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Who chooses to become a public sector employee?

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Tiivistelmä

Tutkimuksessa tarkastellaan henkilön taustaominaisuuksien vaikutuksia päätyä julkisen sektorin työntekijäksi. Tarkastelu tehdään suomalaisella kaksosaineistolla, jonka avulla voidaan ottaa huomioon perhetaustaan ja genetiikkaan liittyvien muuten havaitsemattomien tekijöiden vaikutus. Tutkimuksessa käytetty aineisto kattaa vuodet 1990–2009. Tutkimusaineiston paneeliominaisuutta hyödynnetään tarkastelemalla henkilön siirtymiä yksityisen sektorin palveluksesta julkisen sektorin palvelukseen. Tulosten mukaan korkeampi koulutus ja ammatilliset preferenssit ovat yhteydessä henkilöiden päätymiseen julkisen sektorin palkkalistoille. Perheen perustaminen on myös positiivisesti yhteydessä henkilön todennäköisyyteen siirtyä yksityiseltä sektorilta julkiselle sektorille. Perheen perustamisen myötä riskin karttaminen kasvaa ja hakeutuminen vakaampiin ja vähemmän riskialttiisiin työsuhteisiin lisääntyy. Ekstrovertit henkilöt päätyvät myös muita todennäköisemmin julkisen sektorin työpaikkoihin. Myös palkka vaikuttaa siirtymiin. Korkeammilla palkkaluokilla työskentelevät jäävät todennäköisemmin yksityisen sektorin palvelukseen, koska julkisella sektorilla maksetaan näillä palkkaluokilla pienempää palkkaa.

Abstract

Purpose – This paper examines the extent to which different individual characteristics affect the decision to become a public sector employee using twin study matched to register-based, individual-level panel data for the years 1991-2009.

Design/methodology/approach – The public sector entry probability is examined using fixed-effects logit regression to eliminate shared environmental and genetic factors.

Findings – The results show that the highly educated and those whose field of study is teaching, healthcare or social work are more likely to enter public sector employment. Starting a family and extraversion also positively affect the entry decision. Workers are, however, less likely to enter public sector employment at higher wage levels.

Originality/value - A distinction to previous literature is made using data on twins. This is also the first paper that examines the *entry* probability instead of comparing public sector workers with private sector workers.

Keywords: Public sector; Worker sorting; Unobserved heterogeneity; Twin studies

1. Introduction

One of the most pervasive opinions in the literature on public sector labor markets is that public and private sector employees differ in many of their characteristics. Evidence of these differences has been documented in most industrialized and transition economies and is also related to the public administration and sociological literatures. To date, numerous papers have analyzed the phenomenon, beginning with the Bellante and Link (1981) and Blank (1985) studies, which directly estimated the extent to which workers with specific characteristics are more likely to choose a public sector job. According to the existing evidence, public sector workers are more educated (e.g., Blank, 1985; Lassibille, 1998), more likely to be parents and married (e.g., Jovanovic and Lokshin, 2004), more risk averse (e.g., Bellante and Link, 1981; Hartog *et al*., 2002), and value non-monetary benefits more highly (Demoussis and Giannakopoulos, 2007). The sub-groups of public and private sector employees are also found to differ in their occupational interests (Blank, 1985).

There are two policy motivations to study who chooses public sector employment. First, the choice of occupation and working sector determines an individual's earnings level and social status, which have spillover effects on all aspects of wellbeing. Second, the public sector needs qualified employees to accomplish the required tasks. The public sector's ability to provide high-quality services thus depends on the talent and motivation of the employees who work for the government. The lack of the appropriate qualifications in the public sector is therefore of particular concern in an economy in which a high fraction of employees works in the public sector.

Despite the topic's popularity in the literature, many aspects about public sector employment choice remain unanswered. In particular, very few studies have examined the role of family background and genetic endowments in this process, even though it is obvious that many individual characteristics are generated by these factors. For example, there is evidence on the intergenerational mobility of education (Eccles and Davis-Kean, 2005), and occupation (e.g., Nicolaou and Shane, 2010). An extensive behavioural genetics literature accordingly provides evidence on the effects of heredity on risk preferences (Cesarini *et al*., 2009), work values (Keller *et al*., 1992), and family structure (Johnson *et al*.,

2004). Because all of those characteristics also contribute to the probability of being a public sector employee, it is reasonable to hypothesize that the sector choice process is partly generated by unobserved family background and genetic heterogeneity between individuals.

To some degree, the dearth of research on unobserved differences in the public sector labor market literature is caused by the lack of appropriate data. This paper provides new evidence relevant to this debate using data on twins. The first contribution of this study is thus to ensure that the observed associations (or lack of associations) between different worker characteristics and public sector employment do not operate via workers' unobserved family and genetic endowments. The analysis is made using within-twin variation to condition out the unobserved family background effects. Because identical twins share 100% of their genes, the within-twin variation among those twins accordingly conditions out the unobserved genetic effects. The within-twin variation procedure is accomplished using a conditional (fixed-effects) logit regression approach (e.g., Magnac, 2004).

Previous literature has often directly estimated a probability model of being a public sector employee based on the full sample of public and private sector employees. Instead of comparing these two groups of employees according to different characteristics, this study also examines the extent to which these characteristics affect public sector employment decisions at certain points in time. This is the second novel contribution of the paper. The data at hand comprise the years from 1990 to 2009; thus, employer status is observed over a 20-year working career. This is important because cross-sectional labor market status provides only a snapshot of what happens during workers' life course and working career. The paper thus utilizes the panel dimension of the data to further examine an interesting decision, namely, the decision to *enter* into public sector employment *from* private sector employment.

The analysis is conducted using the Older Finnish Twin Cohort Study, which has been linked to worker-firm panel data covering the years from 1991 to 2009. The data includes a rich set of variables regarding workers' characteristics, such as demographic characteristics, field of study, wage level, job-specific attributes, health endowments and personality characteristics.

The results show that different worker characteristics contribute to public sector employment decisions in various ways. The probability of entering into public sector employment depends on

educational attainment, i.e., occupational preferences. Starting a family increases the probability of entering into public sector employment. Workers also place some value on extrinsic reward motivations because the rates at which workers quit the private sector to enter the public sector decrease at higher wage levels. Extroverted workers are also more likely to choose public sector employment over private sector employment.

2. Past Research on Sector Choice

Theoretical models assume that workers choose the working sector on the basis of utility maximisation, thereby leading to a self-selection of preferable activities by workers (e.g., Roy, 1951). For example, Blank (1985) noted that wage differentials between the sectors may drive individuals to choose the working sector that offers them the greatest monetary advantages. Prior evidence has shown that less skilled workers are compensated with higher rewards in the public sector, while the pay premium decreases at higher skill levels (e.g., Lucifora and Meurs, 2006; Cai and Liu, 2011). In line with this evidence, Borjas (2002) found that rates at which workers quit the public sector to enter the private sector increased at higher wage levels.

Workers do not always place a higher value on extrinsic reward motivators, as Blank also indicated. Many authors have suggested that non-monetary benefits may induce the decision to search for a job in the public sector, including public service motivation (e.g., Perry and Wise, 1990), lower economic pressure in job (e.g., Blank, 1985), and well-being at work related to higher job security and better working times and working hours (Demoussis and Giannakopoulos, 2007). Heywood *et al*. (2002) offered a more nuanced view of the extent of higher job satisfaction in the public sector, arguing that the relationship is due to sorting. This means that workers who are more easily satisfied with their jobs are drawn to the public sector.

Blank (1985) proceeded to suggest that workers with a higher concern for job security typically seek a less economically pressured public sector job, including those with poor health and those who are more risk averse (see also, Hartog *et al*. 2002). This risk behavior idea has been already used in Bellante

and Link (1981), although they did not have an economically direct measure of risk aversion. [1] Accordingly, so-called protected groups of non-whites, veterans and women (Blank, 1985; Gyourgo and Tracy, 1988) and ethnic minorities (Falaris, 2004) are found to prefer public sector employment over private sector employment. These results reflect the fact that certain worker groups, i.e., based on gender or ethnicity, are less discriminated in terms of pay in the public sector than they would be in the private sector. Blank also made this important point when she wrote (Blank, 1985, p. 213) "…Moreover, these differences in the wage structures [between the sectors] suggest that workers with characteristics more highly rewarded in the public sector should more likely to choose employment there, and vice versa."

It has been further reported that more educated individuals (e.g., Lassibille, 1998; Christofides and Pashardes, 2002), older individuals (Bellante and Link, 1981; Kanellopoulos, 1997; Christofides and Pashardes, 2002), married individuals (Kanellopoulos, 1997; Jovanovic and Lokshin, 2004) and individuals with children (Jovanovic and Lokshin, 2004) are more likely to choose public sector employment over private sector employment. Dustmann and van Soest (1998) argued that the positive relationship between education and public sector work reflects the public sector's need to hire more qualified employees. They also noted that older workers have greater access to public sector positions because they have already accumulated the required skills to secure a job in that sector. Being married and parenting could induce the decision to work in the public sector, where the balance between family and working life has traditionally been better organized (e.g., Okun *et al*., 2007). Accordingly, DeLeire and Levy (2004) and Grazier and Sloane (2008) used family structure as a proxy variable for preferences for risky jobs and found that having children increased the aversion to risk. In other words, parents (and single parents in particular) were more likely to make occupational choices that sorted them into safer jobs.

Blank (1985) introduced another three characteristics that affect the probability of choosing a public sector job: union membership, occupational preferences and geographic preferences. In many countries, union membership is more profound in the public sector than in the private sector. Those who have a desire for unionized jobs are thus more likely to choose a job in the public sector (see also Belman and Heywood, 2004).[2] The causal inference of occupational interests and public sector work is more complex.

Certain occupations, such as health, administrative and educational jobs are mostly occupied by public sector employees. Therefore, there might be simultaneity between occupation and working sector. Regional preferences may induce the decision to seek a public sector job if the relative supply of public sector jobs varies across regions. For example, Blank (1985) wrote that the probability of finding a government job in the U.S. is higher in Washington D.C. and in other urban areas. The increased labor supply to public sector jobs may also be the result of poorer labor market prospects in the private sector in the specific are (e.g., Pagani, 2003).[3]

Prior literature has identified two additional factors that may affect the decision to become a public sector employee: family background and ability. Familial social networks may affect individuals' decision to enter public sector employment, for example, through job market information that their parents provide. According to previous evidence, individuals who had a parent working in the public sector were more likely than others to choose a public sector job as well (Dustmann and van Soest, 1998; Lewis and Frank, 2002). These findings reflect similar types of occupations between parents and their children. With regard to ability, Beggs and Chapman (1982) found that highly qualified clerical employees were more likely to enter private sector jobs, while Pfeifer (2011) found that better students, measured based on their expected final grades in Economics and Management, were more likely to choose private sector jobs after graduation.

3. Data and model

3.1. Data sources

This paper makes extensive use of the Older Finnish Twin Cohort Study from the Department of Public Health at the University of Helsinki. This twin study has been linked with the Finnish Longitudinal Employer-Employee Data (FLEED) of Statistics Finland.

The Finnish Twin Cohort Study was a postal health survey that was launched in 1974, and the survey candidates were originally compiled from the Central Population Registry of Finland. The initial candidates were same-gender DZ (dizygotic) and MZ (monozygotic) twins of the Finnish population who

were born before 1958. The 1975 survey was followed by two subsequent surveys in 1981 and 1990, with some attrition mainly due to death and migration. The response rate for the initial 1975 survey was 89%, whereas the response rates for the 1981 and 1990 surveys were 84% and 77%, respectively. The third questionnaire, conducted in 1990, was only sent to twin pairs who were born after 1930. The final number of twin pairs in the sample is 12,502 (Kaprio *et al*., 1979). The FLEED includes annual panel data over the period of 1990-2009. The data are based on various administrative registers on individuals and firms. The twin study contains information on drug use, smoking, alcohol use, symptoms of illnesses and reported diseases, physical characteristics, psychosocial factors and experiences at work and in personal life. The registers combined with the FLEED include, e.g., wage and employment statistics, personal records and educational registers. As both the establishment- and firm-level records are only available for private enterprises, the employees are not examined at the firm level.

The analysis focuses on twin pairs in which both siblings are employed either in the public or in the private sector at period *t*. Entrepreneurs are excluded. The analysis uses information regarding if the worker has switched his/her work sector between the periods *t-1* and *t*. As the data period begins in 1990, the final estimation sample includes the years from 1991 to 2009. In the final sample, 27% of the employees switched their working sector at least once during the observation window of 1991-2009. After excluding missing information, the initial number of twins decreases to 2,157 twin pairs. Of these twin pairs, 39% are MZ twins. The data are unbalanced because not every twin pair is observed every year. The total number of yearly observations in the estimation sample is 44,250.

3.2. Empirical model and definition of variables

This study uses two different types of approaches to examine workers' sorting into public sector employment. The analysis begins by directly estimating a logit model of the probability of being a public sector employee. The dependent variable, $Public_{ijt}$, is equal to 1 if a twin i ($i = 1,2$) in family j ($j = 1,\ldots,J$) at time t ($t = 1991,\ldots,2009$) works in the public sector and is equal to 0 if a twin works in the private sector. The assumption is that public sector attainment, $Public_{ijt}$, is determined by an unobserved latent

variable, $Public^*_{ijt}$, such that $Public_{ijt} = 1$ if $Public^*_{ijt} > 0$ and $Public_{ijt} = 0$ if $Public^*_{ijt} \leq 0$. In particular, the latent variable follows:

$$Public^*_{ijt} = \boldsymbol{\beta}'\boldsymbol{D}_{ijt} + \boldsymbol{\delta}'\boldsymbol{H}_{ij,1975/1981/1990} + \boldsymbol{\theta}'\boldsymbol{J}_{ij,1990} + \boldsymbol{\gamma}'\boldsymbol{P}_{ij,1981} + f_j + g_{ij} + \varepsilon_{ijt} \quad , \qquad (1)$$

where the predictors are grouped into demographic variables (vector $\boldsymbol{D}_{ijt}$), health behavior variables (vector $\boldsymbol{H}_{ij,1975/1981/1990}$), job satisfaction variables (vector $\boldsymbol{J}_{ij,1990}$), and personality variables (vector $\boldsymbol{P}_{ijt}$).

The vector of demographic variables includes age and its squared term (*Age* and $Age^2/100$), education years (*Education*) and dummies for gender (*Female*), field of study (nine categories: *General*, *Teaching*, *Humanistic & arts*, *Business & social sciences*, *Natural sciences*, *Technology*, *Forestry & agriculture*, *Health & social work* and *Services*), marital status (*Married* = 1 if the respondent is currently married & *Divorced* = 1 if the respondent has ever been divorced), having children (*Children* = 1 if respondent has underage children), and owning a home (*Home*). Field of study substantially determines individuals' occupational interests. The predictor is also predetermined for the subsequent working sector.

Health behavior vector includes a measure of leisure time physical activity (*MET* = Metabolic Equivalent of Task), body mass index (*BMI*, in kg/m^2), smoking behavior (*Smoking*, measured as pack-years), alcohol consumption (*Alcohol use*, in grams per week), and number of chronic diseases (*Diseases*). BMI, smoking and alcohol use come from the 1990 survey, and leisure time physical activity comes from the 1981 survey. The number of chronic diseases is measured as the mean number of diagnosed chronic diseases in 1975, 1981 and 1990.

The data do not include direct measures of job satisfaction, but the 1990 survey contains questions that reveal whether the respondent has experienced difficulties with a boss or colleagues (*Weak atmosphere*), whether the respondent can influence his/her own working methods (*Flexibility*), and whether the respondent has felt a general positive experience at work (*Positive experience*) at the time of the survey. There is, however, a possibility that working in a sector with a weak atmosphere in 1990 may cause workers to become employees in another sector after 1990.

Personality characteristics vector includes the Big Five domains of extraversion and neuroticism from the 1981 survey. Extraversion (neuroticism) is assessed by 9 (10) items from the short form of the Eysenck Personality Inventory. Personality characteristics have rarely been considered in studies that examine workers' sorting into public and private sector jobs. Khurshid (2011) found that public sector teachers have higher mean scores on neuroticism, while private sector teachers have higher mean scores on extraversion. However, these findings should be treated with caution, as they rest solely on group means within a single occupation group.

Accordingly, f_j is unobserved family endowments common to both twins of pair *j*, and g_{ij} is unobserved genetic endowments specific to twin *i* of pair *j*. The public sector choice function is first estimated by standard logit regression. This provides estimates for $\boldsymbol{\beta}, \boldsymbol{\delta}, \boldsymbol{\theta}$ and $\boldsymbol{\gamma}$ that may be biased if there are unobservable factors that are correlated with both independent variables and the outcome. I use within-twin variation among the DZ twins to difference out the family effects, f_j. If the twins are identical, then $g_{1j} = g_{2j}$; thus, the genetic effects can also be differenced out. The within-twin variation procedure is accomplished using a fixed-effects logit regression approach. Finally, ε_{ijt} is a time-varying random shock specific to twin *i* of pair *j* with a standard logit distribution with a mean of zero and a variance of one. The standard errors are clustered for yearly twin pairs to take into account the fact that observations of twins *i* in a family *f* may be correlated.

The paper utilizes the panel dimension of the data to further examine the transition probability in a discrete time hazard model. This approach is a clear improvement to the cross-sectional approach for at least three reasons. First, it is able to take into account state dependence. Second, the model can be augmented with variables that would otherwise be potentially endogenous (or jointly determined with the outcome) in a cross-sectional approach, such as earnings level and tenure. Third, the approach directly estimates the extent to which different characteristics affect the decision to *enter* into public sector employment *from* private sector employment.

In the estimation equation, the outcome variable is $Entry_{ijt}$, which is equal to 1 if a twin *i* (*i = 1,2*) in family *j* (*j = 1,…,J*) at time *t* (*t = 1991,…,2009*) has just quit the private sector and entered into the public sector and is equal to zero if a twin worked in the private sector in periods *t-1* and *t*. The vectors of

explanatory variables are the same as in the cross-sectional model, including wages and tenure. The wage vector ($\boldsymbol{W}_{ijt-1}$) includes year-gender-specific centiles of the respondent's earnings at year *t-1* (five categories: *Lag_wage20* = 1 if the respondent's earnings were below the 20th centile within the sample, *Lag_wage40* = 1 if the respondent's earnings were between the 20th and 40th centiles within the sample, *Lag_wage60* = 1 if the respondent's earnings were between the 40th and 60th centiles within the sample, *Lag_wage80* = 1 if the respondent's earnings were between the 60th and 80th centiles within the sample and *Lag_wage100* = 1 if the respondent's earnings were above the 80th centile within the sample). Earnings are deflated in 2009 euros using the cost of living index. Including lagged earnings, it is possible to examine the employee's probability of transitioning into the public sector from the private sector at different wage levels. Finally, the transition probabilities are estimated conditional on the duration in private sector employment, measured from the data in person-year format. Tenure is specified as a third-degree polynomial (see also, Caliendo *et al*., 2014).

Based on the earlier literature, the following hypotheses are proposed:

Hypothesis 1: The probability of being a public sector worker is higher for females, married individuals, older individuals and those who have children. The probability of being a public sector worker is lower for divorced individuals. The probability of entering into the public sector is higher for parents, married individuals and older individuals.

Hypothesis 2: The probability of being a public sector worker and the entry probability is higher for the highly educated and those whose field of study is teaching, health or social work.

Hypothesis 3: The probability of entering into the public sector decreases with the wage level.

Hypothesis 4: The probability of being a public sector worker is higher for those who have better health inputs. The probability of being a public sector worker and the entry probability are higher for those who have more chronic diseases.

Hypothesis 5: The probability of being a public sector worker is higher for those who are more satisfied with their jobs.

Hypothesis 6: The probability of being a public sector worker is higher for more neurotic individuals and lower for more extraverted individuals.

3.3. Descriptive evidence

Table 1 shows the means of the variables based on a pooled sample (column 1) and separately for public and private sector employees (columns 2-3). T-tests of equal means in the sub-samples of public and private sector employees are also conducted. Before commenting on the sample means, it is worth noting that the Finnish twin sample is quite representative of the general Finnish population (e.g., Maczulskij, 2013, p. 95; Hyytinen *et al*., 2013, p. 63). When the calculations are performed based on person-year observations in the sample, the means of individual characteristics confirm known facts. For example, the share of women in the public sector is high and public sector workers are older, more educated and more likely to have children compared to private sector workers. The statistics show that although public sector workers have smaller BMI, they smoke less and are more responsible in their drinking habits, they report more chronic diseases. Finally, public sector employees have higher average scores on extraversion and are more likely to be satisfied with their jobs than private sector employees.

[Insert Table 1 about here]

4. Results

Table 2 presents the estimated effects of workers' characteristics on the probability of being a public sector employee from equation (1). Column (1) gives the standard logit regression estimates for the entire sample. Column (2) gives the fixed-effects logit regression estimates for DZ twins, in which unobservable family background effects are controlled for. Column (3) gives the fixed-effects logit regression estimates for MZ twins, in which both family background and genetic effects are controlled for. Gender, age and year dummies are automatically dropped in columns (2)-(3) due to lack of within-twin variation in these variables.

The standard cross-sectional logit model results correspond to the predictions quite well. Women and those who have children are more likely to be employed in the public sector. The level and square terms of age are jointly significant at the 1% level, suggesting that the probability of working in the public sector increases at older age. Owning a home negatively contributes to public sector employment, This results is consistent with the work of Lassibille (1998) and Christofides and Pashardes (2002), who find that public sector employees have less capital.

The estimates with regard to years of education and field of study reveal sector-specific differences in occupation. The public sector needs highly educated employees to accomplish the required tasks, and employees with a teaching, health and social work education, for example, are more likely to be employed in the public sector than in the private sector. However, there might be a common support problem in the results regarding field of education, because there are more work opportunities for health care and social workers in the public sector.

The results show that public sector employees smoke less. This finding is consistent with the study of Bang and Kim (2001), who found that prevalence of smoking is lowest in occupations that are mainly found in the public sector. However, there is no clear discrepancy in alcohol consumption or leisure time physical activity. As predicted, number of diagnosed chronic diseases increases the likelihood of working in the public sector. Finally, work flexibility is positively related to public sector job, which resembles the results of Van Ophem (1993). In contrast to the hypotheses, marital status and personality traits do not

significantly relate to the probability of being a public sector worker. The results for the demographic variables do not change much when the focus is on the logit model for DZ twins that controls for the family fixed-effects in column (2).

Let us now look at the preferred fixed-effects logit results for MZ twins in column (3). Once both the family background and genetic factors are controlled for, many of the predictor estimates are statistically significant. For example, educational attainment predicts public sector employment, as expected. Public sector employees are less likely to be separated, as hypothesized, but having children and owning a home no longer significantly characterize the probability of working in the public sector. The estimates with regard to health behavior predictors reveal that although public sector employees are more likely to exercise, they have higher BMI and report more diagnosed diseases. This means that although public sector workers have better health inputs, they have worse health outputs. Individuals who are employed in jobs in which they can influence over their own working methods are more likely to be situated in the public sector. The hypothesis of a positive relationship between neuroticism and the probability of working in the public sector is supported. However, in contrast to the hypothesis, extraversion is also positively related to the probability of working in the public sector.

It is interesting to note, for example, that the coefficient of *MET* is positive and statistically significant in the fixed-effects logit model for the MZ sample but not the DZ sample. This indicates that some of the genetic factors are negatively correlated with exercising, such as risk-loving behavior (e.g., Anderson and Mellor, 2008), which may lead to a downward bias in the DZ estimates. The reverse is true for the *Divorced* estimate. Because risk preferences are at least partly genetically inherited (e.g., Cesarini *et al*., 2099), they are better differenced out in the fixed-effects logit model for MZ twins.

Table 3 presents the estimated effects of workers' characteristics on the yearly transition probabilities of entering into public sector employment. The vectors of explanatory variables are the same as in the cross-sectional probability model, augmented with earnings level and tenure. Again, column (1) gives the standard logit regression estimates for the entire sample, while columns (2) and (3) give the fixed-effects logit regression estimates for the DZ and MZ twin samples, respectively. In all models, the coefficients of the polynomial terms of the duration in the current employer state are jointly significant.

Many of the predictor estimates of demographic variables in column (1) are statistically significant, reasserting that the associations between educational attainment, age, gender and parenting are important in explaining the probability of entering into the public sector. These findings are comparable to the cross-sectional probability model presented in Table 2, column (1). The similarities in the estimates suggest that the effects of entry probabilities explain the significant effects on the probability of being a public sector employee. In line with the hypothesis, transitions from the private sector to the public sector increase at lower wage levels.

Again, the preferred estimates are those from the fixed-effects logit specification for MZ twins, which fully accounts for both the shared family and genetic factors. The results in column (3) show that the probability of entering into the public sector is higher for more educated individuals and individuals whose field of study is teaching, health or social work. The entry probability is lower for individuals whose field of study is technology, forestry, agriculture or services. Accordingly, the entry probability is lower for divorced individuals and higher for parents. This finding is consistent with the expectations and previous results (e.g., Jovanovic and Lokshin, 2004). Home ownership is a determinant of creating a family (together with parenting and marital status), which indicates why the predictor obtains a positive and significant coefficient.

Turning to the effects of earnings level, we observe that the rates of quitting the private sector to enter the public sector decrease at higher wage levels. This is hardly surprising, given that more skilled workers are typically compensated with higher rewards in the private sector (e.g., Cai and Liu, 2011). The coefficients of lagged earnings are highly negative and statistically significant in the fixed-effects logit model for the MZ sample but not the DZ sample (Table 3, Column 2). This suggests that some of the genetic factor, such as ability, is positively correlated with earnings, which may lead to upward bias in the DZ estimates.

The estimates regarding personality traits show that the entry probability is higher for more extroverted individuals. The effect of Neuroticism is found to be statistically insignificant. Finally, it is surprising that long-term health problems *decrease* the entry probability, although the effect was positive in the cross-sectional probability model.

5. Discussion

The results of this study are rather consistent with the earlier literature and proposed hypotheses. Both the probability of being a public sector worker and the entry probability are higher for women and for older individuals. The results from the preferred models for the MZ twin samples accordingly provide five interesting findings. First, as hypothesized, both the probability of being a public sector employee and the probability of entering into public sector employment depend on educational attainment, i.e., occupational preferences. In particular, the highly educated and those whose field of study is teaching, healthcare or social work are more likely to enter public sector employment. This finding reflects the fact that the public sector needs qualified employees to accomplish the required tasks and that many occupations are mainly found in this sector, such as educational and healthcare occupations.

Second, private sector workers seem to place more value on extrinsic reward motivators, such as wage. In line with the hypothesis, the rates of quitting the private sector to enter the public sector decreased at higher wage levels. This finding is hardly surprising because more qualified employees typically earn more in the private sector. Third, 'starting a family' is an important factor in explaining the decision to *enter* into public sector employment. This result is in line with the works of DeLeire and Levy (2004) and Grazie and Sloane (2008), who found that especially parents are more likely to make occupational choices that sort them into safer jobs. In the context of public and private sector jobs, this career choice is quite logical, as the balance between family and working life has traditionally been better organized in the public sector. The unemployment risk is also more prevalent in the private sector.

Fourth, personality characteristics are important in determining who chooses public and who chooses private sector employment. In particular, the probability of entering into public sector employment is higher for extroverted individuals. This is not an entirely surprising finding given that many professions in the public sector involve a high level of social interactions. Neuroticism is also positively related to public sector employment, but this association is not explained by the effect of entry probability. One possible explanation for this discrepancy is reverse causality between neuroticism and public sector work. In other words, working in the public sector might be the cause of neuroticism. Because many typical

public sector occupations – teachers, caregivers and police and prison officers – have previously been identified as highly stressful occupations (e.g., Kahn, 1993; Johnson *et al*., 2005), the explanation of reverse causality seems reasonable. Experiencing stressful life events might further affect individuals' stability and neuroticism scores (e.g., Riese *et al*., 2013).

Fifth, the results show that health behavior characteristics contribute to public sector employment decision in different ways. The results from the probability model show that workers who have chronic health problems are more likely to be employed in the public sector, as expected. These health problems, however, do not increase the probability of entering into public sector employment; rather, they decrease it. The tentative conclusion is that public sector jobs are more likely to make workers sick or injured. According to the Bureau of Labor Statistics (2014), the riskiest occupations, based on the injuries and illnesses reports, are nursing, caregiving, and safety activities.

6. Conclusions

This paper used twin data linked to register-based individual information to examine workers' sorting into public sector employment. Its contribution to the previous literature is that it analyzed the data of public and private sector employees from three encompassing dimensions, namely, between groups (using a rich data set on different worker characteristics), within groups (using within-twin variation to examine workers' sorting among genetically equivalent employees), and over time (applying an entry probability model).

This study has many strengths. The study used twin data to fully control for unobserved shared family and genetic factors. The results showed that many of the observed associations (or lack of associations) between individuals' characteristics and the decision to work in the public sector were generated by these unobserved factors. The analysis does not conclusively rule out non-causal explanations for the associations between different worker characteristics and the decision to work in the public sector. I can, however, conclude that, for example, the positive associations between starting a

family, extraversion and higher education and public sector employment are not driven by unobserved shared environmental and genetic factors.

The results also made clear that it is important to study entry probability instead of solely comparing public sector workers with private sector workers. For instance, the positive associations between neuroticism and health problems and public sector work are more likely explained by reverse causality. Such conclusions cannot be revealed by a simple group comparison. The study accordingly has many implications, some of which are mentioned here. For instance, the results showed that among otherwise genetically equivalent employees, those who are more skilled as a result of education are more likely to enter the public sector. Additional findings showed that private sector workers seem to place more value on wage motivators compared to public sector workers. This states that the public sector's ability to hire both high-skilled and devoted employees is satisfactory in Finland. Second, the finding that family structure affects public sector employment decisions may explain why more risk-averse individuals are more likely to enter public sector employment. Third, the findings are important for the public sector work environment. With regard to personality characteristics, the results showed that extraversion aids entry into public sector jobs. This information might be helpful for individuals who need to increase their awareness about public sector employment as an occupational choice. Different training programs such as personality tests would help individuals learn about their own personality in relation to the qualifications needed to begin and secure a job in the public sector, such as a job in nursing or teaching.

Endnotes

[1] Bellante and Link (1981) used a proxy variable for risk aversion that was created based on answers to questions involving the use of seat belts, condition and insurance of car owners, medical coverage and smoking and drinking habits. Hartog *et al*. (2002) used the Arrow-Pratt measure of risk aversion that was formulated using expected utility theory on the basis of individuals' reservation price for a lottery ticket with a specified probability of winning a prize of particular magnitude.

[2] Unionism is unlikely to be an important factor in characterizing workers' sector choice in Finland, where the labor markets are heavily unionized in both sectors. According to recent OECD statistics, the total union density rate was 70 per cent in Finland in 2011.

[3] The data at hand do not report region of work residence for public sector workplaces. This would be a clear shortcoming if the relative supply of public sector jobs varies across different regions. In Finland, however, the fraction of public sector employees from the entire employed work force is typically ~ 30-40 % across all NUTS 3 (Nomenclature of Territorial Units for Statistics) regions; thus, public sector jobs are spread across a wide geographic region.

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Tables

Table 1. Mean characteristics by employer state

	Full sample	Public	Private
Individual characteristics			
Female	0.61	0.81	0.47 ***
Education	12.5	13.4	11.9 ***
Age	48.9	49.2	48.8 ***
Married	0.68	0.68	0.69
Divorced	0.16	0.16	0.16
Children	0.45	0.47	0.44 **
Home	0.86	0.86	0.87
Field of study			
General	0.28	0.16	0.36 ***
Teaching	0.03	0.07	0.002 ***
Humanistic & arts	0.03	0.05	0.008 ***
Business & social sciences	0.19	0.19	0.19
Natural sciences	0.01	0.02	0.02
Technology	0.21	0.07	0.31 ***
Forestry & agriculture	0.02	0.02	0.02
Health & social work	0.14	0.31	0.02 ***
Services	0.09	0.11	0.07 ***
Earnings			
Wage20	0.29	0.23	0.32 ***
Wage40	0.27	0.30	0.26 ***
Wage60	0.18	0.19	0.17 *
Wage80	0.14	0.15	0.14 ***
Wage100	0.12	0.13	0.11 **
Health behavior			
MET	3.14	3.08	3.19
BMI	23.7	23.4	23.9 ***
Smoking (pack years)	5.5	3.6	6.7 ***
Alcohol use (in grams per week)	61.1	47.3	70.4 ***
Diseases	0.65	0.71	0.60 ***

Table 1 (Cont.) Mean characteristics by employer state

	Full sample	Public	Private
Job satisfaction			
Weak atmosphere	0.19	0.22	0.18 ***
Flexibility	0.49	0.51	0.48 **
Positive experience	0.41	0.44	0.38 ***
Personality characteristics			
Neuroticism	0.0	-0.02	0.02
Extraversion	0.0	0.06	-0.04 ***
Person-years	44,250	17,892	26,358

Notes: Standard errors are robust for the within individual correlation. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ for t-test of equal means.

Table 2. Logit and FE logit estimates from sector-choice functions

	Public sector employment		
	Logit All twins (1)	FE logit Within DZ twins (2)	FE logit Within MZ twins (3)
Individual characteristics			
Female	1.097 (.112) ***		
Education	0.155 (.026) ***	0.245 (.071) ***	0.310 (.102) ***
Age	0.020 (.047)		
$Age^2/100$	0.0002 (.0005)		
Married	0.084 (.096)	-0.229 (.208)	0.089 (.270)
Divorced	-0.067 (.119)	-0.253 (.251)	-0.688 (.330) **
Children	0.224 (.066) ***	0.386 (.139) ***	0.011 (.215)
Home	-0.222 (.109) **	-0.477 (.199) **	-0.187 (.242)
Field of study			
Teaching	3.420 (.534) ***	2.395 (.979) **	2.835 (1.116) **
Humanistic & arts	1.460 (.333) ***	0.366 (.555)	0.804 (.873)
Business & social sciences	-0.081 (.163)	-0.722 (.336) **	-0.681 (.591)
Natural sciences	-0.321 (.365)	-1.224 (.729) *	-1.826 (.977) *
Technology	-1.069 (.174) ***	-1.890 (.390) ***	-1.273 (.545) **
Forestry & agriculture	-0.003 (.278)	-1.055 (.554) *	-0.803 (.901)
Health & social work	2.637 (.207) ***	1.711 (.442) ***	1.884 (.587) ***
Services	0.626 (.162) ***	-0.306 (.351)	0.069 (.571)
Health behavior			
MET	-0.003 (.015)	-0.004 (.028)	0.105 (.043) **
BMI	0.019 (.012)	-0.007 (.028)	0.127 (.055) **
Smoking	-0.009 (.005) *	0.011 (.012)	-0.014 (.024)
Alcohol use	-0.001 (.001)	0.000 (.001)	-0.002 (.002)
Diseases	0.152 (.059) ***	0.018 (.096)	0.123 (.072) *
Job satisfaction			
Weak atmosphere	0.159 (.107)	0.100 (.233)	-0.368 (.311)
Flexibility	0.260 (.090) ***	0.140 (.213)	1.024 (.282) ***
Positive experience	0.127 (.085)	0.110 (.184)	0.271 (.245)

Table 2. (Cont.) Logit and FE logit estimates from sector-choice functions

	Logit All twins (1)	FE logit Within MZ twins (2)	FE logit Within MZ twins (3)
Personality			
Neuroticism	0.004 (.047)	-0.005 (.108)	0.356 (.165) **
Extraversion	0.045 (.044)	-0.016 (.106)	0.364 (.170) **
Year dummies	Yes		
Family endowments controlled	No	Yes	Yes
Genetic endowments controlled	No	No	Yes
Pseudo R2	0.30	0.30	0.30
Log likelihood	-20970.4	-2215.2	-1267.3
Person-years	44,250	9,094	5,206

Notes: Standard errors are robust for the within-twin pair correlation. The gender, age, cohort and year dummies are dropped in columns (2) and (3) due to a lack of within-twin pair variation in these variables. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 3. Logit and FE logit estimates from sector-transition functions

	Logit All twins (1)	FE logit Within DZ twins (2)	FE logit Within MZ twins (3)
Individual characteristics			
Female	1.068 (.148) ***		
Education	0.243 (.039) ***	0.513 (.283) *	3.090 (1.142) ***
Age	-0.195 (.104) *		
$Age^2/100$	0.002 (.001) **		
Married	0.042 (.131)	-0.730 (.796)	-0.086 (1.344)
Divorced	-0.028 (.158)	-0.297 (.600)	-6.632 (2.987) **
Children	0.329 (.120) ***	-0.909 (.596)	3.204 (1.575) **
Home	-0.215 (.138)	-0.421 (.681)	8.001 (3.792) **
Field of study			
Teaching	1.730 (.519) ***	-0.031 (1.863)	25.173 (7.470) ***
Humanistic & arts	0.273 (.391)	14.542 (2.966) ***	10.295 (8.384)
Business & social sciences	-0.514 (.223) **	-2.490 (1.643)	-6.651 (4.188)
Natural sciences	-0.477 (.443)	-3.468 (2.572)	-4.187 (4.353)
Technology	-1.068 (.244) ***	-1.845 (1.515)	-6.725 (3.953) *
Forestry & agriculture	-0.317 (.334)	-2.438 (2.191)	-13.714 (4.631) ***
Health & social work	1.440 (.249) ***	1.244 (1.266)	33.863 (8.178) ***
Services	-0.502 (.226) **	0.585 (1.230)	-13.652 (5.214) ***
Health behavior			
MET	0.015 (.016)	-0.140 (.071) **	-0.345 (.293)
BMI	0.018 (.017)	0.025 (.048)	0.756 (.203)
Smoking	0.002 (.007)	0.039 (.030)	0.226 (.145)
Alcohol use	-0.001 (.001)	0.002 (.003)	0.016 (.014)
Diseases	0.024 (.073)	-0.385 (.404)	-4.515 (1.535) ***
Job satisfaction			
Weak atmosphere	0.029 (.132)	-0.696 (.576)	-5.854 (3.854)
Flexibility	0.155 (.117)	0.745 (.566)	1.746 (1.533)
Positive experience	0.100 (.113)	-1.197 (.628) *	0.011 (2.516)

Table 3. (Cont.) Logit and FE logit estimates from sector-transition functions

	Public sector employment		Entry to public sector
	Logit All twins (1)	FE logit Within MZ twins (2)	FE logit Within MZ twins (3)
Personality			
Neuroticism	0.064 (.059)	0.197 (.351)	1.548 (1.360)
Extraversion	0.051 (.059)	0.511 (.336)	3.255 (1.452) **
Earnings			
Lag_Wage20	0.439 (.187) **	1.409 (.874)	-3.084 (1.781) *
Lag_Wage40	0.243 (.178)	0.518 (.999)	-3.713 (2.454)
Lag_Wage80	-0.178 (.228)	-0.131 (1.116)	-7.464 (2.829) ***
Lag_Wage100	-0.283 (.228)	0.427 (1.168)	-11.560 (5.789) **
Year dummies	Yes		
Tenure	Yes	Yes	Yes
Family endowments controlled	No	Yes	Yes
Genetic endowments controlled	No	No	Yes
Pseudo R2	0.30	0.66	0.78
Log likelihood	-1857.1	-37.7	-15.1
Person-years	25,882	316	200

Notes: Standard errors are robust for the within-twin pair correlation. The gender, age, and year dummies are dropped in columns (2) and (3) due to a lack of within-twin pair variation in these variables. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.