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Wioletta Grzenda

MODELLING THE OPINIONS OF POLES ABOUT KEY ASPECTS OF PROFESSIONAL WORK USING A NESTED LOGIT MODEL

Abstract

Objective: The objective of this paper is to examine the opinions of Poles about what they think is important in their professional work.
Research Design & Methods: The paper analyzes the preferences of Poles regarding occupational hygiene factors and motivating factors using Generations and Gender Survey data for Poland. Due to the frequent connections between the possible alternatives of choice, the use of the nested logit model to model the preferences of respondents was proposed in this study.
Findings: This study presents the factors that are important for Poles in their professional work depending on their socio-economic and demographic characteristics. For women, compared to men, options related to occupational hygiene and stable employment were less important than other motivating factors. However, for younger people, compared to people from the last age group, options related to occupational hygiene were also important.
Implications/Recommendations: In the research on the opinions and preferences of respondents, a common approach is to perform a comparative analysis using descriptive statistics or standard logistic regression models. The use of standard multinomial logit models may lead to erroneous conclusions, because in discrete choice problems the available options are rarely unrelated. In such cases, the suggested solution is to use nested logit models.
Contribution: The paper reveals the features of groups of respondents for whom good pay is not necessarily the most important factor in professional work, and so-called higher needs are also important.

Wioletta Grzenda, SGH Warsaw School of Economics, Collegium of Economic Analysis, Institute of Statistics and Demography, Niepodległości 162, 02-554 Warsaw, Poland, e-mail: wgrzend@sgh.waw.pl, ORCID: https://orcid.org/0000-0002-2226-4563.

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JEL Classification: J28, J81.

1. Introduction

In recent years, a drop in the unemployment rate has been observed in Poland. According to Eurostat data (Eurostat 2019), the unemployment rate in 2014 was 9%, and in 2018 only 3.9%. This may be one of the consequences of the aging of Polish society and the decline in labour supply. The decline in the number of people of working age brings with it many challenges for the labour market in Poland nowadays. The situation of employers is changing, and in order to recruit valuable employees, they must create appropriate working conditions for them. Because people with appropriate qualifications generally have no problems with finding a job, they increasingly look for jobs that best suit their individual preferences. Proper recognition of these preferences can benefit both employers and employees. In the case of employers, this is not only limited to recruiting and retaining valuable employees, but can also can have a large impact on employee productivity. In this paper we present the results of an analysis of the preferences of Poles regarding what they think is important in their professional work. The modelling was performed using data from the Generations and Gender Survey (GGS).

There are many theoretical concepts in which factors influencing satisfaction with work are considered (Zalewska 2003, Borowska-Pietrzak 2014). The main one and the basis of many later ones is Herzberg's two-factor theory, also known as Herzberg's motivation-hygiene theory (Herzberg, Mausner & Snyderman 1959). In this article, in the context of Herzberg's theory, an analysis of Poles' preferences regarding what they think is important in their professional work is conducted.

According to Herzberg's theory, two groups of factors can be distinguished in the work environment: factors related to occupational hygiene and motivating factors (or "motivators"). Hygiene factors refer to so-called lower needs, including, among others, working conditions, pay, non-payroll benefits, organization of working time, work safety, and organization of the enterprise. These factors do not affect job satisfaction, but their absence causes dissatisfaction with work. Motivating factors relate to higher needs, including the possibility of professional development, work prestige, recognition for achievements, and responsibility for activities undertaken. The division of factors defined in Herzberg's motivation-hygiene

theory (Herzberg, Mausner & Snyderman 1959) was used in this study to map individual factors to the nests of the model. Moreover, in the remainder of the study, the division of factors into hygiene and motivating factors as defined in the Herzberg's theory is used. Ensuring that these factors remain at an appropriate level affects the employees' satisfaction with their work. According to Herzberg, employers should first eliminate dissatisfaction from work and then focus their attention on creating conditions conducive to job satisfaction. The research problem addressed in this study is an assessment of the importance of occupational hygiene factors and motivating factors for Poles, depending on their socio-economic and demographic characteristics.

The chances that a given person will find a job depend primarily on their hard and soft skills as well as the ways in which they look for a job (Socha & Sztanderska 2002), whereas the decision to take up employment in a given organization depends on their individual preferences as well as on their family and economic situation. According to Marschak (1960), each economic entity making a choice proceeds in a rational manner in order to maximize the usefulness of the decisions made (*Mikroekonometria*… 2012).

Discrete choice models are commonly used to model consumer preferences (Anderson, De Palma & Thisse 1992). In their basic form, these models have certain limitations because they can be used to describe choices between options that are mutually exclusive and unrelated to each other. This assumption in research on respondents' preferences is often not met. Therefor, the use of the nested logit model (McFadden 1978, Maddala 1983) is proposed in this paper. The estimation of this model using the classical method based on the maximizing likelihood function can be problematic due to the difficulties associated with finding the global maximum. In this paper, to model the opinions of respondents, the nested logit model in the Bayesian approach for unordered categories is proposed.

2. The Nested Logit Model

In socio-economic studies, models for qualitative variables are very popular (Cramer 2003, Marzec 2008, Allison 2009, *Mikroekonometria*… 2012). These models are also referred to as discrete choice models. If a dependent variable takes more than two values, multinomial models are considered. The multinomial logit model (MNL) considered in this paper also belongs to this class of models. It is obtained by assuming an appropriate probability distribution for random components in the utility function.

Let the i-th unit $(i=1,\ldots,n)$ have to select one of J unordered categories. In the multinomial logit model, random components $\varepsilon_{ij}\,(j=1,\ldots,J)$ are independent and have the same Gumbel distribution (the type I extreme--value distribution). Moreover, the unobserved stochastic parts of the utility are uncorrelated for all alternatives and have the same variance (McFadden 1974). Then the probability of observing the choice by the i-th unit $(i=1,\ldots,n)$ of the j-th category $(j=1,\ldots,J)$ is given by the formula:

$$p_{ij}=\frac{\exp(\mathbf{x}_{ij}'\boldsymbol{\beta})}{\sum_{k=1}^{J}\exp(\mathbf{x}_{ik}'\boldsymbol{\beta})},\quad i=1,\ldots,n,\ j=1,\ldots,J, \tag{1}$$

where $\mathbf{x}$ denotes the vector of explanatory variables and $\boldsymbol{\beta}$ is the vector of parameters.

These models are used to describe choices between mutually exclusive and unrelated categories (*Mikroekonometria…* 2012). According to the assumptions given in McFadden (1974), in order to use the multinomial logit model, the analyzed categories must fulfill the assumption of independence from irrelevant alternatives (IIA). In practice, this assumption is often not met, because once we eliminate one of the available options, the probability ratio of choosing any two other categories often also changes. Then the solution can be to use the nested logit model (Train 2009).

The nested logit model has a hierarchical structure. The set of all possible alternatives is divided into so-called nests (subsets) so that the assumption of independence from irrelevant alternatives (IIA) is met in each nest, while the ratio of the probability of choosing any two alternatives in different nests is not independent of the existence of other alternatives in these two nests, i.e. the assumption of IIA does not have to be fulfilled between the nests. Therefore, in the nested logit model all the random components $\varepsilon_{ij}\,(j=1,\ldots,J)$ do not have to be independent. Moreover, instead of Gumbel's distribution, generalized extreme-value distribution (GEV) is assumed for them.
Let

$$U_{ij}=\mathbf{x}_{ij}'\boldsymbol{\beta}+\varepsilon_{ij},\quad i=1,\ldots,n,\ j=1,\ldots,J \tag{2}$$

denote the utility function. Let K denote the number of disjoint subsets (nests) $S_1,S_2,\ldots,S_K$, on which, as described above, the alternatives are divided. Then the cumulative distribution for the vector of random components $\boldsymbol{\varepsilon}_i=(\varepsilon_{i1},\varepsilon_{i2},\ldots,\varepsilon_{iJ})$, is given by the formula:

$$F(\boldsymbol{\varepsilon}_i)=\exp\left(-\sum_{k=1}^{K}\left(\sum_{j\in S_k}\exp\left(-\frac{\varepsilon_{ij}}{\lambda_k}\right)\right)^{\lambda_k}\right). \tag{3}$$

In the given nest, random components ε_{ij} $(j=1,\ldots,J)$ are correlated with each other. The parameter λ_k is a function of the correlation coefficient between possible alternatives in the k-th nest and is used to measure the correlation between the alternatives in a given nest. Value 1 for the parameter λ_k means no correlation in the k-th nest, so if the value of this parameter for all nests is 1, then the nested logit model can be replaced with a standard logit model.

With these assumptions, the probability of observing the choice by the i-th unit $(i=1,\ldots,n)$ of the category $j \in S_k$ is given by the formula:

$$P(y_{ij}=1)=\frac{\exp\left(\frac{\mathbf{x}'_{ij}\boldsymbol{\beta}}{\lambda_k}\right)\left(\sum\limits_{m\in S_k}\exp\left(\frac{\mathbf{x}'_{im}\boldsymbol{\beta}}{\lambda_k}\right)\right)^{\lambda_k-1}}{\sum\limits_{l=1}^{K}\left(\sum\limits_{m\in S_l}\exp\left(\frac{\mathbf{x}'_{im}\boldsymbol{\beta}}{\lambda_l}\right)\right)^{\lambda_l}}. \tag{4}$$

Then the likelihood function for the model under consideration is:

$$p\left(\mathbf{y}\,|\,\boldsymbol{\beta},\boldsymbol{\lambda}\right)=\prod_{i=1}^{N}\prod_{j=1}^{J}(P(y_{ij}=1))^{y_{ij}}, \tag{5}$$

where $\boldsymbol{\lambda}=(\lambda_1,\ldots,\lambda_K)$. If for all k we have $0\leq\lambda_k\leq 1$, then the model is consistent with the principle of utility maximization for all possible values of explanatory variables, whereas when $\lambda_k>1$, it is only consistent for some values of these variables. The negative values of λ_k indicate that the obtained results are inconsistent with this principle (*Mikroekonometria*… 2012).

In this paper, the Bayesian approach has been used to estimate the parameters of the nested logit model (Lahiri & Gao 2002, Rossi, Allenby & McCulloch 2005). The Bayesian estimation requires selecting the prior distributions for the vector of parameters $\boldsymbol{\beta}$ and the vector of parameters $\boldsymbol{\lambda}$. In the case of the vector of parameters $\boldsymbol{\beta}$, depending on the prior information, flat prior distributions or normal prior distributions are most often selected. The overview of prior distributions for the vector of parameters $\boldsymbol{\lambda}$ can be found in the Lahiri and Gao (2002). In the present work, the following prior distribution was used:

$$p(\lambda)=\begin{cases}a\lambda^{a-1}\exp(-\lambda^a) & \text{for } \lambda>0,\\ 0 & \text{for } \lambda\leqslant 0.\end{cases} \tag{6}$$

For the nested logit model, the formula for posterior distribution can be written as follows:

$$p\left(\boldsymbol{\beta},\boldsymbol{\lambda}\,|\,\mathbf{y}\right)\propto p\left(\mathbf{y}\,|\,\boldsymbol{\beta},\boldsymbol{\lambda}\right)p(\boldsymbol{\beta})p(\boldsymbol{\lambda}). \tag{7}$$

In this paper, the Markov Chain Monte Carlo (MCMC) method, in particular the Metropolis algorithm (Gelman *et al*. 2000) and the Gamerman algorithm (Gamerman 1997), were used to determine marginal posterior distributions.

3. Scope of the Research

The study used a data set derived from the Generations and Gender Survey panel survey for Poland conducted as a part of the Generations and Gender Programme (GGP 2019). The data comes from the second half of 2014. The GGS survey is conducted on a random sample of respondents aged 18–79. Taking into account recent changes in the retirement age in Poland, in this study it was decided to extract from the entire data set those people who were between 18 and 65 years of age at the time of the research. In this way, a sample consisting of 9,805 observations was obtained. The endogenous variable was created on the basis of the answers given by the respondents to the following question: What in your opinion is important at work?

In response to this question, the respondents had to indicate what they believed to be the most important feature from the following set of possible answers:

1. Good pay.
2. Little stress (tension).
3. Stable employment.
4. Work generally respected by people.
5. Appropriate working hours.
6. Possibilities to show initiative.
7. Many days off from work.
8. Work that gives you the feeling that you can achieve something.
9. Responsible work.
10. Interesting work.
11. Work according to skills.

Based on a preliminary analysis of the responses, it was found that 51.98% of people indicated "good pay" and 23.24% chose "stable employment". None of the other nine alternatives were indicated by more than 8% of the respondents. On the basis of the theoretical foundations of the subject presented in the introduction, the categories: "good pay", "appropriate working hours" and "many days off from work" were combined into one. Then, for the purposes of modelling, a dependent variable was created in such a way that the value 1 was assigned to those three categories,

Table 1. A Set of Potential Explanatory Variables

Variable	Description of the variable	Names and labels of levels	Percent
sex	sex	0 = woman 1 = man	58.06 41.94
age_group	age group	1 = from 18 to 34 years old 2 = from 35 to 49 years old 3 = from 50 to 65 years old	31.61 29.07 39.32
klm	place of residence during the survey	1 = city of 100,000 residents and more 2 = city under 100,000 residents 3 = rural areas	40.41 18.70 40.89
education	level of education	1 = higher 2 = post-secondary and professional secondary 3 = general secondary 4 = basic vocational 5 = primary	15.50 30.11 11.19 27.16 16.04
financial_situat	current financial situation of the household in the respondent's opinion	1 = good 2 = average 3 = poor or no response	13.29 59.46 27.25

Source: author's own calculations based on GGS data (2014).

2 was assigned to "stable employment" responses, and 3 to the other seven possible variants. The study analyzed what variables affected the thus--defined endogenous variable and how. A set of potential exogenous variables describing selected socio-economic and demographic characteristics of the respondents is presented in Table 1.

4. The Model Estimation

Among the possible answers to the question "What in your opinion is important at work?", factors related to occupational hygiene and motivating factors can be distinguished. The first group includes the categories "good pay", "appropriate working hours", and "many days off from work", while the second group includes the remaining categories. In the second group of factors, the answer "stable employment", which was indicated by as much as 23.24% of respondents, was particularly frequent. Therefore, the right research tool for modelling the three-level dependent variable defined in

section 3 is the nested multinomial logit model. The model with two nests was selected. Factors related to occupational hygiene were placed in one nest (variant 1) and motivating factors were placed in the second nest. The latter divided the responses to the "stable employment" option (option 2) and others (option 3).

Taking into account large sample size, all considered models were estimated using the non-informative prior distributions. In each model, the normal non-informative prior distributions with the mean 0 and the variance 100 were used to estimate the $\boldsymbol{\beta}$ parameter vector. The formula for the prior distribution for the lambda parameter is presented in Formula 6. To minimize the impact of initial values on posterior estimation, it was assumed that the number of burn-in iterations would be 500, and 20,000 chain states were accepted for the posterior reasoning. For sampling, the Metropolis algorithm or the Gamerman algorithm were used, depending on the model considered. Moreover, Figures 1 to 3 show the posterior density of parameters for the nested logit model, for the standard logit model, and for the nested logit model with sex variable, respectively.

First, the nested logit model and the standard logit model were estimated in order to compare their usefulness in modelling the studied phenomenon. The obtained results for the nested logit model are presented in Table 2, and for the standard logit model in Table 3. Evaluation of convergence of the Markov chains was made using the Geweke test. Based on the results obtained for both models, at the significance level of $\alpha = 0.05$, the null hypothesis that the obtained chains for the considered parameters of these models are convergent cannot be rejected (Table 2 and 3).

Then, for these two models, the values of the deviance information criterion (DIC) were compared (Congdon 2006). A slightly lower value of this statistic was obtained for the nested logit model, which means that this model fits better to empirical data than the standard logit model. In addition, the posterior expected value obtained for the lambda parameter was investigated. This parameter is used to measure the correlation between possible alternatives in the given nest. Under the assumed initial assumptions for the considered models, this parameter is only one, because the first nest is degenerated and consists of only one option. It was found that the lambda value is less than 1, hence the nested logit model is a better model for analyzing the preferences of the respondents compared to the standard logit model, because it takes into account the correlation between possible alternatives in the second nest. Therefore, the results obtained for this

model were interpreted. Also, the more complex nested logit models were estimated including the selected characteristics of the surveyed respondents.

Based on the results presented in Table 2, it may be concluded that if from the set of possible options all motivating factors apart from the "stable employment" factor were removed, then for the surveyed respondents the factors of work hygiene such as "good pay", "appropriate working hours" and "many days off from work" (option 1) would be more important, while option 2, including "stable employment", would lose importance, in both cases compared to option 3.

Table 2. Statistics of the Posterior Samples and Geweke Convergence Diagnostics for the Nested Logit Model

Parameter	Posterior expected values	Posterior standard deviation	Highest probability density interval ($\alpha = 0.05$)		Geweke diagnostics	
					z	*p*-value
Option 1	0.7329	0.2686	0.2068	1.2655	1.4982	0.1341
Option 2	–0.0172	0.0313	–0.0808	0.0478	–0.2343	0.8148
Lambda	0.8957	0.3900	0.1381	1.6706	1.4006	0.1613

Source: author's own calculations based on GGS data (2014).

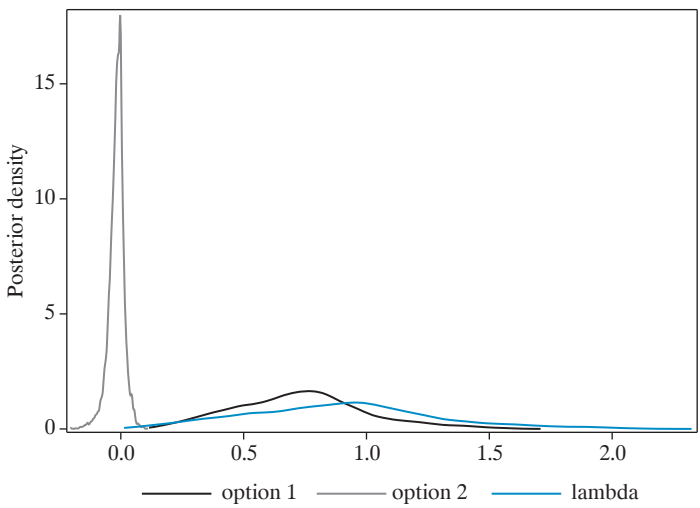

Fig. 1. The Posterior Density of the Parameters of the Nested Logit Model

Source: author's own calculations based on GGS data (2014).

Table 3. Statistics of the Posterior Samples and Geweke Convergence Diagnostics for the Standard Logit Model

Parameter	Posterior expected values	Posterior standard deviation	Highest probability density interval ($\alpha = 0.05$)		Geweke diagnostics	
					z	p-value
Option 1	0.8039	0.0250	0.7559	0.8530	–1.9512	0.0510
Option 2	–0.0211	0.0296	–0.0800	0.0356	–1.2450	0.2131

Source: author's own calculations based on GGS data (2014).

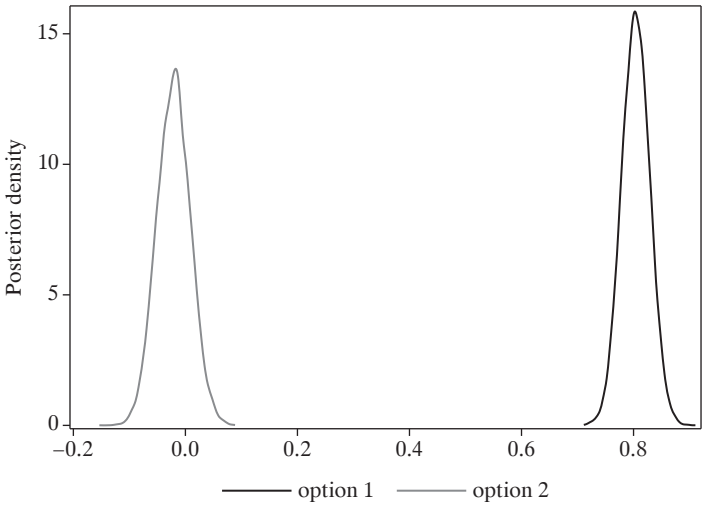

Fig. 2. The Posterior Density of the Parameters of the Standard Logit Model
Source: author's own calculations based on GGS data (2014).

In the next stage of the research, the opinion of Poles about key aspects of their professional work were analyzed, depending on their socio--economic and demographic characteristics. This required the construction of models with interactions between the studied features and the considered alternatives. The introduction of interaction was necessary because for a given respondent for each possible option the values of considered variables are the same. These models were estimated using the same initial assumptions as in the first model. Before interpreting the results, the convergence of the generated Markov chains was evaluated using the Geweke test. Based on the obtained results, it was found that with the significance level $\alpha = 0.01$, the null hypothesis that the obtained chains for the considered parameters of these models are convergent cannot be rejected (Tables 4 to 8).

First, a variable describing the sex of the respondent was included in the model. The obtained results are presented in Table 4. It was found that when all factors other than the "stable employment" option were eliminated from the set of possible motivating factors, in the case of women, compared to men, both alternative 1, i.e. occupational hygiene factors such as "good pay", "appropriate working hours" and "many days off from work", and, albeit to a lesser extent, alternative 2, i.e. "stable employment", were less preferred.

Table 4. Statistics of the Posterior Samples and Geweke Convergence Diagnostics for the Nested Logit Model with the *sex* Variable

Parameter	Posterior expected values	Posterior standard deviation	Highest probability density interval ($\alpha = 0.05$)		Geweke diagnostics	
					z	*p*-value
Option 1	1.0317	0.2875	0.4786	1.5931	0.2633	0.7924
Option 2	–0.00748	0.0585	–0.1292	0.1042	–0.7051	0.4807
Option 1 * sex0	–0.2741	0.0575	–0.3904	–0.1666	0.4325	0.6654
Option 2 * sex0	–0.0238	0.0755	–0.1739	0.1247	0.5072	0.6120
Lambda	1.0985	0.4125	0.3470	1.9381	0.4295	0.6676

Source: author's own calculations based on GGS data (2014).

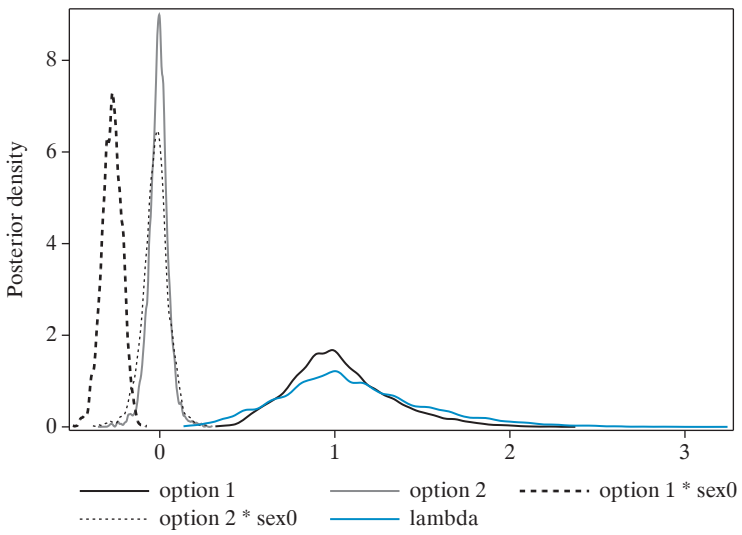

Fig. 3. The Posterior Density of the Parameters of the Nested Logit Model with the *sex* Variable

Source: author's own calculations based on GGS data (2014).

For the variable describing the age group of the respondents, when option 3 was eliminated from the group of motivating factors, it was found that the youngest persons (from 18 to 34 years old) were more likely to choose option 1, i.e. factors related to work hygiene such as "good pay", "appropriate working hours" and "many days off from work", while option 2 – "stable employment" – suited them less compared to people aged 50 to 65 (Table 5). On the other hand, people aged from 35 to 49, as compared to the oldest ones, had in both cases a higher probability of choosing both the first and second alternatives compared to the third option. This probability was the highest for the first alternative i.e. occupational hygiene factors.

Table 5. Statistics of the Posterior Samples and Geweke Convergence Diagnostics for the Nested Logit Model with the *age_group* Variable

Parameter	Posterior expected values	Posterior standard deviation	Highest probability density interval ($\alpha = 0.05$)		Geweke diagnostics	
					z	*p*-value
Option 1	0.8677	0.3091	0.3173	1.5067	–1.6330	0.1025
Option 2	0.0240	0.0567	–0.0895	0.1373	–2.3833	0.0172
Option 1 * age_group1	0.0259	0.0806	–0.1493	0.1668	1.9839	0.0473
Option 1 * age_group2	0.2450	0.0752	0.1067	0.4023	0.4909	0.6235
Option 2 * age_group1	–0.3199	0.1461	–0.5945	–0.0467	1.8361	0.0663
Option 2 * age_group2	0.1652	0.1079	–0.0125	0.3957	0.6799	0.4966
Lambda	1.2032	0.4377	0.4366	2.1153	–1.4891	0.1365

Source: author's own calculations based on GGS data (2014).

Considering the model with a variable describing the place of residence during the survey (Table 6), it was found that respondents living in cities both above and below 100,000 residents (level 1 and 2) were less willing to choose both options 1 and 2 compared to option 3, in both cases compared to the residents of rural areas. At the same time, this inclination was lower in the case of the persons living in the cities below 100,000 residents.

The variable describing the respondents' level of education was included in the model as a binary variable, where a value of zero meant having a lower education than a higher education. It was found that people with

a lower education compared to people with a higher education had a higher probability of choosing both options 1 and 2 as compared to option 3 (Table 7). At the same time, these people were more likely to choose the factors related to work hygiene: "good pay", "appropriate working hours" and "many days off from work", than the "stable employment" alternative.

Table 6. Statistics of the Posterior Samples and Geweke Convergence Diagnostics for the Nested Logit Model with the *klm* Variable

Parameter	Posterior expected values	Posterior standard deviation	Highest probability density interval ($\alpha = 0.05$)		Geweke diagnostics	
					z	*p*-value
Option 1	1.1873	0.3246	0.6041	1.8460	0.7916	0.4286
Option 2	0.1330	0.0788	0.00931	0.2971	0.1111	0.9115
Option 1 * klm1	–0.2823	0.0711	–0.4284	–0.1533	–1.2216	0.2218
Option 1 * klm2	–0.6559	0.1129	–0.8665	–0.4388	–0.1389	0.8895
Option 2 * klm1	–0.1330	0.1007	–0.3497	0.0353	–0.8915	0.3726
Option 2 * klm2	–0.4735	0.2011	–0.8859	–0.1271	1.0679	0.2856
Lambda	1.1973	0.4248	0.4393	2.0617	0.6845	0.4937

Source: author's own calculations based on GGS data (2014).

Table 7. Statistics of the Posterior Samples and Geweke Convergence Diagnostics for the Nested Logit Model with the *education* Variable

Parameter	Posterior expected values	Posterior standard deviation	Highest probability density interval ($\alpha = 0.05$)		Geweke diagnostics	
					z	*p*-value
Option 1	0.1765	0.2486	–0.2742	0.6761	–0.2561	0.7979
Option 2	–0.3297	0.1575	–0.6501	–0.0723	0.5863	0.5577
Option 1 * education0	0.8303	0.1044	0.6502	1.0545	–0.6052	0.5451
Option 2 * education0	0.3831	0.1795	0.0979	0.7600	–0.7285	0.4663
Lambda	1.0937	0.4405	0.2771	1.9700	–0.2695	0.7875

Source: author's own calculations based on GGS data (2014).

The last of the variables considered was a variable describing the current financial situation of the household in the respondent's opinion (Table 8). Respondents who assessed the financial situation of their household as good compared to people who assessed the financial situation of their

Table 8. Statistics of the Posterior Samples and Geweke Convergence Diagnostics for the Nested Logit Model with the *financial_situat* Variable

Parameter	Posterior expected values	Posterior standard deviation	Highest probability density interval ($\alpha = 0.05$)		Geweke diagnostics	
					z	*p*-value
Option 1	1.4140	0.3520	0.7862	2.1353	2.3417	0.0192
Option 2	0.2534	0.1157	0.0545	0.4909	1.4187	0.1560
Option 1 * financial_situat1	–1.1227	0.1667	–1.4575	–0.8045	–2.3809	0.0173
Option 1 * financial_situat2	–0.4711	0.0770	–0.6226	–0.3294	–0.9936	0.3204
Option 2 * financial_situat1	–0.8966	0.3333	–1.5976	–0.3211	–2.3732	0.0176
Option 2 * financial_situat2	–0.2238	0.1180	–0.4546	–0.0134	–1.1124	0.2660
Lambda	1.2331	0.4393	0.4801	2.2030	2.3562	0.0185

Source: author's own calculations based on GGS data (2014).

household as poor or did not answer this question had the lowest probability of choosing a variant including factors related to work hygiene – "good pay", "appropriate working hours" and "many days off from work" – compared to motivating factors, except for the "stable employment" option. In addition, people who assessed the situation of their household as good compared to those who rated it as poor preferred option 2 – "stable employment" – as compared to option 3. Among those assessing the situation of their household as average compared to people assessing the situation of their household as poor, a slightly lower tendency to choose both options 1 and 2 was observed, in both cases compared to option 3. To sum up, it is worth emphasizing that some of the results should be treated in a suggestive way, because not in all the cases considered were the posterior expected values significantly different from 0.

5. Summary and Conclusions

This work presents a model approach to the analysis of the preferences of Poles about key aspects of professional work. One of the most popular methods in modelling economic activity, including employment and unemployment, is the logit model (Baranowski *et al*. 2016, Kubiak 2017, Śliwicki 2013). In this paper, discreet selection models have been used

to analyze the occupational hygiene factors and the motivating factors. Attention was paid to the possibilities and limitations of these models, which are commonly used to model consumer preferences (*Mikroekonometria*… 2012). Due to the frequent connections between the possible alternatives of choice, the use of nested logit model to model the preferences of respondents was proposed in this study.

It was found that once motivating factors such as "little stress (tensions)", "work generally respected by people", "possibility of showing initiative", "work that gives you the feeling that you can achieve something", "responsible work", "interesting work", and "work according to skills" are eliminated, for the surveyed respondents an important role is played by factors related to work hygiene, such as: "good pay", "appropriate working hours" and "many days off from work", but the option "stable employment" becomes less important. In addition, it was shown that the decisions of respondents differed depending on their socio-economic and demographic characteristics.

For women, compared to men, both options related to occupational hygiene and "stable employment" were less important than the other motivating factors. However, for younger people (from 18 to 34 years old and from 35 to 49 years old), in comparison to people from the last age group (from 50 to 65 years old), options related to occupational hygiene were also important. Moreover, for young people (from 18 to 34 years old) employment stability did not matter much. Persons without higher education, compared to people with higher education, paid greater attention both to factors related to occupational hygiene such as "good pay", "appropriate working hours" and "many days off from work" and to the motivating factor "stable employment". For the respondents assessing the financial situation of their household as good or average, as compared to those assessing the financial situation of their household as poor and those who did not provide information, both options related to occupational hygiene and the "stable employment" option were of less importance compared to other motivating factors. Similar results were obtained for city residents, both of cities above and below 100,000 residents, compared to residents of rural areas. Summing up, this paper identifies groups of respondents for whom good pay is not necessarily the most important factor in professional work, and so-called higher needs are also important.

The relatively good situation on the labour market means that employers have more and more problems in finding and retaining well-qualified employees. There is a large turnover of employees with high qualifications,

and the departure of such employees often entails large costs for the company (Grzenda & Buczyński 2015). This study presents those factors that are important for Poles in their professional work depending on their socio-economic and demographic characteristics. The results of the study can contribute to the solutions that companies should implement if they want to acquire valuable employees and keep them as long as is necessary in their organizations. Providing employees with appropriate working conditions can also affect the results they achieve, increase work efficiency, and thus contribute to the growth of an organization's profits.

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