Wage Disparity and Inter-Occupation Specifics in Managing Czech Households' Portfolios: What is the position of agricultural workers?

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Anotace

Článek se zabývá analýzou mzdové disparity a meziprofesních rozdílů v řízení portfolií českých domácností. Výsledky jsou založeny na Heckmanově selekčním modelu a doplněny analýzou mzdové disparity. Výsledky ukazují, že mezi skupinou dělnických povolání (vč. zaměstnanců v zemědělství) a povolání střední úrovně nelze identifikovat žádné signifikantní rozdíly. Důvodem je vysoká heterogenita skupiny dělnických povolání a identifikovaná mzdová disparita mezi povoláními, resp. sektory. Zaměstnanci v zemědělství spadají do skupiny s podprůměrným příjmem a jsou charakterizováni nízkou pravděpodobností využití produktů dlouhodobého spoření, úvěrů a mají nižší platby na produkty krátkodobého spoření. Skupina zaměstnanců v zemědělství a zemědělských domácností je rovněž vysoce heterogenní. Mzdová disparity v zemědělském sektoru je významná i mezi jednotlivými regiony.

Klíčová slova

Příjmová disparita, profesní specifika, volba portfolia, Heckmanův selekční model.

Abstract

Wage disparity that exists between genders, sectors, and geographical regions, can influence household portfolio management. This study examines the impact of wage disparity and inter-occupation differences on Czech household portfolios. The model of portfolio choice was estimated using the Heckman selection model complemented by wage disparity analysis. Results show no significant differences in financial portfolios between blue-collar workers, including farm households and employees in agricultural sector, and white-collar workers. There was high heterogeneity within the group of blue-collar workers, and wage disparity among employment sectors. Employees in the agricultural sector were categorised as having a below average salary and characterised by a lower probability of utilising long-term saving products, loans and making a smaller contribution to short term saving products. Agricultural workers and farm household were a highly heterogeneous group. Finally a significant regional wage disparity in the Czech agriculture sector was observed.

Key words

Wage disparity, Occupation specifics, Portfolio choice, Heckman selection model.

JEL: C25, D14, G11, Q12

Introduction

Wage disparity is a worldwide problem that can be found between genders (e.g. Borland (1999), Blau and Kahn (2001), Arulanpalam, Booth and Bryan (2007)), sectors and regions (e.g. Lucifora, Meurs (2006), occupations (e.g. Weeden (2002)), skilled and unskilled workers (e.g. Abdel-Rahman (2002)). Wage disparity has different consequences – economical, social, psychological etc. (e.g. Hakim (1998)). Income gap between farm households and workers in other sectors of economy is presented as one of the reasons for agricultural support. In this paper we aim at the wage disparity among sectors and regions. In particular, we focus on the position of employees in agriculture with respect to other sectors. Moreover, we link the wage disparity problem of the Czech agricultural sector with how household portfolios are managed. In other words, we show how the wage disparity and

inter-occupation differences affect the households' portfolio choice.

We will elaborate three key questions in this paper. The first question concerns the specifics of portfolio choice considering occupation and gross wage. The second question deals with the wage disparity and inter-occupation differences as factors shaping household portfolio choice. The last question concerns the situation of agricultural workers in different regions and the specifics of agricultural sector as a whole.

The next section describes the data, introduces theoretical framework and outlines the econometric procedure for analysis of consumer decision-making process, followed by section 3, which presents the results. The final section is a discussion of conclusions.

Data and Methods

1. Data

Data from 2007 was collected from OVB Allfinanz, a company which specializes in providing financial services to consumers. The data consists of information about financial products that clients used before receiving a financial consultancy service from OVB. The data also includes details regarding age, gender, wage, occupation and household composition. In total the data set contains information from 629 Czech household portfolios. Table 1 provides a summary of the data.

Financial products are grouped into four aggregate variables based on their function in the consumer portfolio: long term savings, short term savings, insurance and loans (LS, SS, IN, LO). Each financial product is represented by a binary variable and the amount of payment to that product is represented by a continuous variable. The average values of product binary variables show the ratio of consumers in the sample who have the particular financial product. The average of product continuous variables express the average payment on financial products conditional on its positive holding i.e. this is the average payment by only those consumers who have the product. Demographic and social-economic characteristics are represented by categorical variables. Their averages show the frequency of given demographic and social-economic categories within the sample. Finally a tax incentive variable provides information on the tax savings when tax-deductible payments (2000 CZK/month) are applied.

2. Theoretical framework

The model describing the decision-making process is derived in the form of a Heckman selection model:

$FP = \alpha + \beta_1 SFP + \beta_2 OFP + \beta_3 payment\ on\ SFP + \beta_4 payment\ on\ OFP + \beta_5 Gender + \beta_6 Age + \beta_7 Household + \beta_8 Occupation + \beta_9 Salary + \beta_{10} Tax\ incentive + e$ (1)

where SFP are substitute financial products (products within the same group) and OFP are the other aggregate groups of financial products i.e. long term savings, short term savings, insurance and loans.

3. Estimation procedure

Heckman's selection model (1979) treats the ownership and share decisions separately while allowing for the possibility that unobserved determinants of the two decisions are correlated. Heckman suggests a two-step procedure. In the first step the selection equation is estimated using all observations. The estimated inverse Mill's ratios $\hat{\lambda}_{i2} = \lambda(\mathbf{x}_{i2}\delta_2)$ are used in the second step to estimate parameters $\hat{\beta}_1$ and $\hat{\gamma}_1$ using OLS method on the selected sample (outcome equation):

$$P\ (y_{i2} = 1|\mathbf{x}_{i2}) = \Phi(\mathbf{x}_{i2}\delta_2) \quad i = 1, 2, \dots, N \quad (2)$$

$$\hat{\lambda}_{i2} = \lambda(\mathbf{x}_{i2}\delta_2) \quad (3)$$

$$E(y_{i1}|\mathbf{x}_{i1}, y_{i2} = 1) = \mathbf{x}_{i1}\beta_1 + \gamma_1\lambda(\mathbf{x}_{i2}\delta_2) \quad i = 1,2,\dots N_1 \quad (4)$$

where y_1 is observed only if Error terms (u_1, v_1) are independently and normally distributed with zero mean and constant variance, σ^2. The correlation between u_1 and u_2 is assumed to be ρ.

Heckman (1979) reported that the presence of selection bias can be viewed as an omitted variable problem within the selected sample. The Heckman two-step estimation procedure provides efficient parameter estimates when the degree of multicollinearity is low (Nawata, 1994).

Since the estimated parameters are difficult to interpret directly their first differences are used. The probability change of holding financial product is a difference between the predicted probabilities for two values of independent variable, ceteris paribus. If the variable is presented only in the outcome equation its parameters provide the information about the monthly change in payment given by the unitary change of independent variable. If the

	Variable	Mean	St. Dev.	Max.
LS	**Long-term savings**	0.548	0.498	1
PF	Pension funds	0.335	0.473	1
WLI	Whole life insurance	0.321	0.467	1
ULI	Unit-linked life insurance	0.095	0.294	1
SS	**Short-term savings**	0.668	0.471	1
BS	Building society	0.51	0.5	1
LI	Life insurance used for short-term savings	0.275	0.447	1
MF	Mutual funds	0.025	0.158	1
IN	**Insurance**	0.7	0.459	1
TLI	Term life insurance	0.051	0.22	1
CAI	Casualty insurance	0.641	0.48	1
CI	Contents insurance	0.083	0.276	1
PI	Property insurance	0.091	0.287	1
LO	**Loans**	0.159	0.366	1
HC	Lending for home purchase	0.102	0.303	1
CC	Consumer credit	0.062	0.241	1
LS payment	**Monthly payment on LS [ths. CZK]**	0.319	0.473	3.265
PF payment	Monthly payment on PF [ths.CZK]	0.101	0.215	1.5
WLI payment	Monthly payment on WLI [ths. CZK]	0.153	0.29	2.008
ULI payment	Monthly payment on ULI [ths. CZK]	0.065	0.262	3
SS payment	Monthly payment on SS [ths. CZK]	0.706	0.879	8.333
BS payment	Monthly payment on BS [ths. CZK]	0.556	0.718	4.5
LI payment	Monthly payment on LI [ths. CZK]	0.101	0.2	1.25
MF payment	Monthly payment on MF [ths.CZK]	0.056	0.503	8.333
IN payment	**Monthly payment on IN [ths. CZK]**	0.156	0.356	4.903
TLI payment	Monthly payment on TLI [ths.CZK]	0.057	0.327	4.7
CAI payment	Monthly payment on CAI [ths.CZK]	0.077	0.099	1.084
CI payment	Monthly payment on CI [ths.CZK]	0.007	0.027	0.244
PI payment	Monthly payment on PI [ths. CZK]	0.016	0.074	1.402
LO payment	**Monthly payment on LO [ths. CZK]**	0.592	1.847	16.587
HC payment	Monthly payment on HC [ths. CZK]	0.411	1.649	16.587
CC payment	Monthly payment on CC [ths. CZK]	0.184	0.856	9.4
Men	Binary variable: 0 – Women, 1 - Men	0.512	0.5	1
Age				
0-19	Consumer in the age of 0-19	0.254	0.436	1
20-29	Consumer in the age of 20-29	0.245	0.43	1
30-39	Consumer in the age of 30-39	0.283	0.451	1
40-49	Consumer in the age of 40-49	0.149	0.357	1
50-64	Consumer in the age of 50-64	0.068	0.253	1
Household				
Single	Single-person household	0.122	0.328	1
Partners	Two-persons household without children	0.089	0.285	1
One child	Household with one child	0.231	0.422	1
Children	Household with two and more children	0.558	0.497	1

Source: OVB Allfinanz and own calculations

Table 1: Descriptive statistics of variables.

	Variable	Mean	St. Dev.	Max.
Occupation				
Blue-collar	Blue-collar workers	0.28	0.449	1
White-collar	White-collar workers	0.118	0.322	1
Public sector	Employees in public sector	0.097	0.296	1
Professional	Professionals	0.079	0.271	1
Self-employed	Self-employed persons	0.037	0.188	1
Benefits	Persons receiving benefits	0.073	0.261	1
Student	Children, students	0.316	0.465	1
Wage				
0-0.5	Gross wage: 0 - 10 478 CZK/m.	0.386	0.487	1
0.5-0.75	Gross wage: 10 479 - 15 717 CZK/m.	0.145	0.352	1
0.75-1	Gross wage: 15 718 - 20 957 CZK/m.	0.186	0.389	1
1-1.5	Gross wage: 20 958 - 31 435 CZK/m.	0.191	0.393	1
1.5 +	Gross wage: 31 435 CZK/m. and more	0.092	0.29	1
Tax incentive	Tax savings for tax-deductible item: 2000 CZK/m. [ths. CZK]	0.269	0.255	1.28

Source: OVB Allfinanz and own calculations

Table 1: Descriptive statistics of variables.

variable appears in both equations (the selection and the outcome equation) the parameter in outcome equation is influenced by its presence in the selection equation. According to Sigelman and Zeng (1999) the marginal effect can be calculated as:

$$\frac{\partial\, E(y_{i1}|x_{i1}, y_{i2} = 1)}{\partial x_k} = \beta - \delta\rho\sigma_v\lambda(\lambda - \delta'x_2) \quad (5)$$

where β is the parameter in the outcome equation and α is the corresponding parameter in the selection equation. ρ is the correlation coefficient between the error terms in the selection and outcome equation, sigma is the error term of the outcome equation and lambda is the inverse mill's ratio.

In the case of categorical variables the calculation of marginal effects is based on Hoffman and Kassouf (2005):

$$\frac{\partial\, E(y_{i1}|x_{i1}, y_{i2} = 1)}{\partial x_k} = \beta - \rho\sigma_v(\lambda_1 - \lambda_0) \quad (6)$$

where λ_1 and λ_2 are the inverse mill's ratios for categorical variable equals one and zero.

The multicollinearity was tested by traditional VIF test (variance inflation factor test) (Green, 2003) and condition number test (Leung and Yu, 2000).

Results and discussion

1. Portfolio choice models

Portfolio choice models (1) were estimated for following aggregate group of products: Long-term savings (LS), Short-term savings (SS), Insurance (IN) and Loans (LO). Furthermore to explore the impact of wage-disparity and inter-occupation specifics on the portfolio choice the individual product specific models were estimated within each aggregate group.

The estimates of aggregate models are presented in Table 2. For easier interpretation the table shows first differences of explanatory variables for participation decision and marginal effects of explanatory variables for decision about monthly payment. In the first step of the Heckman selection model the first differences express the impact of explanatory variable on probability of having particular aggregate group of products in financial portfolio. The first differences were calculated as difference between two values of dependent variable for two values of explanatory variable when other variables remain fixed. The two values of explanatory variable were set as follows: for categorical variables it was zero and one, for variables representing payment on financial product it was zero and value of conditional mean, and for other continuous variables it was zero and value of unconditional mean. For easier interpretation the values were rounded up to hundreds' of CZK. In

the second step of Heckman selection model the marginal effects are calculated conditionally on the positive holding, in other words they show impact of endogenous variables on amount of payment for consumers who have at least one product from the particular aggregate group.

The heteroscedasticity was not directly tested. However, the high conformity of robust errors of the estimate with standard errors of the estimate in the first step of the Heckman procedure suggests that there is no heteroscedasticity problem within the model. Moreover, the VIF test and conditional number test did not detect the high multicolinearity among variables. Finally, the LR test in the first step and the Wald test in the second step of Heckman procedure suggest that all models except

Variable	Long-term savings		Short-term savings		Insurance	Loans	
	Participation	Payment	Participation	Payment	Payment	Participation	Payment
LS	-	-	-17.68 %***	-	-	3.16%	-
			(0.06)			(0.03)	
SS	-16.31 %**	-	-	-	-	-1.40%	-
	(0.07)					(0.03)	
IN	12.14 %**	-	4.50%	-	-	1.08%	-
	(0.06)		(0.05)			(0.02)	
LO	9.33%	-	5.50%	-	-	-	-
	(0.09)		(0.08)				
LS payment	-	-	4.26%	0.108	-0.082	-1.93%	-0.638
			(0.03)	(0.09)	(0.05)	(0.02)	(0.6)
SS payment	0.97%	0.060**	-	-	0.019	-3.65%	-0.799*
	(0.04)	(0.03)			(0.02)	(0.02)	(0.04)
IN payment	-3.20 %**	0.024	-2.15 %*	0.048	-	-0.42%	
							4.517***
	(0.01)	(0.07)	(0.01)	(0.15)		(0.01)	(0.97)
LO payment	-8.02%	-0.027*	-23.16 %***	-0.031	0.026**	-	-
	(0.07)	(0.01)	(0.08)	(0.05)	(0.01)		
Men	-9.44%	0.094	-8.76 %**	0.057	-0.024	3.12%	0.295
	(0.06)	(0.06)	(0.05)	(0.09)	(0.05)	(0.03)	(0.61)
Age							
20-29	-	-	-3.62%	0.429***	0.064	-	-
			(0.08)	(0.14)	(0.07)		
30-39	16.87 %**	0.063	-14.59%	0.736***	0.082	2.67%	-0.31
	(0.07)	(0.08)	(0.1)	(0.02)	(0.08)	(0.03)	(0.67)
40-49	18.58 %**	0.199**	-15.03%	0.747***	0.302***	3.96%	-1.132
	(0.09)	(0.1)	(0.11)	(0.23)	(0.09)	(0.05)	(0.93)
50-64	32.19 %***	0.419***	-6.37%	0.998***	0.098	-5.72 %**	1.762
	(0.1)	(0.11)	(0.12)	(0.23)	(0.1)	(0.03)	(2.61)
Household							
Partners	-4.75%	0.027	10.52%	-0.383**	-0.019	27.72 %***	0.461
	(0.1)	(0.1)	(0.07)	(0.18)	(0.08)	(0.08)	(1.54)
One child	0.58%	-0.155*	-3.83%	-0.429***	-0.056	9.17 %**	0.368
	(0.09)	(0.09)	(0.07)	(0.15)	(0.07)	(0.04)	(1.21)
Children	3.58%	-0.113	-9.14%	-0.626***	-0.039	-0.12%	0.83
	(0.09)	(0.09)	(0.07)	(0.15)	(0.07)	(0.03)	(1.06)

Note: results of t-test provide information about the statistical significance of parameters not their marginal effects; *** $p<0.01$; **$p<0.05$; * $p<0.1$; AUC (LS) = 0.889, AUC (SS) = 0.737, AUC (LO) = 0.854; SE in parenthesis.
Source: own calculations

Table 2: Portfolio choice models – aggregate product groups.

Variable	Long-term savings		Short-term savings		Insurance	Loans	
	Participation	Payment	Participation	Payment	Payment	Participation	Payment
Occupation							
Manual	7.57%	-	-14.44 %**	-	-	-0.45%	-
	(0.06)		(0.07)			(0.05)	
Public sector	-9.60%	-	-7.67%	-	-	0.46%	-
	(0.09)		(0.08)			(0.06)	
Professional	-14.16%	-	-3.43%	-	-	-8.15 %*	-
	(0.1)		(0.09)			(0.05)	
Self-employed	-20.23%	-	7.48%	-	-	-4.23%	-
	(0.14)		(0.1)			(0.07)	
Benefits	3.41%	-	-18.35 %*	-	-	18.84 %*	-
	(0.1)		(0.11)			(0.1)	
Student	-66.05 %***	-	-7.49%	-	-	-10.49 %*	-
	(0.09)		(0.13)			(0.06)	
Wage							
0 - 0.5	2.31%	0.091	-1.60%	0.215	-0.063	-8.39 %*	0.447
	(0.13)	(0.12)	(0.11)	(0.16)	(0.09)	(0.05)	(1.46)
0.5 - 0.75	-23.51 %***	0.009	-6.70%	-0.281*	-0.033	-3.85%	-0.535
	(0.08)	(0.09)	(0.07)	(0.15)	(0.07)	(0.04)	(0.94)
1 - 1.5	5.65%	0.067	-7.65%	0.066	-0.029	5.76 %**	-0.255
	(0.09)	(0.07)	(0.07)	(0.14)	(0.06)	(0.05)	(0.76)
1.5 +	7.29%	0.233**	-14.23%	0.239	0.151	24.27%	0.095
	(0.12)	(0.11)	(0.12)	(0.17)	(0.09)	(0.11)	(1.17)
Tax incentive	4.57%	0.12	2.44%	-	0.177	-2.59%	4.451*
	(0.06)	(0.2)	(0.05)		(0.16)	(0.03)	(2.53)

Note: results of t-test provide information about the statistical significance of parameters not their marginal effects; *** $p < 0.01$;
**$p < 0.05$; * $p < 0.1$; AUC (LS) = 0.889, AUC (SS) = 0.737, AUC (LO) = 0.854; SE in parenthesis.
Source: own calculations

Table 2: Portfolio choice models – aggregate product groups.

of the models of participation in insurance products and mutual funds and models of payment on unit-linked life insurance, property insurance and life insurance used primarily for short-term savings are significant at a 5 % level of significance. Model of life insurance used primarily for short-term savings is significant at a 10 % level of significance. The goodness of fit, measured by the size of the area below the ROC curve (AUC), is high for all models.

The results in Table 2 suggest that only some variables are significant determinants of consumer's decision about the structure of their financial portfolio. These determinants are also product specific which is given by the nature of individual financial products and their function in the portfolio.

The estimated inter-product relationships provide the information about the substitutions or complementarities of financial products. As expected

the mutual significant substitution relationship was estimated between financial group of long-term savings and the group of short-term savings. The probability of utilizing of long-term saving products is lower by 16.31 % if the consumer has short-term saving product(s) in her (his) portfolio and vice versa, the utilizing of long-term saving products decreases the probability of inclusion of short-term saving products into the portfolio by 17.68 %. The mutual complementary relationship was estimated between the group of insurance product and loans. The one-way relationship exists between groups of long-term savings and insurance products, the amount of payments on loans and on long-term savings and between short-term savings and loans. The utilisation of insurance increases the probability of usage of long-term saving products by 12.14 %. The loans determine the payment on long-term savings in negative way.

The estimated relations are consistent with the expected role of financial products in the portfolio. The roles are confirmed by the effects of socio-demographic and economic variables.

Age is an important determinant of consumer's portfolio choice. We estimated that the probability of utilisation of long-term savings goes up with increasing age. Whereas the probability of inclusion of long-term savings into the portfolio is higher by 16.78 % in the group of consumer between 30 and 39 comparing to the group of consumer between 18 and 29, then in the group 40 and 49 the probability is higher by 18.58 % and in the group over 50 it is 32.19 % more than in the group of consumer between 18 and 29. Moreover, the age significantly determines the amount of payment on short-term saving products, the higher the age the higher the payment on short-term saving products. In addition, a significant relationship was estimated for insurance products and the age group between 40 and 49. The payment on insurance in this group is significantly higher comparing to other groups. Finally, the estimates show that the probability of utilisation of loan products drops significantly if the consumer is older than 50.

The household is a significant determinant especially for short-term saving products and loans. We estimated that the households with more members have a higher tendency to use loan products and a lower tendency to include the short-term saving products into their portfolio. It also holds that households consisting only of couples have a high probability to use loan products. These characteristics are consistent with our expectation about the consumer behavior and income constraints of young couples or families with children, respectively.

The estimated inter-occupation differences are pronounced only for some products. According to our expectation students have significantly lower probability of using both long-term saving products and loans. Blue-collar workers (including those from farm households and employees in agricultural sector) and persons who are in receipt of state benefits have a significantly lower probability (by 14.4 %, or 18.35 % respectively) of using short-term saving products. This can be explained by low disposable income within these groups. In addition, the professionals have a lower probability to use loans (by 8.15 %) as opposed to persons receiving state benefits who have higher probability of including loans in their portfolio (by 18.84 %).

Probability of utilisation of long-term saving

products and loans and the amount of payment on short term saving products is lower for consumers with bellow average income. On the other hand, consumers with a higher than average salary have a greater tendency to use loans and pay more on long-term saving products.

Since the inter-occupation and income differences are significant characteristics of Czech household portfolios we provide a more in-depth analysis of each aggregate group.

Table 3 presents the parameter estimates for the group variable occupation and individual financial products. The group of long-term saving products consists of pension funds, whole life insurance and unit-linked life insurance. In particular the significant inter-occupation differences can be found for financial product pension funds. The employees in public service, professionals, self-employed persons as well as students have significantly lower probability of the inclusion of pension funds into their portfolio comparing to the group of white-collar workers. Moreover, the employees in public service, professionals and students have a lower tendency to use consumer credit. In addition, students have a lower probability of borrowing for home purchase. In the case of insurance products, the significant difference can be found for casualty insurance and contents insurance. The self-employed persons have significantly higher probability (by 25.56 % higher) to use casualty insurance comparing to white-collar workers. On the other hand, persons receiving state benefits have a lower probability to use contents insurance. Whereas the estimated high probability for self-employed persons can be explained by the risk aversion against a potential drop in income in the case of casualty occurrence, then the lower probability for persons taken benefits is due to the income constraints.

The interesting feature of the estimates is that the group of blue-collar workers (including farm households and employees in agricultural sector) does not distinguish significantly from the white-collar workers or does not have any special characteristics in the sample, respectively. The reason can be found in the high heterogeneity of this group, which includes high variability of income (see the discussion in the section 3.2). That is, the analysis becomes more relevant if we connect the occupation with the information about the average income in individual occupation.

Table 4 provides the parameter estimates for the group variable income and individual financial

	Long-term saving products					
Variable	Pension funds		Whole life insurance		Unit-linked life insurance	
	Participation		Participation		Participation	
	ME	SE	ME	SE	ME	SE
Occupation						
Manual	10.90%	0.08	5.70%	0.08	4.49%	0.04
Public sector	-17.39 %**	0.09	-7.74%	0.1	-3.52%	0.04
Professional	-21.94 %**	0.09	4.30%	0.11	4.85%	0.06
Self-employed	-25.90 %**	0.1	-7.86%	0.14	8.07%	0.09
Benefits	8.06%	0.12	-14.33%	0.12	4.83%	0.08
Student	-39.99 %***	0.08	-38.43 %***	0.09	-5.16%	0.04

	Short-term saving products				Loans			
Variable	Building society		Life insurance - SS		Home purchase		Consumer credit	
	Participation		Participation		Participation		Participation	
	ME	SE	ME	SE	ME	SE	ME	SE
Occupation								
Manual	-11.80%	0.08	-9.09%	0.07	-2.35%	0.05	0.17%	0.02
Public sector	-0.58%	0.09	2.28%	0.09	3.20%	0.06	-2.59 %*	0.02
Professional	-0.54%	0.1	0.90%	0.1	-6.09%	0.05	-2.68 %*	0.02
Self-employed	15.74%	0.12	17.78%	0.15	-4.15%	0.06	-2.30%	0.02
Benefits	-16.03%	0.11	3.38%	0.12	5.84%	0.09	9.02 %*	0.07
Student	-6.73%	0.15	1.82%	0.14	-9.19 %**	0.05	-	-

	Insurance products							
Variable	Term life insurance		Casualty insurance		Property insurance		Contents insurance	
	Participation		Participation		Participation		Participation	
	ME	SE	ME	SE	ME	SE	ME	SE
Occupation								
Manual	0.83%	0.03	4.57%	0.08	-2.33%	0.02	0.08%	0.02
Public sector	0.32%	0.03	14.93%	0.09	-2.67%	0.02	3.61%	0.04
Professional	1.05%	0.04	10.18%	0.1	-1.24%	0.02	5.66%	0.05
Self-employed	4.80%	0.07	25.56 %**	0.12	-1.76%	0.02	-0.80%	0.04
Benefits	6.88%	0.07	6.40%	0.12	-2.53 %*	0.02	-0.92%	0.04
Student	-1.82%	0.03	21.49%	0.14	-	-	-	-

Note: results of t-test provide information about the statistical significance of parameters not their marginal effects.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Source: own calculations

Table 3: Portfolio choice models – inter-occupation differences among financial products.

products. As expected the results show that the probability of the product inclusion is higher for consumers with the income higher than the average income and vice versa.

The probability of investing in a pension funds is 8% lower for consumers with below average gross wage (10,479 - 15,717 CZK) and by 15 %, resp. 21%, higher for consumers above average gross wage in comparison to the consumer with average wage. In addition, the consumers with gross wage higher than 31,435 CZK have on average by 140 CZK higher contributions to their pension funds than consumers with an average wage. In contrast to the pension funds the participation decision in two other tax incentivised long-term savings products, whole life insurance and unit-linked life insurance, is not so strongly related to the income. However the income has a positive impact on the amount of payment on the whole life insurance when the consumers in the highest income category pay on their life insurance on average income by 261 CZK more. Income also has a positive impact on the amount of short-term savings on building

Variable	Long-term savings									
	Pension funds				Whole life insurance				Unit-linked life insurance	
	Participation		Payment		Participation		Payment		Participation	
	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE
Wage										
0 - 0.5	1.17%	0.08	0.047	0.08	15.97%	0.11	0.03	0.09	-6.57%	0.05
0.5 - 0.75	-8.07 %*	0.05	0.005	0.06	-3.39%	0.06	0.04	0.07	-6.62 %*	0.04
1 - 1.5	15.22 %***	0.06	0.006	0.05	1.72%	0.06	0.004	0.06	-1.86%	0.04
1.5 +	20.94 %**	0.11	0.140*	0.07	-6.40%	0.07	0.261***	0.09	-0.02%	0.07

Variable	Short-term savings							
	Building society				Life insurance - SS			
	Participation		Payment		Participation		Payment	
	ME	SE	ME	SE	ME	SE	ME	SE
Wage								
0 - 0.5	-8.73%	0.12	0.281	0.19	-5.98%	0.12	-0.008	0.12
0.5 - 0.75	-1.44%	0.08	-0.116	0.13	-5.97%	0.08	-0.063	0.09
1 - 1.5	-9.02%	0.07	0.306**	0.13	0.33%	0.07	0.075	0.09
1.5 +	-7.66%	0.12	0.213	0.18	-8.61%	0.10	0.064	0.13

Variable	Insurance products									
	Term life insurance				Casualty insurance				Property insurance	
	Participation		Payment		Participation		Payment		Participation	
	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE
Wage										
0 - 0.5	0.76%	0.03	-1.000**	0.44	-1.41%	0.12	-0.039	0.03	-	-
0.5 - 0.75	-1.20%	0.02	-0.345	0.42	6.79%	0.07	0.005	0.02	1.79%	0.02
1 - 1.5	0.33%	0.02	-1.046**	0.42	6.85%	0.07	0.014	0.02	0.38%	0.01
1.5 +	1.05%	0.04	0.016	0.41	-0.54%	0.11	0.000	0.03	-0.49%	0.01

Variable	Insurance products				Loans							
	Contents insurance				Home purchase				Consumer credit			
	Participation		Payment		Participation		Payment		Participation		Payment	
	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE	ME	SE
Wage												
0 - 0.5	-	-	-0.024	0.04	-2.57%	0.03	0.481	1.97	-	-	-	-
0.5 - 0.75	-0.29%	0.02	0.006	0.02	-1.87%	0.03	0.772	1.51	0.97%	0.02	-0.797	1.01
1 - 1.5	-2.21%	0.02	-0.003	0.02	2.48%	0.03	-1 522	1.20	2.82%	0.02	0.72	0.80
1.5 +	-1.40%	0.03	0.044*	0.02	30.45 %***	0.14	-1 691	2.03	3.41%	0.05	1 647	1.28

Note: results of t-test provide information about the statistical significance of parameters not their marginal effects.   *** p<0.01; ** p<0.05; * p<0.1

Source: own calculations

Table 4: Portfolio choice models – wage differences.

society accounts. The consumers with above average income save on average by 306 CZK more than the consumers with average income. Similarly to the long-term saving products the decision in participation in life insurance used for short-term savings does not change with the income.

In relation to the loan products the consumers have a higher probability of having loan for home purchase (by 30%). As showed in table 2 there is a complementary relationship between mortgage and the term life insurance as the term life insurance is often required for opening the mortgage. That is

why the average payment on term-life insurance is lower for consumers with income below 10,479 CZK and for consumers with income between 20,958 CZK and 31,435 CZK as this income group has a lower participation in home related loan in the sample.

2. Wage disparity problem

Table 5 provides the information on the average salaries in sectors of Czech Economy. These figures together with tables 6 and 7 can be used to deduce the wage disparity problem in Czech Economy. The wage disparity problem is approached from the sector and regional point of view. Moreover, we will predominantly concentrate on the position of agricultural sector.

The lowest salaries are in the sector Accommodation

and food services activities industry with the ratio to the average salary around 52 % between 2005 and 2011. As opposite, the highest level of salaries was reached in Financial and insurance activities with about 86 % over the average salary. The salaries in agricultural sector are significantly below the average salary with the ratio 71 % within 2005 and 2011. That is, the average salary in agricultural sector belongs to the group below average income with the consequences identified in previous section.

The average salary increased from 19,729 CZK in 2005 to 25,912 CZK in 2011. The variation coefficient rose as well which indicates that the salary differences among the sectors went up. As far as the agricultural sector is concerned we may conclude that the growth of salaries in agricultural

Economic Activity	2005	2006	2007	2008	2009	2010	2011
Agriculture, forestry and fishing	13 961	14 838	16 194	17 765	17 644	18 399	18 630
Mining and quarrying	17 837	18 977	20 311	22 118	22 625	23 473	24 242
Manufacturing	22 679	24 047	25 714	29 271	28 312	30 118	31 289
Electricity, gas, steam and air conditioning supply	17 362	18 490	19 852	21 564	21 968	22 828	23 621
Water supply; Sewerage, waste management and remediation activities	26 594	29 179	31 157	35 420	39 436	39 604	40 598
Industry, Total	17 703	18 749	19 750	21 461	22 049	22 729	23 081
Construction	16 808	17 885	19 036	20 948	22 022	22 352	22 636
Wholesale and retail trade; Repair of motor vehicles and motorcycles	17 058	18 238	19 821	21 341	21 358	21 683	22 480
Transportation and storage	18 188	19 262	20 663	22 369	23 000	23 090	23 352
Accommodation and food services activities	10 637	11 676	12 380	12 474	12 330	12 632	12 856
Information and communication	33 423	35 814	38 167	41 800	43 083	43 461	44 639
Financial and insurance activities	37 296	40 020	42 351	45 655	46 124	46 356	47 425
Real estate activities	17 879	19 263	20 718	20 808	20 715	20 885	21 880
Professional, scientific and technical activities	23 486	24 678	26 925	30 244	31 789	31 017	30 702
Administrative and support service activities	13 516	14 478	15 254	15 521	15 927	16 031	16 368
Public administration and defence; Compulsory social security	22 244	23 292	25 040	26 209	27 045	26 958	26 349
Education	18 787	20 040	21 251	22 119	23 429	23 030	23 718
Human health and social work activities	17 609	19 043	20 169	21 177	23 032	24 338	24 941
Arts, entertainment and recreation	16 071	16 827	17 908	18 797	19 434	19 881	19 829
Other service activities	15 450	16 497	17 612	17 990	18 340	18 568	19 594
Descriptive statistics							
Minimum	10 637	11 676	12 380	12 474	12 330	12 632	12 856
Maximum	37 296	40 020	42 351	45 655	46 124	46 356	47 425
Average	19 729	21 065	22 514	24 253	24 983	25 372	25 912
Standard Deviation	6 484	6 977	7 408	8 429	8 854	8 806	9 003

Note: full time equivalent

Source: Czech Statistical Office (http://www.czso.cz/csu/csu.nsf/engi/tab_2_pmz/$File/pmzcr030912_2.xls) and own calculations

Table 5: Average gross monthly wage in Czech Economy (in CZK).

sector kept the pace with the economy.

Table 6 shows the average salaries for the main occupation groups and their distribution. The group of blue-collar workers can be defined as: Service and sales workers, Skilled agricultural, forestry and fishery workers, Craft and related trades workers and Plant and machine operators, and assemblers. Within the group of blue-collar workers there are

significant differences in salaries. Both the average and median are significantly lower in the group of Service and sales workers and Skilled agricultural, forestry and fishery workers comparing to the groups of Craft and related trades workers and Plant and machine operators, and assemblers. The average salary in the group of Service and sales workers was 16,123 CZK in 2011 which is 37% below the total average salary. Similarly the

Occupation		Average earnings	Earnings (in CZK) in main quantiles				
			1st decile	1st quartile	Median	3rd quartile	9th decile
Total		25 645	11 506	15 825	21 826	29 418	40 326
CZ-ISCO major groups	Armed forces occupations	26 216	16 135	19 074	24 536	30 127	38 382
	Managers	55 158	19 159	26 835	39 846	60 214	102 025
	Professionals	36 372	20 243	24 829	30 355	40 832	58 198
	Technicians and associate professionals	28 364	15 662	20 453	25 638	32 955	42 612
	Clerical support workers	22 131	12 092	16 137	20 483	26 240	32 969
	Service and sales workers	16 123	9 058	10 952	14 505	18 766	25 247
	Skilled agricultural, forestry and fishery workers	17 174	11 183	13 656	16 535	20 268	23 618
	Craft and related trades workers	21 023	11 840	15 561	20 035	25 320	31 094
	Plant and machine operators, and assemblers	20 651	12 114	15 576	19 923	24 580	30 038
	Elementary occupations	14 590	8 850	10 908	13 577	17 254	21 413

Source: Czech Statistical Office (http://vdb.czso.cz/vdbvo/tabdetail.jsp?kapitola_id=15&potvrd=Zobrazit+tabulku&go_zobraz=1&cislotab=PRA0021UU&voa=tabulka&cas_1_29=2011&str=tabdetail.jsp)

Table 6: The distribution of average salaries (2011).

Region	Average earnings	Blue-collar workers			
		Clerical support workers	Service and sales workers	Skilled agricultural, forestry and fishery workers	Craft and related trades workers
Total	25 645	16 123	17 174	21 023	20 651
Prague, the Capital City	33 546	18 302	19 750	23 459	22 290
Central Bohemian Region	25 651	15 808	17 839	23 029	22 292
South Bohemian Region	23 199	15 095	19 985	20 072	20 411
Plzeň Region	24 036	16 153	19 439	21 921	20 344
Karlovy Vary Region	21 723	16 632	16 490	20 214	19 421
Ústí nad Labem Region	23 174	14 586	15 641	20 689	21 571
Liberec Region	23 422	15 762	15 725	21 501	20 146
Hradec Králové Region	22 837	15 759	15 553	20 068	20 185
Pardubice Region	22 978	15 561	19 438	19 914	19 217
Vysočina Region	22 918	15 377	18 891	20 175	19 062
South Moravian Region	24 651	15 120	16 190	20 584	19 840
Olomouc Region	22 825	15 837	19 471	20 587	20 050
Zlín Region	22 655	15 245	17 293	20 665	20 241
Moravian-Silesian Region	24 174	15 244	16 465	21 985	22 104

Source: Czech Statistical Office (http://vdb.czso.cz/vdbvo/tabparam.jsp?voa=tabulka&cislotab=PRA0041PU_KR&&kapitola_id=15)

Table 7: Regional wage disparity – Blue-collar workers – 2011 (CZK).

average salary in the group of Skilled agricultural, forestry and fishery workers was 33 % below the total average salary. In contrast the average salary in groups of Craft and related trades workers and Plant and machine operators, and assemblers was about 18% below the average. This implies that the Service and sales workers and Skilled agricultural, forestry and fishery workers belong to the group with bellow average income and the groups of Craft and related trades workers and Plant and machine operators, and assemblers are in the group of average salary (as defined in the previous section).

In addition to the significant wage disparity among sectors there can be also regional wage disparity. Table 7 provides the average salaries within the main regions in the Czech Republic (NUTS3) and their distribution across the group of blue-collar workers. The figures show that there is significant regional wage disparity in the group of Skilled agricultural, forestry and fishery workers.

Conclusion

The results show that a mutual significant substitution relationship exists between long-term saving and short-term saving products. The mutual complementary relationship was estimated between insurance and loan products. The one-way relationship exists between long-term saving and insurance products, between the amounts of payments on loans and on long-term saving products and between the products of short-term saving and loans. Moreover, the presence of loans in the financial portfolio decreases the payments on long-term saving products.

The socio-demographic and economic variables provided important information about managing households' portfolios. The probability of utilisation of long-term products goes up with increasing age. Moreover, the age significantly determines the amount of payment on short-term saving products, the higher the age the higher the payment on short-term saving products. The payment on insurance products is significantly higher in the age group between 40 and 49 comparing to other groups. Finally, the estimates show that the probability of utilisation of loan products drops significantly if the consumer is older than 50 years.

The household is a significant determinant especially for short-term saving products and loans. The households with more members have a higher tendency to use loan products and a lower tendency to include the short-term saving products. Moreover, households consisting only of couples have a high probability to use loan products.

We did not find significant differences between the group of blue-collar workers (including farm households and employees in agricultural sector) and the group of white-collar workers. The reason is the high heterogeneity of the group of blue-collar worker and the identified wage disparity among sectors. That is, the inter-occupation differences as a factor determining the portfolio choice must be considered together with the level of income. Since employees in agricultural sector fit in the group of below average salary they are characterized by the lower probability of utilisation of long-term saving products and loans and they have lower payments on short term saving products.

Moreover, as far as the group of agricultural workers and farm households are concerned we have to be aware of the high heterogeneity within this group. In addition to the high variability of average salaries in agricultural sector we identified significant regional wage disparity in Czech agriculture sector. Finally, the portfolio choice can be determined by agricultural specifics which were not possible to include in the model, e.g. natural income, seasonality, specifics of farm households budget.

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References

[1]   Abdel-Rahman, H. M. Does the Structure of an Urban System Affect Income Disparities?. Journal of Regional Science. 2002, vol.42, pages 389–409.

[2]   Arulampalam, W., Booth, A. L.; Bryan, M. L. Is There a Glass Ceiling over Europe? Exploring the Gender Pay Gap across the Wage Distribution. Industrial and Labor Relations Review. 2007, vol.60(2), pages 163-186.

[3]   Blau, F. D.; Kahn, L. M. Understanding International Differences in the Gender Pay Gap. Journal of Labor Economics. 2003, vol.21(1), pages 106-144.

[4]   Borland, J. The Equal Pay Case – Thirty Years On. Australian Economic Review. 1999, vol. 32(3), pages 265-72.

[5]   Hakim, C. Social Change and Innovation in the Labour Market: Evidence from the Census SARs on Occupational Segregation and Labour Mobility, Part-Time Work and Students' Jobs, Homework and Self-Employment. Oxford:Oxford University Press, 1998. 318 p. ISBN: 0-98-29381-X.

[6]   Heckman, J. J. Sample Selection Bias as a Specification Error. Econometrica. 1979, vol. 47(1), pages 153-161.

[7]   Hoffmann, R., Kassouf, A. L. Deriving conditional and unconditional marginal effects in log earnings equations estimated by Heckman's procedure. Applied Economics. 2005, vol. 37(11), pages 1303-1311.

[8]   Green, W. H. Econometric Analysis. 5. vydání. New Persey: Pearson Prentice Hall, 2003. 1178 p. ISBN 0-13-066189-9.

[9]   Leung, S., Yu, S. Collinearity and Two-Step Estimation of Sample Selection Models: Problems, Origings, and Remedies. Computational Economics. 2000, vol. 15, pages 173-199.

[10]   Lucifora, C., Meurs, D. The Public Sector Pay Gap In France, Great Britain and Italy. Review of Income and Wealth. 2007, vol.52(1), pages 43-59.

[11]   Nawata, K. Estimation of sample selection bias models by the maximum likelihood estimator and Heckman. Economics Letters. 1994, vol. 41(1), pages 33-40.

[12]   Siegelman, L., Zeng, L. Analyzing Censored and Sample-Selected Data with Tobit and Heckit Models. Political Analysis. 1999, vol. 8(2), pages 167-182.

[13]   Weeden, K. A. Why Do Some Occupations Pay More than Others? Social Closure and Earnings Inequality in the United States. American Journal of Sociology. 2002, vol. 108(1), pages 55-101.