presented in four subsections. We start with a presentation of conventional ordered probit happiness estimates based on the ESS data. We then use the same data to contrast the simple methods with our structural switching regression models with self-selection. We use the results to establish the relative importance of observables and unobservables for the selection into public sector jobs. In a third part we repeat the analysis with GSOEP data using relatively detailed information on preference heterogeneity. Finally, in a fourth part, we employ

the results to quantify the overall effect of sorting on the aggregate distribution of well-being.

5.1 Conventional Ordered Probit Happiness Models

The prevailing methodological approach is exemplified by columns 2 and 3 of Table 2, which shows estimates based on ESS data. In this approach, the data for public and private sector workers are pooled, and the coefficient on the dummy variable for public sector measures the difference in the estimated ordered probit index between public and private sector workers. Without additional controls, we obtain a coefficient of +0.080, which is statistically significant. Essentially, this estimate reproduces the evidence from Figure 2 that public sector workers are somewhat more likely than private sector workers to be found in the 8-10 range of the happiness scale. For example, the predicted probability that a public sector worker scores a 10 is $1 - \Phi(1.25 - 0.08) = 12.1$ percent, where 1.25 is the rightmost threshold estimate and Φ is the distribution function of the standard normal. The predicted probability of a 10-score is $1 - \Phi(1.25) = 10.6$ percent for a private sector worker. Thus, there is a 1.5 percentage point difference between the two types of workers.

Of course, there are many reasons why public sector workers could be happier than private sector workers, other than their sector of work *per se*. To control for observable differences, the third column of Table 2 includes a number of covariates, including a second order polynomial in age, education level and marital status. As soon as we include these few additional variables, the public sector well-being premium shrinks in size, and it is no longer statistically significant. The average public sector worker appears to be equally well of in either sector. There is no evidence for rents.

A simple extension of the basic model introduces sector-specific happiness coefficients. This is shown in columns 4-6 of Table 2. Estimation of such a model is very simple as long as we assume exogenous switching, an assumption that should (and will) of course be tested. Under exogeneity, the parameters can be estimated by simply running separate ordered probit models on the subset of public and private sector workers, respectively. In addition, column 6 shows a binary probit model for the decision to work in the public sector.

We can use these results to offer a first test of the importance of heterogeneous effects. The standard model (in column 3) is nested in the more general two-equation model. The number of restrictions is equal to the number of estimated slope parameters plus the number of threshold parameters minus one (because the restricted model has a sector specific intercept). There are 17 such restrictions in total. The likelihood ratio statistic is 44.0, the p-value close to zero, and the null hypothesis of constant parameters is thus rejected. The estimated well-being premia for being female and married are larger in the public sector than in the private sector. Having a father who worked in the public sector appears to have no affect on either public or private sector well-being, although it positively affects the probability of working in the public sector.

5.2 Switching Ordered Probit Models with Self-Selection

The full estimation results for the model with endogenous switching, based on our 2002/2004 ESS sample, are given in Table 3. The model is estimated in two versions. In a first version, the two variables "Citizen" and "Father in Public Sector" are used as "instruments", i.e., they are excluded from the outcome equations but included in the selection equation. In many countries, government jobs are, at least partly, available for citizens only. Moreover, personal contacts are an important source of information about the availability of jobs and job conditions (Lewis and Frank, 2002) and father's occupation is thus a potential instrument.[11]

The use of exclusion restrictions is common in this type of model, although functional form alone would actually suffice for identification. However, as Heckman (1990) has shown, the generalized Roy model is not non-parametrically identified for finite valued instruments (which our two binary variables clearly are). From this point of view, there is not much gained from excluding these

[11] To be precise, we observe whether or not the father works in a modern professional occupation. Such occupations are highly concentrated in, although not exclusively restricted to, the government sector. Another potential instrument would be the location of residence. If a person lives nearby major government institutions, for example in the capital, this should increase the probability of such employment. We don't pursue this possibility as we lack detailed geographic information.

variables from the outcome equations. To the contrary, this may induce specification error if they affect outcomes. Thus, a second version of the model includes these two variables in all three parts of the model.

Both models, with or without instrument, are generalization of the uncorrelated switching regression discussed in the previous section. A likelihood ratio test clearly rejects the restricted version of the model, as the log-likelihoods (for the no-instrument versions) are -68'970 and -68'996, respectively, with two additional parameters in the general model. Thus, endogenous selection based on unobservables is a signature feature of the data. A second comparison, between the no-instrument and the instrument versions of the model, suggests that the exclusion restrictions cannot be rejected, so that we focus our discussion on the instrumented model shown in the first three columns of the Table.

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Table 3 about here

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The two key parameters of the model, the correlation between the selection equation and the two outcome equations, are very similar regardless of specification. The correlation between selection into the government sector and well-being in the government sector is close to zero and statistically insignificant, whereas the correlation between selection into the government sector and well-being in the private sector is large, negative, and statistically significant. Thus, there is clear evidence for endogenous selection, and ignoring this selection will produce spurious estimates of the effects of sector choice on well-being.

Selection on observables

We first consider parameter heterogeneity across the two outcome equations. For example, in the model with instrument, household size has a significant positive effect on life satisfaction in the private sector equation, but not so in the public sector equation. More intriguingly, one can compare

the effect of explanatory variables in the selection and outcome equations. Such a comparison is interesting since according to the maximization hypothesis, people should tend to prefer the sector where the returns are largest.

Education, for example, has no effect on well-being, but it is highly significant in the selection equation. Apparently, education affects selection not through labor supply (what employees want) but rather through labor demand (what employers want). The same can be said about the variable female.

Just the opposite case arises for the variable "marital status". Here, there are significant effects in both outcome equations but it is insignificant in the selection equation. One has to be cautious when comparing coefficients across outcome equations, since their relationship to the outcome distribution is moderated through thresholds that vary in the two equations. However, when we compute the predicted effect of marriage on the probability of being very satisfied (a score of 8 or higher on the 0-10 scale), for an otherwise average person, one finds indeed a stronger effect in the government sector (+10 percentage points compared to +6.7 percentage points). One would therefore expect that married people select themselves into the government sector because the benefits from that characteristic is largest there. While the positive estimate of being married in the selection equation points in the right direction, the hypothesis of no selection based on marital status cannot be rejected.[12]

In order to assess the overall evidence for positive or negative selection based on observables, we compute the combined effect of all characteristics. Let $\bar{x}_1$ denote the sample mean of these characteristics among government employees, and $\bar{x}_0$ the sample mean among private sector employees. The predicted satisfaction distribution of an average government worker in the government sector,

[12] A possible explanation for the absence of an effect in the selection equation is that the differences in returns to marriage reflect sector-independent preference heterogeneity. In this interpretation, government sector workers would retain their above average well-being premium from being married even if they were to move to the private sector. As a consequence, marital status need not affect sectoral choice.

unconditional on selection but conditional on $\bar{x}_1$, is then

$$P(\widehat{y_1 = j}|\bar{x}_1) = \Phi(\hat{\kappa}_{1,j+1} - \bar{x}_1'\hat{\beta}_1) - \Phi(\hat{\kappa}_{1,j+1} - \bar{x}_1'\hat{\beta}_1)$$

whereas the predicted satisfaction distribution of an average private sector worker in the government sector is

$$P(\widehat{y_1 = j}|\bar{x}_0) = \Phi(\hat{\kappa}_{1,j+1} - \bar{x}_0'\hat{\beta}_1) - \Phi(\hat{\kappa}_{1,j+1} - \bar{x}_0'\hat{\beta}_1)$$

Based on our parameter estimates and sample means it turns out that the difference between these distributions is small, although there is some evidence for positive selection based on observables. For example, the predicted probability of being very satisfied in the government sector (defined as an outcome of 8 or above, i.e., $P(y_1 \geq 8)$) is by 0.4 percentage points higher among government workers than among private sector workers. Similarly, the predicted probability of being very satisfied in the private sector ($P(y_0 \geq 8)$) is by 0.2 percentage points higher among private sector workers than among government workers.[13]

Selection on unobservables

The influence of self-selection can be computed at any value of the outcome distribution. For illustrative purposes, we focus here on the probability of reporting a high level of life satisfaction, defined as a score of 8 or higher on the 0-10 scale. This probability can be expressed as a function of the selection error, since

$$\begin{aligned} P(y_s \geq 8|\varepsilon) &= P(y_s^* \geq \kappa_{s,8}|\varepsilon) \\ &= 1 - P(x'\beta_s + u_s < \kappa_{s,8}|\varepsilon) \\ &= 1 - \Phi\left(\frac{\kappa_{s,8} - x'\beta_s - \rho_s\varepsilon}{\sqrt{1-\rho_s^2}}\right) \end{aligned}$$

[13] These estimates are based on the assumption that differences in returns are sector related. If they reflect preference heterogeneity instead, the gains from matching on observables will be even smaller, or non-existent altogether. However, in either case, most of the gains from matching remain as they result from selection based on unobservables.

Figure 3 plots this function for $s = 0, 1$, for an average person ($x = \bar{x}$), and for $\varepsilon \in (-2, 2)$, based on the parameter estimates from the instrumented model in Table 3. Since the marginal distribution of ε is standard normal, this range covers approximately 95 percent of all possible cases. A large ε means that the person is likely to work in the government sector. The selection rule formally requires that $\varepsilon_i > z_i'\gamma$, so that the cut-off for selection into the government sector is individual specific. However, we know that 16 percent of all persons in the sample work in the government sector. Therefore, an otherwise average person is allocated to the government sector as long as $\varepsilon > \Phi^{-1}(0.84) \approx 1$.

From Figure 3, we see that predicted government workers (those with a high ε in the selection equation) tend to be less satisfied than predicted private sector workers, regardless of the sector they work in. However, they would be much worse off if allocated to the private sector. Thus they gain the most from working in the government sector, which is a manifestation of self-selection based on comparative advantage.

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Figure 3 about here

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The two satisfaction curves in Figure 3 intersect when ε is approximately minus one. Thus it would be optimal if all workers on the left of the intersection, where workers maximize their satisfaction by working in the private sector, would actually work in the private sector. Similarly, all workers with $\varepsilon \geq -1$ should work in the government sector. This does not happen however since, as we saw above, much fewer people work in the government sector. The actual threshold is around $\varepsilon \geq +1$. Within the formal structure of our model, the fact that more workers find it optimal to work in the government sector than actually do can be explained by a restricted labor demand in that sector. The fact that there are queues for government jobs is well known and has been analysed before (e.g., Krueger, 1988). The novel insight here is that into the nature of the rationing mechanism, namely that government workers are those who gain most from working in

that sector.

Finally, we also observe that private sector workers have on average only a slightly lower probability of reporting a high satisfaction than government workers. This can be seen from Figure 3, by averaging over the government satisfaction locus for $\varepsilon \geq 1$, and over the private sector satisfaction locus for $\varepsilon < 1$. Formally, the probability of high satisfaction for an average person in the government sector is

$$P(y_s \geq 8|\varepsilon \geq c) = 1 - \frac{\Phi_2(\kappa_{1,8} - x'\beta_1, -c, -\rho_1)}{\Phi(-c)} \tag{10}$$

whereas it is

$$P(y_s \geq 8|\varepsilon < c) = 1 - \frac{\Phi_2(\kappa_{0,8} - x'\beta_0, c, \rho_0)}{1 - \Phi(-c)} \tag{11}$$

in the private sector, for $c = 1$. If we evaluate these expressions at the sample means of the explanatory variables and the parameter estimates, we obtain $P(y_s \geq \widehat{8}|s = 1) = 0.612$ and $P(y_s \geq \widehat{8}|s = 0) = 0.577$. Thus, government workers have on average a slightly higher probability of being highly satisfied. We have seen a similar result already in the pooled ordered probit estimates with government sector dummy variable (Table 2). Hidden behind this average effect is a large amount of individual heterogeneity and a self-selection process based on comparative advantage. The "treatment effect on the treated", as suggested by the above analysis, is much larger indeed.

5.3 Evidence from the German Socio-Economic Panel

In this section, we repeat the analysis of public-private sector well-being with data from the 2004 wave of the German Socio-Economic Panel. Our interest in the GSOEP data stems from the fact that these data allow for estimating an extended model with additional controls for preference heterogeneity. The first three columns of Table 4 show results for a model that closely resembles the one estimated with ESS data. The coefficients have mostly the same signs and magnitudes, and the same coefficients are significantly different from zero. The pattern of selection on unobservables is similar as well: the correlation between ε and u_1 is insignificant, whereas the correlation between

ε and u_0 is negative and significant: those more likely matched to the public sector have a below average well-being in the private sector. The coefficient is somewhat smaller than in the ESS data.

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Table 4 about here

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The extended model includes a number of preference controls – the importance of helping, of a successful career, and of social and political activism, and a favorable attitude towards risk taking. As a group, these additional variables are highly significant, as evident from a likelihood ratio test. They also show interesting individual patterns of significance. The effect of placing high importance on one's career is only significant in the private sector but not in the public sector. Fittingly, people who value their career highly are more likely to work in the private sector. A similar pattern is observed for risk taking: people who are more willing to take risks are more likely to be found in the private sector where they receive a significant return to the match.

With more observables included, we expect that the scope for selection on unobservables might be somewhat diminished. And this is the case indeed. The difference between ρ_1 and ρ_0 decreases, from 0.57 in the model without controls for preference heterogeneity to 0.4 in the model with these variables included. In addition, standard errors increase. While the point estimates still suggest selection on unobservables (and, given the size of the coefficients, a large rent for public sector workers), the null hypothesis of random matching cannot be rejected in this extended model. Of course, the power of this test may not be high, and we caution against abandoning the endogenous selection model too quickly. We find this evidence from the GSOEP data as generally supportive of our argument that preference heterogeneity has a role to play in the choice of workers between public and private sector employment.

5.4 Gains from Matching

The gains from matching, based on the ESS data and the Table 3 estimates, are illustrated in Figure 4, where we display the predicted aggregate happiness distribution under two scenarios. The first one, in dark grey bars, shows the actual distribution in the sample. Hence, it reflects the choices of people and incorporates the gains from sorting and matching. The second scenario is a counterfactual one. We ask the question, what would happen if people were randomly assigned to the two sectors, without taking preference heterogeneity into account, while keeping the sector sizes unchanged, i.e., 16 percent of the worker population are assigned to the government sector, and 84 percent are assigned to the private sector. For a worker with average characteristics, we obtain the predicted happiness distribution as

$$P(\widehat{y=j}|\bar{x}) = 0.16 * P(\widehat{y_1=j}|\bar{x}) + 0.84 * P(\widehat{y_0=j}|\bar{x})$$

We see that the sorting based on comparative advantage shifts the happiness distribution to the right relative to the random matching case. For example, the probability of being very satisfied ($P(\widehat{y \geq 8})$) is increased by 5 percentage points due to endogenous matching.

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Figure 4 about here

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The graphical and numerical results thus indicate significant welfare gains from sorting and matching in the labor market that were not and could not be measured with traditional approaches. Accordingly, we are not aware of any previous results on the gains from matching that could serve as a benchmarkfor the effect estimated here. There are, however, many studies estimating the loss in subjective well-being due to individual unemployment (see Frey and Stutzer 2002, chapter 5 for a review), probably the most extreme case of a mismatch. For the same set of countries in the ESS, we find that the fraction of employed or self-employed people reporting a satisfaction score of 8 or more is 57.4 percent while it is only 33.5 percent for unemployed people. Thus the gains from

sectoral matching shift about a fifth as many people into the category of very satisfied people as employment as such.[14]

Moreover, the overall result hides large gains from matching for people working in the government sector and small average losses for people working in the private sector. The latter effect is due to the politically determined size of the government sector restricting access to government employment. It means that with random allocation, on average, 16 percent of the private sector workers were to be employed in the government sector that would have made them better off, on average. However, not all people employed in the private sector would have benefited from random allocation. As seen in Figure 3, those most likely to work in the private sector are indeed better off in the private than in the government sector and thus benefit from sorting as well.

6 Concluding Remarks

According to standard economic decision calculus, individuals choose their jobs to attain an optimal match between job characteristics and their preferences. As far as an individual is not the marginal worker in a job, he or she benefits from a rent, i.e. a utility premium from matching. In general terms of traditional welfare economics, workers' sorting maximizes consumer and producer rents. Empirically, it is very difficult to get a grip on this fundamental source of well-being in society. Traditional approaches are based on the theory of equalizing differences and are restricted to analyze observed behavior at the margin. Thereby, the degree of preference heterogeneity and resulting welfare gains from matching remain very difficult to take into consideration.

Here, we propose a completely different approach. People's reports of their subjective well-being are taken as a proxy measure for their utility. It thus becomes possible to address the welfare gains from matching with minimal structural assumptions and no information about specific job characteristics in the two sectors. We introduce a two-equation ordered probit model with

[14]The raw difference in the fraction of very satisfied people between employed and unemployed people does not account for selection and differences in baseline satisfaction, but rather serves as a first approximation.

endogenous switching. This is the most basic model to capture the idea that there are individual specific gains in well-being from working in a particular sector and that people self-select into sectors according to these relative advantages.

The model is applied to study sorting between government and private sector jobs for a sample of 29,584 workers from 18 European countries. We find that there is sectoral sorting based on relative advantage. The resulting gains in subjective well-being relative to a random allocation of workers to the two sectors are considerable: The fraction of very satisfied workers increases from 53.8 to 58.8 percent. Additional results from the German Socio-Economic Panel suggest that the gains to selection on unobservables might be substantially diminished if one can include a larger number of controls capturing inter-individual preference heterogeneity.

There are at least one implication of substance and one of methodology in research on individual well-being from this study. First, the study highlights matching on the labor market as a potentially very important determinant of well-being in society. We expect that these gains in well-being depend on labor market institutions. In fact, an important motivation for state unemployment benefits is the concern that gains from matching are lost if people cannot afford to search for appropriate employment.

Second, the empirical findings make clear that the well-being gains from acting in a particular environment like working in the government rather than in the private sector are individual specific. In situations where people have choice, this leads to self-selection. Accordingly, the well-being consequences of different environmental conditions can neither be assessed from simply comparing individuals' well-being across environments nor from studying changes in well-being for those who voluntarily change environments. The latter advice of caution applies also to panel studies that account for individual specific fixed effects. In such a framework, for example, the effect of having a public sector job on individuals' well-being is evaluated based on people who change sectors (see e.g. Heywood et al. 2002). On the one hand, this might lead to a systematic over-estimation of the benefits from public employment because only those people who benefit the most will be observed as movers. On the other hand, if only a small fraction is moving, the well-being gains might be

under-estimated because the gains of public employment of those already in the public sector are not taken into account. [15] Our approach with endogenous switching handles these difficulties.

The implications of our model do not only apply to the specific case of sectoral selection on the labor market but to all the situations where people can choose their environment. This calls for a careful interpretation of previous findings in economic research on people's happiness. For example, the findings in cohort and panel studies on the correlation between marital status and subjective well-being (e.g. Easterlin 2005, Stutzer and Frey 2006) or education, the number of children, etc. and subjective well-being might seriously change. In contrast, self-selection might play a minor role in assessing the psychic costs of unemployment (e.g. Clark and Oswald 1994, Winkelmann and Winkelmann 1998) or the welfare consequences of democratic institutions (e.g. Frey and Stutzer 2000). We see our contribution as a first step to a better understanding of the gains in happiness where people self-select into situations that match their preferences best.

[15] Moreover, panel analyses of this sort rely on the identifying assumption that the only unobserved individual specific change is the change in the environment. However, whenever this change in the environment is chosen, this assumption may not hold. The change itself indicates that the decision calculus of the individual has altered. According to economic theory, the change in the environment is driven by either a change in constraints and /or preferences. It is, then, likely that these changes in the constraints and/or preferences have direct effects on life satisfaction beyond inducing individuals to change the environment.

References

Bellante, Don and Albert N. Link (1981). Are Public-Sector Workers More Risk Averse Than Private Sector Workers? *Industrial & Labor Relations Review* 34(3): 408-412.

Besley, Timothy and Maitreesh Ghatak (2005). Competition and Incentives with Motivated Agents. *American Economic Review* 95(3): 616-636.

Borjas, George J. (1987). Self-Selection and the Earnings of Immigrants. *American Economic Review* 77(4): 631-553.

Borjas, George J. (2002). The Wage Structure and the Sorting of Workers Into the Public Sector. NBER Working Paper 9313.

Clark, Andrew E. and Andrew J. Oswald (1994). Unhappiness and Unemployment. *Economic Journal* 104(424): 648-659.

Clark, Andrew E. and Fabien Postel-Vinay (2005). Job Security and Job Protection. IZA Discussion Paper No. 1489.

Clark, Andrew.E., Paul Frijters and Michael. A. Shields (2006) Income and Happiness: Evidence, Explanations and Economic Implications, mimeo.

Crewson, Philip E. (1997). Public Service Motivation: Building Empirical Evidence of Incidence and Effect. *Journal of Public Administration Research and Theory* 7(4): 499-518.

DeVaro, Jed (2006) Teams, Autonomy, and the Financial Performance of Firms, *Industrial Relations*, 45: 217-269.

Di Tella, Rafael, Robert J. MacCulloch and Andrew J. Oswald (2003). The Macroeconomics of Happiness. *Review of Economics and Statistics* 85(4): 809-827.

Dixit, Avinash (2002). Incentives and Organizations in the Public Sector: An Interpretative Review. *Journal of Human Resources* 37(4): 696-727.

Easterlin, Richard A. (2005). Building a Better Theory of Well-Being. In: Luigino Bruni and Pier Luigi Porta (eds). *Economics and Happiness. Framing the Analysis.* Oxford: Oxford University Press: 29-64.

Frey, Bruno S. and Alois Stutzer (2000). Happiness, Economy and Institutions. *Economic Journal* 110(466): 918-938.

Frey, Bruno S. and Alois Stutzer (2002a). *Happiness and Economics: How the Economy and Institutions Affect Well-Being.* Princeton, NJ: Princeton University Press.

Frey, Bruno S. and Alois Stutzer (2002b). What Can Economists Learn from Happiness Research? *Journal of Economic Literature* 40(2): 402-435.

Frey, Bruno S., Simon Luechinger and Alois Stutzer (2004). Valuing Public Goods: The Life Satisfaction Approach. IEW Working Paper No. 184, University of Zurich.

Frijters, Paul, John P. Haisken-DeNew and Michael A. Shields (2004). Money Does Matter! Evidence from Increasing Real Income and Life Satisfaction in East Germany Following Reunification. *American Economic Review* 94(3): 730-40.

Gregory, Robert G. and Jeff Borland (1999). Recent Developments in Public Sector Labor Markets. In: Orley Ashenfelter and David Card (eds). *Handbook of Labor Economics*, vol. 3C. Amsterdam: Elsevier: 3573-3630.

Gruber, Jonathan H. and Sendhil Mullainathan (2005). Do Cigarette Taxes Make Smokers Happier? *Advances in Economic Analysis and Policy* 5(1): 1-43.

Hartog, Joop, Ada Ferrer-i-Carbonell and Nicole Jonker (2002). Linking Measured Risk Aversion to Individual Characteristics. *Kyklos* 55(1): 3-26.

Heckman, J.J. (1990) Varieties of Selection Bias, *American Economic Review* 80(2): 313-318.

Heywood, John S., W. Stanley Siebert and Xiangdong Wei (2002). Worker Sorting and Job Satisfaction: The Case of Union and Government Jobs. *Industrial and Labor Relations Review* 55(4): 595-609.

Kahneman, Daniel, Ed Diener and Norbert Schwarz (eds) (1999). *Well-Being: The Foundations of Hedonic Psychology.* New York, NY: Russell Sage Foundation.

Kelman, Steven (1987). Public Choice and Public Spirit. *Public Interest* 87: 80-94.

Krueger, Alan (1988). The Determinants of Queues for Federal Jobs. *Industrial and Labor Relations Review* 41: 567-581.

Lewis, Gregory B. and Sue A. Frank (2002). Who Wants to Work for the Government? *Public Administration Review* 62(4): 395-404.

Luttmer, Erzo F. P. (2005). Neighbors as Negatives: Relative Earnings and Well-Being. *Quarterly Journal of Economics* 120(3): 963-1002.

Rosen, Sherwin (1986). The Theory of Equalizing Differences. In: Orley Ashenfelter and Richard Layard (eds). *Handbook of Labor Economics*, vol. 1. Amsterdam: North Holland: 641-692.

Roy, Andrew D. (1951). Some Thoughts on the Distribution of Earnings. *Oxford Economic Papers* 3: 135-146.

Stutzer, Alois (2004). The Role of Income Aspirations in Individual Happiness. *Journal of Economic Behavior and Organization* 54(1): 89-109.

Stutzer, Alois and Bruno S. Frey (2006). Does Marriage Make People Happy, or Do Happy People Get Married? *Journal of Socio-Economics* 35(2): 326-347.

van Praag, Bernhard and Ada Ferrer-i-Carbonell (2004) *Happiness Quantified: A Satisfaction Calculus Approach*. Oxford University Press.

Warr, Peter (1999). Well-Being and the Workplace. In: Daniel Kahneman, Ed Diener and Norbert Schwarz (eds). *Well-Being: The Foundations of Hedonic Psychology.* New York: Russell Sage Foundation: 392-412.

Winkelmann, Liliana and Rainer Winkelmann (1998). Why Are the Unemployed So Unhappy? Evidence from Panel Data. *Economica* 65(257): 1-15.

Table 1. Descriptive Evidence on Preference Heterogeneity

How important is it for you to	important/very important (in percent)		
	Public Sector	Private Sector	
a) help other people?	90.4	89.6	
b) have a succesful career?	73.2	76.1	**
c) be an engaged citizen?	40.7	25.6	**
To what extent are you prepared to take risks in life? (0/10)	5.0	5.2	**

Source: German Socio-Economic Panel, 2004, Men, N=4181

Table 2. Ordered Probit Regression Models of Public and Private Sector Well-Being (European Social Survey 2002/2004)

Dependent Variable: Life Satisfaction						
		Ordered Probit Models				Probit
		Single equations		Switching regression		
Variable	mean			Public	Private	Selection
Public sector	0.16	0.080**	0.019			
		(0.016)	(0.016)			
Household size	1.66		0.093**	0.050	0.101**	0.056**
			(0.016)	(0.043)	(0.018)	(0.026)
Female	0.45		0.072**	0.113**	0.065**	0.328**
			(0.012)	(0.029)	(0.013)	(0.018)
Age$*10^{-1}$	4.09		0.341**	-0.481**	-0.325**	0.305**
			(0.036)	(0.104)	(0.038)	(0.058)
Age squared$*10^{-3}$	1.80		0.398**	0.525**	0.386**	-0.215**
			(0.043)	(0.122)	(0.046)	(0.069)
Married	0.58		0.179**	0.269**	0.162**	0.017
			(0.015)	(0.037)	(0.016)	(0.022)
Years of schooling$*10^{-1}$	1.29		0.239**	0.157**	0.255**	0.911**
			(0.016)	(0.042)	(0.018)	(0.026)
Citizen	0.94		0.064**	0.108	0.059**	0.533**
			(0.025)	(0.099)	(0.026)	(0.050)
Father in pub.sec.	0.05		0.029	-0.018	0.046	0.198**
			(0.027)	(0.055)	(0.031)	(0.038)
Log-Likelihood		-57028.5	-56764.3	-56742.3		-12253.4
Number of observations		29584	29584	29584		29584

Notes: asymptotic standard errors in parentheses.
/ indicates statistical significance at the 1/5 percent level.
An additional ten threshold parameters were estimated for each ordered probit model.

Table 3. Ordered Probit Switching Regression Models With Self-Selection (European Social Survey 2002/2004)

Dependent Variable: Life Satisfaction						
	With instruments			Without instruments		
	Public	Private	Selection	Public	Private	Selection
Household size	0.046	0.075**	0.041	0.055	0.075**	0.040
	(0.043)	(0.018)	(0.025)	(0.054)	(0.018)	(0.025)
Female	0.082	-0.020	0.309**	0.134	0.021	0.308**
	(0.058)	(0.013)	(0.017)	(0.274)	(0.013)	(0.017)
Age$*10^{-1}$	-0.507**	-0.356**	0.301**	-0.442	-0.357**	0.302**
	(0.109)	(0.037)	(0.059)	(0.338)	(0.037)	(0.059)
Age squared$*10^{-3}$	0.543**	0.386**	-0.224**	0.489*	0.388**	-0.226**
	(0.123)	(0.045)	(0.069)	(0.285)	(0.045)	(0.069)
Married	0.265**	0.146**	0.031	0.269**	0.144**	0.032
	(0.038)	(0.015)	(0.022)	(0.037)	(0.016)	(0.022)
Years of schooling$*10^{-1}$	0.064	0.006	0.899**	0.223	0.004	0.896**
	(0.153)	(0.023)	(0.024)	(0.811)	(0.022)	(0.024)
Citizen			0.503**	0.157	0.042	0.522**
			(0.048)	(0.493)	(0.026)	(0.049)
Father in pub. sec.			0.191**	-0.005	0.014	0.198**
			(0.034)	(0.182)	(0.031)	(0.037)
ρ	-0.126	-0.684**		0.091	-0.694**	
	(0.201)	(0.031)		(1.165)	(0.031)	
Log-Likelihood		-68971.8			-68970.4	
Number of observations		29584			29584	

Notes: see Table 2.

Table 4. Ordered Probit Switching Regression Models With Controls for Preference Heterogeneity (German Socio-Economic Panel 2004)

Dependent Variable: Job Satisfaction						
	Without preference heterogeneity			With preference heterogeneity		
	Public	Private	Selection	Public	Private	Selection
Age$*10^{-1}$	-0.986**	-0.162	-0.586**	-0.959**	-0.172	-0.548**
	(0.375)	(0.190)	(0.237)	(0.383)	(0.192)	(0.240)
Age squared$*10^{-2}$	1.223**	0.154	0.811**	1.187**	0.187	0.741**
	(0.434)	(0.222)	(0.270)	(0.441)	(0.225)	(0.274)
Married	0.097	0.136**	-0.074	0.087	0.143**	-0.091*
	(0.088)	(0.042)	(0.053)	(0.089)	(0.043)	(0.054)
Years of schooling$*10^{-1}$	0.140	-0.085	0.683**	0.083	-0.073	0.630**
	(0.222)	(0.094)	(0.079)	(0.210)	(0.097)	(0.082)
Poor Health	-0.194**	-0.161**	0.020*	-0.196**	-0.163**	0.018*
	(0.020)	(0.009)	(0.010)	(0.018)	(0.009)	(0.010)
Importance career				0.048	0.101**	-0.125**
				(0.089)	(0.043)	(0.053)
Importance helping				0.403**	0.111*	-0.005
				(0.115)	(0.058)	(0.076)
Soc./pol. engagement				0.041	0.009	0.323**
				(0.111)	(0.050)	(0.049)
Risk taking				0.006	0.022**	-0.033**
				(0.018)	(0.007)	(0.011)
German			0.590**			0.592**
			(0.102)			(0.101)
Father in pub. sec.			0.255**			0.280**
			(0.095)			(0.098)
ρ	0.142	-0.434**		0.076	-0.313	
	(0.360)	(0.182)		(0.349)	(0.211)	
Log-Likelihood		-9999.9			-9956.4	

Notes: see Table 2.

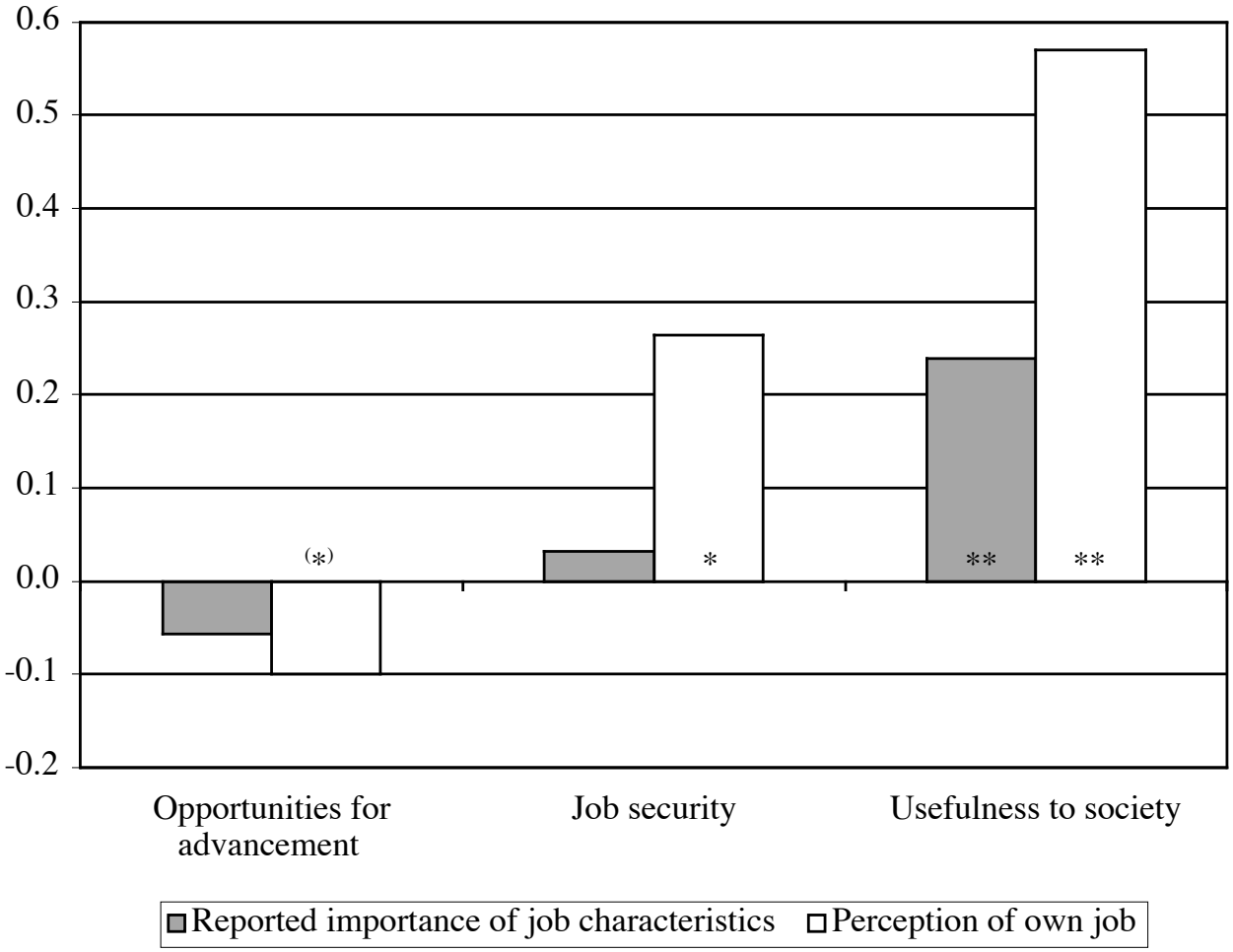

Figure 1: *Differences in preferences and perceptions of job characteristics between government and private sector workers in 23 countries 1997 .*

Notes: The bars reflect the mean differences of the answers, elicited on a six point scale, between public and private sector employees; ** is significant at the 1 percent level, * at the 5 percent level, and (*) at the 10 percent level. The differences are calculated based on the pooled sample for all 25 countries in the ISSP, except the USA and the Netherlands where the required sector information is not available. Standard errors are adjusted for possible clustering at the country level. People working in publicly owned firms, cooperatives and non-profit organization are excluded. The numbers of observations vary between 12,365 and 14,480.
Source: Own calculations based on ISSP 1997.

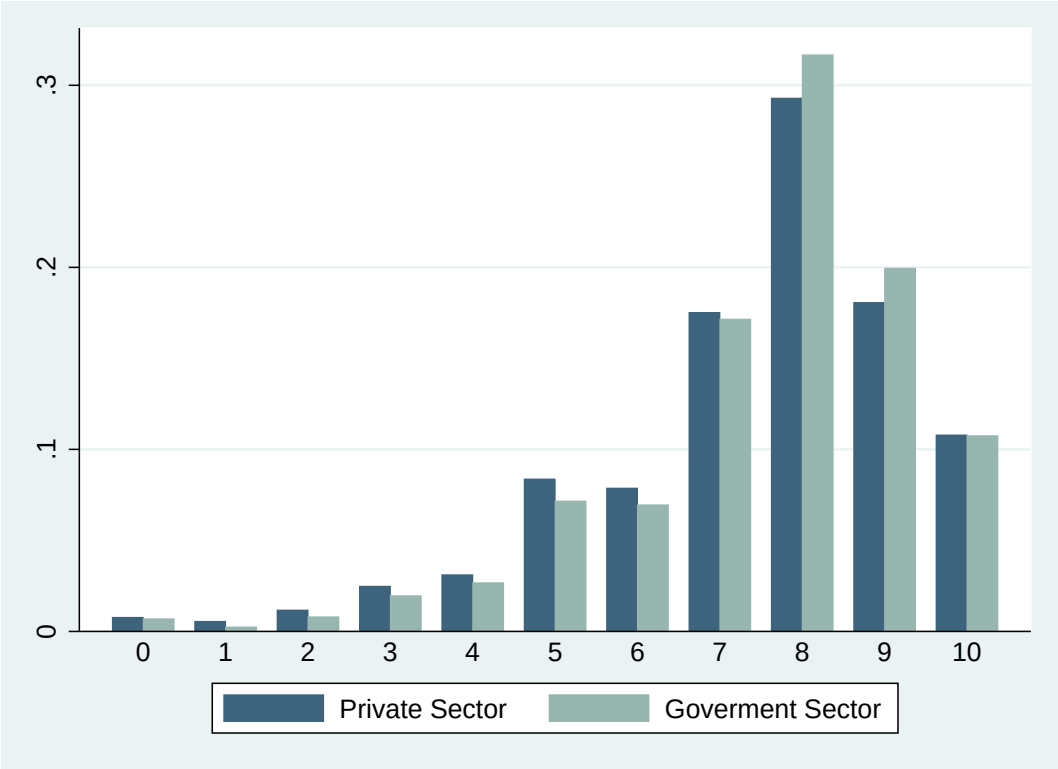

Figure 2: *Happiness distribution for government and private sector employees. Source: European Social Survey 2002 and 2004, pooled data.*

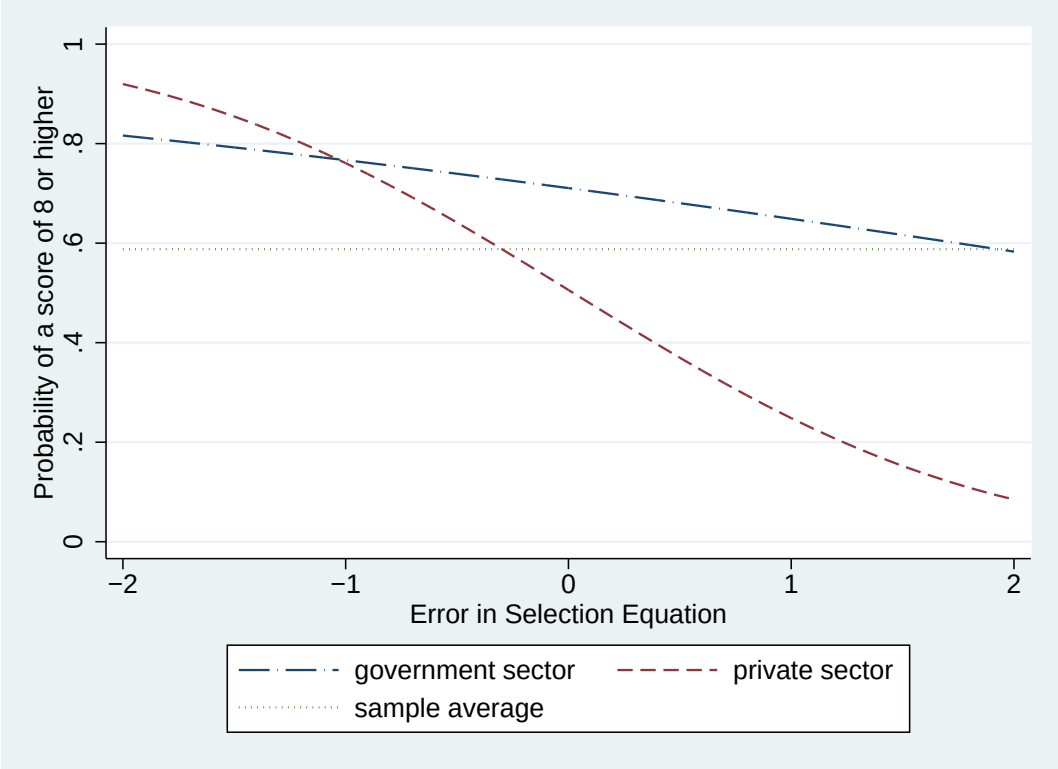

Figure 3: *Predicted probability of being very happy (a score of 8 or above) for government and private sector employees by ε (the error in the selection equation).*

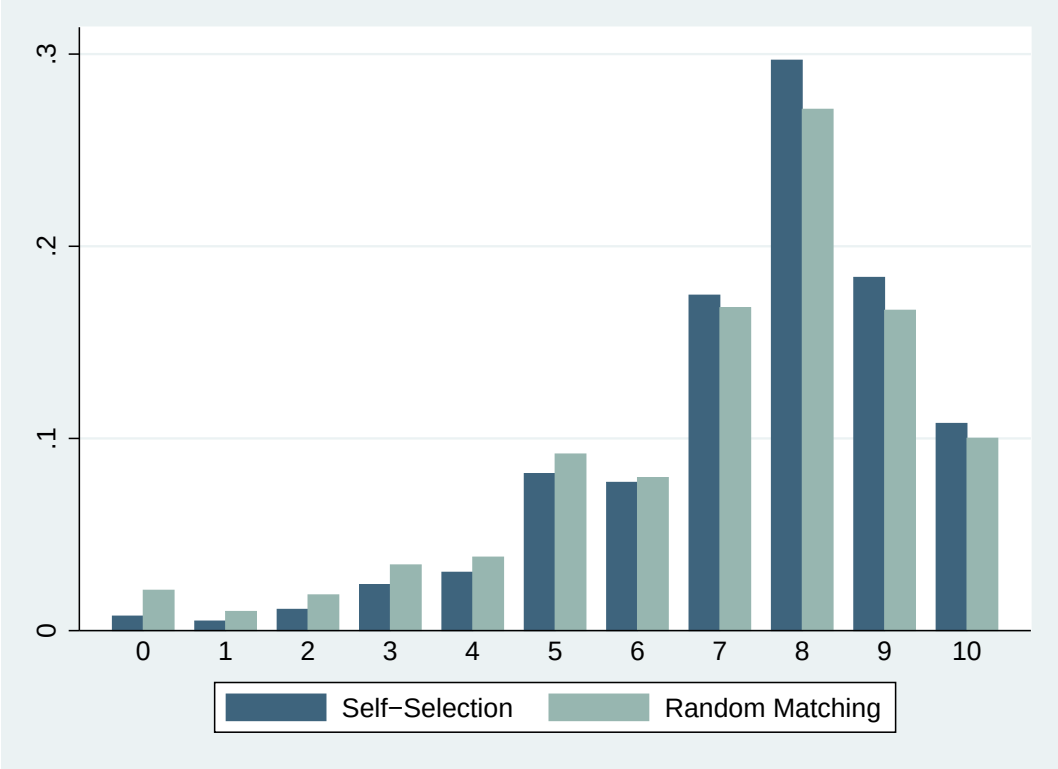

Figure 4: *Predicted aggregate happiness distribution (0-10 scale) under self-selection (dark grey) and random matching (light grey).*