MODELING THE RETIREMENT DECISION IN UKRAINE

by

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A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Arts in Economics

National University "Kyiv-Mohyla Academy"
Economics Education and Research Consortium
Master's Program in Economics

2006

Approved by _____
Mr. Serhiy Korablin (Head of the State Examination Committee)

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Program Authorized
to Offer Degree Master's Program in Economics, NaUKMA

Date _____

National University "Kyiv-Mohyla Academy"

Abstract

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This paper investigates the factors influencing retirement decisions in Ukraine. The research is based on data from Ukrainian Longitudinal Monitoring Survey (ULMS) for 2003 and 2004. The sample includes individuals, who made their retirement decisions between 2003 and 2004. The paper is based on an empirical model that allows investigating the influence of wage, retirement benefits, job satisfaction, working tenure, health status, and socio-demographic factors on retirement decision. The estimation is based on binomial logit model. The results of the research conducted generally go in line with the relevant literature. However, there are some differences in the results coming from peculiarities of economical and social conditions in Ukraine as a transition economy. One of the main findings of the paper is that wage and job satisfaction have a negative influence on the probability of retirement. Another finding is that health status, level of education and marital status does not influence a retirement decision of Ukrainian elder workers.

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ACKNOWLEDGMENTS

The author wishes to express his sincere gratitude to his advisor Dr. Serguei Maliar for his guidance and invaluable comments. The author wants to thank EERC research workshop faculty, and especially Dr. Tom Coupé, Volodymyr Vakhitov and Tatiana Zabotina for their useful comments. The author is also thankful to Olga Kupets for help and useful comments concerning the data for this research.

GLOSSARY

ULMS 2003	–	Ukrainian Longitudinal Monitoring Survey held in 2003
ULMS 2004	–	Ukrainian Longitudinal Monitoring Survey held in 2004
PFU	–	Pension Fund of Ukraine
SSA	–	Social Security administration of US

Chapter 1

INTRODUCTION

Pension reform is now a crucial question for Ukraine. There are several reasons for providing a pension reform. First, it is necessary to improve pensioners' welfare by increasing retirement payments. Second, a share of pensioners in the population of Ukraine increased from 23.6% in 1986 to 30.1% in 2001, but the share of working people in the population is slowly decreasing and in 2003 it was equal to 45%[1]. The problem is, that growing share of pensioners together with increase in amount of state retirement benefits expand the tax burden on working people and worsens a financial balance of State Pension Fund. On the one hand, greater tax burden on working people is necessary for increasing the amount of pension, but, on the other hand, it leads to higher share of hidden economy.

One possible way to improve financial stability of State Pension Fund and at the same time to increase pensioners' welfare is to create incentives for pensioners to retire later. By this, elder workers could have an opportunity to keep sufficient level of income and at the same time increase the amount of future pension by paying taxes for a longer time.

There is an evidence that Ukrainian elder workers are already willing (or have) to prolong their working tenures. Employment statistics for Ukraine shows that 60% of people at age 50-59 and 19.7% at age 60-70 are working. Furthermore, 14.3% of all working people in Ukraine are allowed to receive a pension because they are either elder than retirement age (elder than 55 for

[1] State Statistics Committee

females and 62 for males) or have a disability status[2]. Thus, the aim of this research is to investigate the incentives that make people continue working.

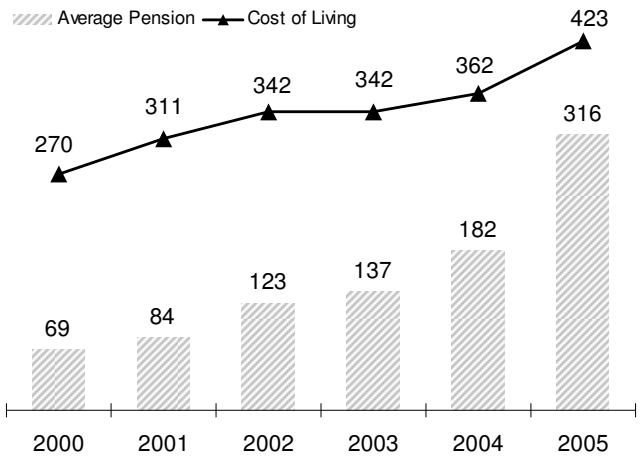
Several studies held in US and Europe (they are discussed in the literature review) were devoted to the modeling of the employees' retirement decisions. They found out that the level of income, education, health status and previous working history influences worker's decision concerning retirement.

However, Ukraine has several important peculiarities of labor market, and pension system, which make it different from developed countries. First, Ukrainian workers have lower level of real income and accumulated wealth and lower certainty about future level of wealth and social security.

Second, in contrast to US and European countries, private pension funds are not well developed in Ukraine. The majority of today's pensioners and those who are close to retirement age are already not able to accumulate a sufficient wealth for future retirement payments with privately-owned pension funds. Thus, pensioners could only receive retirement payments from State Pension Fund.

Third, the average level of pension in Ukraine is significantly lower than cost of living. As can be seen from Figure 1, average level of pension in Ukraine during last five years was significantly lower than cost of living. And only in 2005, when new government began to implement new social policy, average pension became closer to the cost of living, however is still lower.

[2] Statistical Yearbook of Ukraine 2002



Source: State Statistics Committee

FIGURE 1. AVERAGE PENSION AND COST OF LIVING IN UKRAINE

Today's Ukrainian pensioners have a significant part of their working history concerned with former Soviet Union economy. Structure of that economy, biased towards military and heavy machine building industries, resulted in the fact that most of the present pensioners have technical education and working background in heavy industries. Furthermore working conditions, conditions of life influenced people's evaluation of leisure, income and necessities of life. This evaluation differs from those of European or American elder workers. Poor working conditions together with low level of labor protection on former Soviet Union enterprises left a negative imprint on workers' health. This is another reason for why we should expect different effects of retirement incentive variables on Ukrainian workers' retirement decisions.

Financial incentives in retirement decision are also different in Ukraine. In developed countries, elder workers are comparing the cash flows from existing salary and from future retirement payments. This trade-off influences their retirement decision. Ukrainian pension system differs from those in US. It assumes that worker pays a certain amount of his/her salary each month in a form of pension tax. When worker reaches a retirement age, Pension Fund of

Ukraine (PFU) computes the amount of retirement benefits that a pensioner will receive. For this, a worker chooses any "best" 5 years out of his/her working life before the year 2000 (these years are the best in terms of amount of salary and other monetary compensations). Each year after the 2000[3] is automatically taken into account. Then PFU computes the ratio of a worker's wage for each of those years to Ukraine's average wage in each year. Finally, it computes the amount of pension, taking into account these ratios, and total working tenure of a person.

In the US there are three sources of pension benefits: state social security, deferred compensation plans, and individual retirement arrangements.

The government provides state social security. Social Security Administration (SSA) of US collects and keeps all the information about the amount of pension tax that a person had paid during the working life. Then an individual becomes 65 years old, SSA computes the amount of a social security benefits that a person will receive. SSA takes into account amount of pension tax paid, working tenure, wage and inflation rates.

Deferred compensation plans are organized by companies for their employees. A company creates an account for each employee in a mutual fund, and every employee could transfer a part of earnings to this account. Sometimes employer transfers additional money to employees' accounts.

Any working person or his/her spouse could open an account of IRA type (Individual Retirement Arrangement) in a bank or in a mutual fund and transfer some fixed amount to this account annually.

[3] PFU introduced personification in 2000

Taking into account all above-mentioned differences in pension systems, I expect different impact of financial incentives on retirement decision in Ukraine.

An important peculiarity of Ukrainian pension system is that people are allowed to receive pension while working. After retirement, elder workers lose a part of their income in the form of salary. The higher the share of household income formed by worker's wage, the lower is willingness to lose this significant share of income, and hence, an individual is less willing to retire. The fact that Ukrainian worker could lose a significant share of income after retirement is supported by the data, which suggests, that the salary received by a working pensioner forms more than a half of his/her household income[4].

Taking into account all these factors, we could expect that influence of retirement factors is different for Ukrainian workers and they could have other preferences and value the factors differently while making a retirement decision. It is more likely that financial incentives play major role in the retirement decision. Therefore, the aim of this research is to study the factors that influence the retirement decision of Ukrainian worker and the relative importance (magnitude) of these factors.

The structure of the paper is the following: In the second chapter I will provide a review of the literature concerning retirement decision and factors influencing it. The third chapter includes description of the data I used for the estimation and discussion of variables in the model, it also provides a summary statistics for all variables in the regression. The fourth chapter proceeds with methodological part of the research, it discusses the principles of sample construction for the estimation, it also includes a discussion of variables and provides an explanation of why they should be included into the model. Fifth

[4] ULMS 2003 (See data description).

chapter describes the results of the estimation. And, finally, in the last chapter I provide conclusions, discussion of the results and policy implications of this research.

Chapter 2

LITERATURE REVIEW

The problem of retirement decision found the reflection in various studies on the field of retirement and labor force participation of elder workers. There are various questions under study in the literature on retirement. And one of them is why people extend their working lives. Specifically, what factors influence the worker's decision to retire or to remain a part of the labor force? This problem was of interest for the economists not only from behavioral point of view. By studying retirement decisions and learning about factors influencing it, policymakers could make an implication of the effect on elder workers of various changes in retirement policy.

A fundamental question that arises in every study of retirement decision is how to define a retired person. The answer to this question is not straightforward and, unfortunately, there is no unanimity in the literature. One way to define that a person is retired is when (s)he is at or beyond the normal retirement age and receives 80 % of income from retirement benefits. In the literature, it is called "full retirement" (Palme and Svensson (1997, 2002). Nevertheless, some authors suggest classifying as retired those people who have a part-time job being older than normal retirement age (NRA). The reason is that in some countries there is no strict requirement to have no job at all in order to claim state social security compensation (Hakola (2002)). It was shown that for US partial retirement is common and excluding the partial retirees from a list of retired people lead to model misspecification (Gustman and Steinmeier (1984)). Another approach is to consider as retired a person who is at or beyond the NRA and leaved the labor force for a certain period, most commonly one month (Ucello (1998)).

In this study an individual is classified as retired if he/she left the last job because of retirement by age or working disability[5].

First studies of retirement decisions of elder workers were on theoretical level. Those studies contained the models that allowed studying different aspects of retirement decisions. Gustman and Steinmeier (1986) considered the partial retirement. They assumed that worker maximizes the life-time utility that depends on the consumption level and leisure. Maximization is done subject to the lifetime budget constraint. The peculiarity of the model is that it considered the partial retirement. It assumes that an elder employee could work any continuous amount of time. Solving a maximization problem an elder worker gets to the optimal allocation of time between work and leisure. If the working time is equal to zero a person is considered as fully retired.

The retirement decision was also considered as the choice of optimal age for retirement. Gustman and Steinmeier (2001) discussed the model, where an employee maximizes the lifetime utility that depends on consumption, choosing the optimal consumption and leisure, given the optimal retirement age. The maximization is done subject to the lifetime budget constraint. The model is solved for several retirement ages. After the simulations, the authors got the optimal retirement age that allows for the largest consumption level (that is already utility maximizing). The interesting founding of the paper is that the greater a person evaluates leisure, the lower is optimal retirement age and the accumulated wealth is also lower. Authors compared the results to the data for US and found that leisure preferences do not explain much of the variation in retirement ages from the data.

[5] Withdrawals from a labor force because of disability were classified in the literature as "involuntary retirement" (Ucello (1998)).

However, not only consumption and leisure influence an employee's utility. Kerkhofs et. al. (1998) considered the utility function that also depends on the health status. Authors noticed that relative importance of consumption and leisure may depend on health. An elder worker is making a decision each period of time by comparing the utilities from staying at work for one more period and retiring this period. In tern, decision to work one more period influences health stratus. Thus authors get to the problem of endogeneity of health in the model of retirement decision. The suggestion of the paper is to use several alternative measures of health status in order to cope with the problem of endogeneity and reporting errors in case the data contains a subjective self-evaluated health status.

Blau (2005) discussed the issue of "retirement-consumption puzzle". Data for the United States suggests that the level of consumption falls after retirement. But it is inconsistent with life-cycle models and consumption smoothing theory. Paper explains that the exact date of retirement is uncertain during the life time and hence retirement is a source for shocks in income. Another point is that increase in savings during the life time in order to smooth consumption after retirement is more costly in terms of utility than drop in consumption right after the retirement.

There is another set of papers that are devoted to empirical models. They are estimating the influence of different factors on a retirement decision. Such papers consider several sets of incentive variables.

Among the most influential factors are financial factors. They include earnings at current job, household income, accumulated wealth and property ownership. For a working person wage and other monetary compensations from employer form a significant part of total income. After retirement, a worker loses this source of income and gets another source, retirement benefits. Therefore, these incentive variables are of great importance for a person making a decision

to retire. It is naturally to assume, that other things equal, the greater is the wage the lower is the willingness of an employee to leave this job. This assumption was tested and it was shown that current salary makes a negative effect on the probability to retire (Ucello (1998)).

The ratio of current salary to future retirement benefits shows the trade-off that faces an elder worker making a retirement decision. In the literature it is called replacement rate. The higher is the wage relative to amount of pension, the lower is willingness to retire (Antolin and Scarpetta (1998)).

On the other hand, after retirement an individual gets retirement benefits. And the willingness to retire increases with the amount of retirement benefits (Coile, 2003). The author investigates several methods of computing retirement wealth. Among them are: PDV of retirement wealth, which is a flow of all future retirement benefits discounted by mortality risk and time preferences; the wealth accrual effect – change in retirement wealth from working one additional year; option value, which measures individual's indirect utility from work and leisure; peak value, which is equal to the PDV of retirement wealth at its maximum value minus the PDV today. The paper shows that retirement wealth positively influences probability to retire independently of what measure to use.

Total household income and accumulated wealth are essential as the measures of financial stability and certainty concerning future welfare. It was shown that elder workers with larger accumulated wealth have greater probability to retire (Ucello (1998)). The same tendency holds for house ownership. If a household owns a house it lives in, its members tend to retire later (Quinn et. al. (1998)).

As was shown by Kerkhofs et. al. (1998), health status should be considered among factors of retirement decision. The poorer is employee's health, the lower is the utility from working one more period. Especially in case

of harmful working conditions, when health worseness with each year of working. Therefore, it is quite logical that health status should influence a retirement decision.

Sickles and Taubman (1986) were first to study the relation between health status and retirement age using structural model and longitudinal data with random effects correlated over time for different individuals. The authors used the utility function that depends on consumption, leisure and health. The utility function is maximized subject to budget constraint and "health production function", where health depends on age, amount of medical care, job characteristics and personal conditions. As result, they found that a retirement decision depends on health status, financial variables, marital status and education. They also found that level of Social Security and pension payments positively affects healthiness.

The availability of health insurance after retirement also affects a retirement decision. Madrian et al. (1994) showed that the employer-provided postretirement health insurance positively influences the probability to retire.

The problem of pensioners' social security was also studied by Bhattacharya et al. (2001). The authors tried to answer the question whether an improvement in social security for pensioners will encourage retirement and hence create new vacancies for young people. They found that governments are used to offer more than optimal level of social security to elder workers in order to induce retirement.

Gruber and Wise (1999) showed that improvement in social security programs have indeed contributed to reduction of labor force participation of older persons.

Filer and Petri (1886) investigated the influence of working conditions on the age of retirement. Heavy physical demands and lot of stress at work was shown to decrease a retirement age. An interesting finding of the paper is that occupations, which include large share of self-employed and part-time workers, are characterized by later retirement. The reason is that self-employed people have better opportunities to adjust work environments to their preferences. Also the occupations dealing with communication skills, which improve with age, positively correlated with later retirement.

It was shown that the retirement decision of an elder worker is also influenced by a spouse's incentive variables, such as income, health and retirement status. (Coile (2003)). Married individuals while making a retirement decision also take into account their valuation of leisure together with spouse. Therefore, if one of the spouses is already retired the probability of other spouse's retirement increases. Another finding is that household's dependence on male decreases his probability to retire (Jiménez-Martín et. al. (1999)).

Chapter 3

DATA DESCRIPTION

The source of the data for this research is Ukrainian Longitudinal Monitoring Survey (ULMS) held in Ukraine in 2003 and 2004. Survey covered the total amount of 8 641 individuals. The average age of the respondents is 40. Males form 43% of the respondents and females 57%.

From two waves of ULMS I took people who were between 55 and 75 years old in 2003 (the dates of birth are between 1928 and 1948 year). I took only those people who made their retirement decision in 2003. Data shows that 18% of all individuals in the sample of ULMS were retired in 2003. But we do not know when they stopped working and decided to retire. So, there can be a situation that a person had retired several years before 2003, hence the decision was made before. Thus, I have chosen only those people who were at the retirement age in 2003, and then among them I have taken only those people who worked in 2003. It means that these individuals made their decision exactly in 2003. There are 443 such observations in the sample. Then, in 2004, some of them decided to retire (24.4%) and others continued working (75.6%).

In the above-mentioned sample average person is 60 years old. There are 56.2% males and 43.8% females.

33,4% out of those 443 people were not allowed to receive the state retirement benefits. Possible explanation for the fact that males are not supposed to receive retirement benefits is that according to Ukrainian law a retirement age for males is 62 years. Males younger than 62 do not receive retirement benefits if

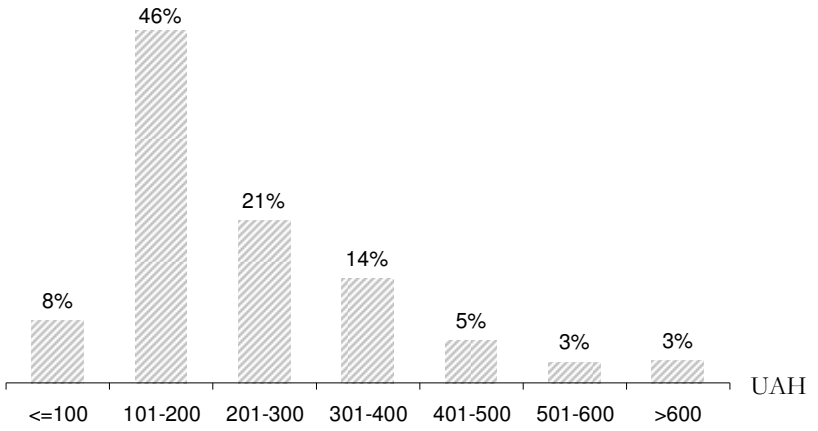
only they are not allowed for early retirement due to illness or specific working experience (say, at harmful production).

However, 46.5% of males between 55 and 62 years old (younger than retirement age) are allowed to receive a pension. Moreover, 18% of females are not entitled to receive retirement benefits. Possible explanation is insufficient (too short) record of service.

In order to overcome this problem, I left in the sample only those people who were allowed to receive state retirement benefits. After this, 295 individuals left in the sample.

Average salary from the main job for those working in 2003 was 252.3 UAH with maximum of 1400 and minimum 20 UAH. The average salary in ULMS 2003 was equal to 293.5 UAH. It brings us to the conclusion that elder workers in Ukraine earned less than average salary.

Wage distribution in the sample under study is shown in Figure 2.



Source: ULMS 2003

FIGURE 2. DISTRIBUTION OF WAGES

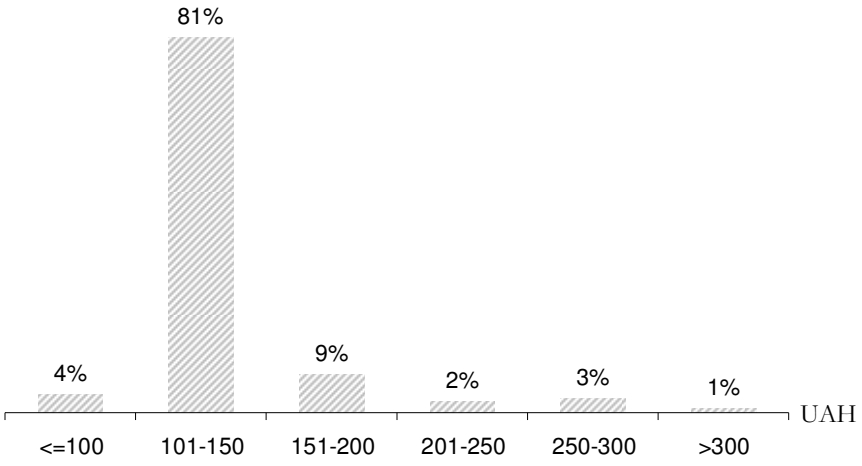
As can be seen from the graph, only a few people in the sample earned more than 600 UAH per month. Distribution of wages for elder workers is highly skewed and concentrated between 100 and 200 UAH.

What about the amount retirement benefits received by individuals in the sample? Average amount of pension in the sample is 152,7 UAH with maximum of 1056 UAH and minimum of 86 UAH (officially reported average level of pension in Ukraine in 2003 was 136 UAH)[6]. Interesting fact is that an individual who received the highest wage in the sample (1400 UAH) was not entitled to receive a pension in 2003, and individual with highest pension (1056 UAH) received relatively high wage of 1100 UAH. We can suppose that there could be a correlation between wage and retirement benefits. However, data suggests that this correlation is not very high and is equal to 0.386 (See Table 2). Explanation comes from the fact that before the reform in 2005 only 2 last years of individual's working history were taken into account for computation of the amount of retirement benefits. Moreover, there was an upper bound for pension[7]. This is very interesting peculiarity of Ukrainian retirement law in 2003. In 2005 the new scheme of calculation of pension made it more correlated with wages.

Distribution of pensions in the sample is shown in the following graph.

[6] "Zerkalo Nedeli" #4 (479), January 31 – February 6, 2004 (http://www.zerkalo-nedeli.com/nn/show/479/45436/)

[7] However, state employees, judges and some other categories of employees were not subject to such upper bound.

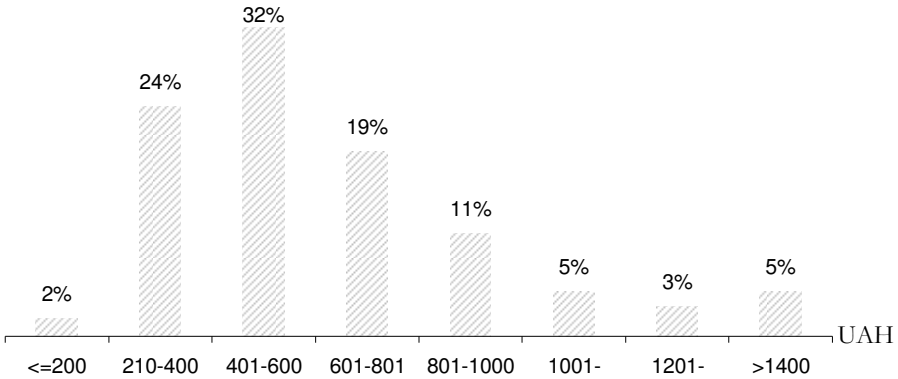


Source: ULMS 2003

FIGURE 3. DISTRIBUTION OF PENSIONS

As we can see, the distribution of pensions is also skewed and concentrated around 100 – 150 UAH per month.

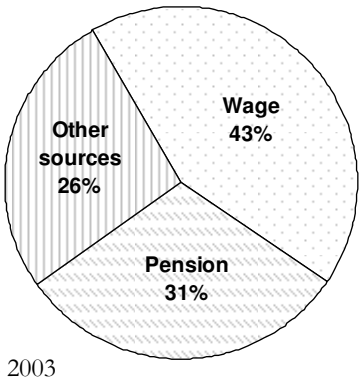
Average household income of elder worker was 650 UAH per month with minimum amount of 110 UAH and maximum of 3750 UAH.



Source: ULMS 2003

FIGURE 4. DISTRIBUTION OF HOUSEHOLD INCOME

An average household income of elder worker is formed by the wage (43%), pension (31%) and other sources (26%). The structure of average household income in the sample is shown in the following figure.



Source: ULMS 2003

FIGURE 5. STRUCTURE OF HOUSEHOLD INCOME[8]

The summary statistics for financial incentives is listed in the following table.

TABLE 1. SUMMARY STATISTICS FOR FINANCIAL VARIABLES

VARIABLE	AVERAGE	MIN	MAX	STD. DEV.
Current salary	252.38	20	1400	159.511
Pension	152.68	86	1056	65.93475
Household income	649.94	110	3750	398.5677

Correlations between financial variables are shown in the following table.

TABLE 2. CORRELATIONS BETWEEN FINANCIAL VARIABLES

	WAGE	PENSION	HH INCOME
Wage	1.0000		
Pension	0.3864	1.0000	
HH income	0.5767	0.3812	1.0000

[8] Only for those individuals who received wage and pension simultaneously

As can be seen from the above table, financial variables are not much correlated with each other. The lowest correlation is between pension and household income (correlation coefficient is equal to 0.3812). Possible explanations are low variability in pensions and low share of pension in the household income. The highest correlation is between wage and household income. As all people in the sample were working in 2003 it is naturally to expect that wage had large share in household income, especially if the household.

Now let us consider the set of health variables. The indicators of health status that I used are self-evaluated health status and presence of chronic illnesses.

52% of people in the sample had suffered from health problems during last three month. 9.5% of elder workers evaluate their health status as good, 67.7% thought that their health was not bad but not good and 20.3% of all respondents in the sample evaluate their health as bad. 75% of people in the sample had chronic heart illnesses, 19% suffered from gastrointestinal diseases, 9.5% had liver diseases and 17.6% had spinal problems. Data suggests that only 2.3% of individuals in the sample had neither of the chronic illnesses.

The set of socio-demographic variables consists of education level, marital status and dummies for regions of Ukraine. Let me describe the highest educational level got by the respondents. 22% of people received specialist's diploma from the institute or university, 21.9% - professional secondary education, 18.5% got a diploma of a high school and 10,4% had only completed from 7 to 9 classes of school.

The following table represents the summary statistics for all variables in the regression.

TABLE 3. SUMMARY STATISTICS FOR ALL VARIABLES IN THE REGRESSION

MEANING	NAME	TYPE	AVG	ST. DEV.	MIN	MAX
Was working in 2003 and retired in 2004	worked_retired	Dummy	0.2437923	.4298543	0	1
Social variables						
Age in 2003	age	Integer	60.03	4.296537	55	71
Sex	d_male	Dummy	0.562	.4966924	0	1
Marital status	d_married	Dummy	0.74	.4376605	0	1
Financial variables						
Current salary from the main job, in UAH	wage	Real	251.69	159.8359	0	1400
Current Pension, in UAH	pension	Real	152.68	65.93475	86	1056
Household Income	hh_income	Real	649.94	398.5677	110	3750
Health status						
Very good health		Dummy	0.011	.105757	0	1
Good health		Dummy	0.095	.2932809	0	1
Average health		Dummy	0.677	.4680752	0	1
Bad health		Dummy	0.203	.4028057	0	1
Presence of chronic illnesses	chronic_illnes	Dummy	0.977	.1487068	0	1
Highest level of education						
School, not finished	d_educ_school_nf	Dummy	0.181	.3851105	0	1
School, finished	d_educ_school	Dummy	0.185	.388819	0	1
Professional education (PTU)	d_educ_profes	Dummy	0.370	.4834049	0	1
High education (institute)	d_educ_high	Dummy	0.237	.4257356	0	1
Master's degree	d_educ_MA	Dummy	0.014	.1157186	0	1
Ph.D	d_educ_science	Dummy	0.014	.1157186	0	1

MEANING	NAME	TYPE	AVG	ST. DEV.	MIN	MAX
Position occupied at current job						
Elementary operations	d_pos_element	Dummy	0.219	.4140101	0	1
Plant and machine operators and assistants	d_pos_operators	Dummy	0.065	.2476203	0	1
Craft and related trades workers	d_pos_craft	Dummy	0.163	.3693518	0	1
Skilled agricultural workers	d_pos_agr	Dummy	0.032	.1751377	0	1
Clerks and service workers	d_pos_clerck_serv	Dummy	0.045	.2078606	0	1
Professionals and technicians	d_pos_profes	Dummy	0.280	.4494622	0	1
Managers	d_pos_mng	Dummy	0.061	.2395055	0	1
Other job characteristics						
Satisfaction with current job	job_satisf	Dummy	0.648	.4781787	0	1
Tenure at current job, years	cur_tenure	Integer	17.289	14.79995	0	52
Region						
25 dummies for regions of Ukraine	-	Dummy	-	-	0	1

Chapter 4

METHODOLOGY

To explain a retirement decision of an elder worker I use the simplified and a little bit modified version of the model introduced by Gustman and Steinmeier (2002)

When going to retire, an employee maximizes the lifetime utility function that depends on consumption and leisure. If an individual finds it optimal to retire, than amount of leisure equals to one. In other case, if he/she decides to work one more period, the amount of leisure is equal to zero.

Individual maximizes the following utility function:

$$U = \sum_{t=0}^{T} \left[\frac{1}{\alpha} C_t^{\alpha} + X_t L_t \right]$$

Subject to the following rule of asset (wealth) accumulation:

$$A_t = A_{t-1} + W_t(1 - L_t) + B_t - C_t$$

In this framework C_t is consumption at current period, L_t – the amount of leisure (either zero or one) at current period, X_t is the vector of variables, which describe the valuation of leisure, among them are age, education, marital status and health. W_t is wage at current period from the main job, B_t is amount of retirement benefits and A_t is level of accumulated assets (wealth). We assume that individual starts with zero assets.

Equation (2) implies that a working individual older than retirement age is allowed to work and get wage W_t and at the same time to receive retirement benefits B_t.. This implication conforms to Ukrainian pension law.

As can be seen from the asset accumulation rule, if an individual decides to retire, than the amount of leisure equals one, and therefore there is no wage term in the equation (2). It means that after retirement, a person loses a wage as a part of income. And retirement benefits become the only source of income.

As a result, an individual gets an optimal amount of leisure L* that depends on current wage, retirement benefits, health status, job satisfaction set of socio-demographic factors.

$$L^* = L[W_t, B_t, X_t, A_t].$$

If L* is equal to one it means that an individual decided to retire this period, in other case, if L* equals zero, he/she decided to work for one more period.

I used a LOGIT model for the empirical estimation. The dependent variable is binomial and shows whether a person is retired or not. I consider a person as retired one if he/she is between 55 and 75 years old, is allowed to receive state retirement benefits and in the reference week:

- had not worked for at least one hour at paid job;

- was not engaged in entrepreneurship, business activities or individual work, was not working in a family enterprise or on a farm, as a freelancer or as a registered entrepreneur;

- did not have a job or own business at which he/she was temporarily absent or not employed due to illness, vacations, training, or any other reason;

- was not seeking for a job during four weeks before the reference week (an individual who is elder than retirement age and is seeking for a job is not considered as retired one).

As explanatory variables I took those of 2003 in order to find their influence on retirement decisions made during 2003-2004 years.

Another point that should be mentioned here is a need to control for voluntary vs. involuntary retirement in the sample. In the case of involuntary retirement some factors could have the opposite influence than in case of voluntary retirement. For example, the amount of wage received by the worker negatively influences his/her probability to retire. However, from the employer's point of view, the higher is the wage of an elder worker the higher is the probability of him/her to be involuntary retired.

I consider a pensioner as involuntary retired if he/she leaved the job for reasons not depending on him/her. Data allows us to control for such reasons of involuntary retirement as:

- closing down of enterprise/organization;

- reorganization of enterprise/organization;

- bankruptcy of enterprise/organization;

- privatization of enterprise/organization;

- personnel reduction, i.e. mass lay-offs;

- lack of actual work at this enterprise;

- dismissal initiated by employer for other reasons.

The point is that in case financial or other problems happen to the enterprise, elder workers are usually the people who have the highest probability to be fired. Data suggest that among all people who left their job involuntary in 2004 (there were 168 such individuals), 14.2% were at the retirement age.

Among the elder workers who leaved their jobs in 2004 there were only 20 individuals from the sample who did it involuntary. However 4 out of these 20 individuals were looking for a new job in 2004 and thus could be considered as retired. Therefore we have only 16 individuals who retired involuntary. In other words, those people did not make their own retirement decisions and thus I excluded them from the sample.

There are several sets of incentive (explanatory) variables in the model.

As suggested in the literature on retirement decisions the most influential factors affecting a retirement decision (as was discussed in the literature review) are the financial incentives. They are the earnings, received from current job and the amount of state retirement benefits, which a person is supposed to receive or is already receiving.

Another important financial incentive variable is an amount of retirement benefits a person is supposed to receive. There could be several cases. First, if an individual reaches a retirement age at this year, he/she is able to compute an approximate amount of pension he/she will be supposed to receive. If a person is already elder than retirement age, he/she directly knows the amount of pension that he/she receives. This amount of retirement benefits is taken into account by an individual who decides on whether to retire or not this year.

An interesting point that also should be mentioned is expectations of increase in future amount of retirement benefits. If a worker currently receives high wage, he/she could expect that amount of pension will be higher next year.

The explanation is based on Ukrainian pension law. According to it, an amount of pension positively depends on total working tenure and amount of current wage. Furthermore, amount of retirement benefits should be recalculated each year if a person continues working. So, we can conclude, that by working one more period individual could increase an amount of his/her future retirement benefits. Taking into account the opportunity of pension increase described above, it is possible that not only current wage but also a position occupied and total working tenure could influence a retirement decision.

With the model I am going to test the hypothesis that the greater is working tenure and the 'higher' is a position occupied, the lower is the probability to retire.

Working conditions and interrelations with colleagues should also play an important role in the retirement decision. If a worker has favorable working conditions and is in good relations with colleagues and supervisors, other things equal, it is naturally to assume that he/she is less willing to retire. Unfortunately, data does not provide us with the information of how a person evaluates his/her current working conditions and interrelations with colleagues. Nevertheless, we can proxy these variables. As proxy variable, we can use data for worker's job satisfaction. For this purpose I have created a dummy for the job satisfaction. It is equal to 1 if a worker is:

- fully satisfied with current job,

- satisfied or

- rather satisfied with current job.

I am making a conjecture that level of education influences a retirement decision. Possible explanation is that people with different level of education

could evaluate financial, health and social incentives (such as leisure together with a spouse) in different ways. To account for level of education I included the total years of schooling into regression.

Whether an individual is married or not could influence a decision to retire. Previous studies suggest that marital status should have a significant effect on retirement decision. The reason is that married individuals were shown to value leisure together with spouse, especially if other spouse is already retired. Therefore, I included a marital status in the regression.

Regions of Ukraine differ by economic development, structure of the economy, level of income and some cultural features. So, geographical location may influence a retirement decision. To account for such factors I'm going to use regional dummies.

Variables representing health status are also important: whether a person has chronic diseases and he/she evaluates his/her overall health status.

Males and females were shown to value retirement factors in different ways (Kenc (2000), Ucello (1999)). To check whether such difference in preferences holds for Ukraine I will include the dummy for sex into the regression.

So, let me summarize what hypothesis I would like to test with the model:

1. The elder is a person the higher is the probability to retire.

2. Salary at current job has negative influence on the probability of retirement.

3. The higher the amount of pension that a person receives, the higher the probability to retire.

4. The better an individual evaluates his/her own health, the lower is the probability of retirement.

5. The higher a worker is satisfied with the job, the lower the probability to retire.

6. The probability of retirement to varies with sex and marital status.

7. Financial incentives make greater influence on retirement decision than health status.

Chapter 5

ESTIMATION RESULTS

Before I describe the regression output, one important point should be mentioned. There is a problem with financial variables. In the sample some people refused to answer the questions concerning their financial status and therefore we have negative values of, say, current salary, for such individuals. Negative value for wage or pension means that a person refused to answer this question. In order to avoid incorrect estimation there is a need to control for the financial variables to be positive. This controlling reduced the number of observations from 443 individuals in the initial sample to 248 people who have the full set financial variables.

Another problem is that some people in the sample are not supposed to receive retirement benefits. For the reasons such as insufficient working tenure or lower than retirement age. This problem arose because I included into the sample males and females. But some males younger than 62 are not allowed to receive pension. If an elder worker is not supposed to receive a pension he/she is not actually making a retirement decision this period. Therefore, I included into the regression only those people who received a pension.

After all these conditions number of observations in the regression decreased to 248 out of 443 in the initial sample. It is not a large number of observation, but still, it is sufficient for the law of large numbers to work.

So, the final regression is the following.

TABLE 4. REGRESSION DESCRIPTION

DEPENDENT VARIABLE	EXPLANATORY VARIABLE	DESCRIPTION
Retired		Whether a person worked in 2003 and then retired in 2004
	Age	Age of a person, varies between 55 and 75 years old
	Sex	Dummy for sex, equals 1 for males and 0 for females
	Marital Status	Dummy for marital status, equals to 1 if a person is in registered or no-registered marriage
	Job satisfaction	Dummy for job satisfaction , equals to 1 if a person is satisfied with current job
	Current Tenure	Number of years that a person have been worked at current company
	Position	Set of dummies fro the position that a person occupies at a current job
	Wage	Amount of wage that a person was supposed to receive at the main job for the previous month, in UAH
	Pension	Amount of pension that a person was supposed to receive at the main job for the previous month, in UAH
	Health status	Set of dummies for the self-evaluated health status
	Chronic Illnesses	Dummy for the presence of chronic illnesses
	Level of education	Set of dummies for each level of education
	Region	Set of dummies for the regions of Ukraine

For the estimation I used the Logit regression and received the following results. The results of the estimation are presented in the Appendix 1. I

First, let me discuss the goodness of fit statistics that is represented in the following table.

TABLE 5. GOODNESS OF FIT STATISTICS FOR ESTIMATED LOGIT MODEL

MEASURE	VALUE
Log-Likelihood (constant only)	-155.49591
Log- Likelihood (full model)	-89.43973
Pseudo R2	0.3587
Adjusted pseudo R2	0.058
McKelvey and Zavoina's R2	0.576
Cragg & Uhler's R2	0.492
Efron's R2	0.402
Count R2:	0.847
Adj Count R2	0.387
Wald chi2(40)	88.86
Prob > chi2	0.0000
Pearson chi2(207)	273.55
Prob > chi2	0.0011
Hosmer-Lemeshow chi2(8)	14.84
Prob > chi2	0.0623
Correctly classified (constant only)	75.80%
Correctly classified (full)	84.68%

I obtained the model with pseudo-R^2 equal to 0.3587. The exact value of pseudo-R^2 in the logit does not have a direct interpretation as it is in OLS. Pseudo (McFadden's) R^2 compares the model with just an intercept to the model with all parameters. Positive value of pseudo-R^2 only indicates that all slope coefficients in the model are jointly different from zero. Count R-squared indicates the proportion of correct predictions. However, at binary models it is possible to correctly predict at least 50% of outcomes by choosing the category with the largest percentage of observed cases. Therefore, high value of Count R-squared (0.847 in my model) could lead to the impression that model predicts very well. To avoid such misleading conclusions, an adjusted Count R-squared is calculated. In my model it is equal to 0.387 and it is the proportion of correct guesses beyond those predicted by choosing largest marginal category[9].

[9] See Long and Freese (2000)

The p-value associated with Wald chi-squared statistics with 41 degrees of freedom, indicates that the model as a whole is statistically significant. The p-value associated with Pearson chi-squared statistics shows that the model fits well. However, then a number of covariate patterns approaches number of observations the Pearson test is not appropriate. Instead we could use the Hosmer-Lemeshow test. P-value of this test indicates that the model fits reasonably well. The model correctly classifies 84,7% of outcomes. In comparison, model with only a constant predicts correctly in 75,8% of outcomes.

Important issue that should be discussed here is the problem of heteroscedasticity in the model. Possible sources of heteroscedasticity are age and level of education. The reason is that people of different age and education could value the incentive variables differently. I tried to run a regression using the command "hetprob" in Stata. However, the process of maximum likelihood estimation did not converge. Therefore, to overcome the problem of heterscedasticity in error terms I used a robust estimation. Estimated coefficients with robust standard errors are reported in Appendix 1.

As Kerkhofs et. al. (1998) suggested there could be a problem of endogeneity of health status to the model of retirement decision. The nature of the problem is that health status influences retirement decision, but, at the same time, individual's health could worsen if he/she works one more year. As was discussed in previous chapter, I have chosen for the estimation only those people who worked in 2003 and then retired in 2004. So, the retirement decision was actually made between 2003 and 2004. And all explanatory variables are of the year 2003. Therefore, individual's retirement status in year 2004 can not influence his/her health in 2003. So, there is no problem of endogeneity of health status in my model.

A peculiarity of a logit model is that the coefficients estimated from it can not be interpreted themselves. For interpretation I computed the marginal effects that are reported in Appendix 2. Marginal effects from logit model allow us to interpret how the changes in explanatory variables influence the probability of retirement.

I have found that probability to retire, other things equal, increases with age. It means that the elder is a person the higher is the probability to retire. Each additional year increases the probability to retire by 1.4%. This result is quite logical and gives support to the hypothesis I made before the estimation.

Tenure at current job does not affect a worker's willingness to retire. The hypothesis, that the more time a person dedicated to the current job, the lower is his/her willingness to retire, does not find a support after the estimation.

What is quite natural is that job satisfaction negatively influences the probability to retire and this effect is rather significant. If an employee is satisfied with current job, the probability to retire decreases by 15.5%. Interesting fact is that job satisfaction does not have any significant influence on female's retirement decision.

Previous studies suggest that marital status influences retirement decision, especially if another spouse is already retired. The results of my model show that this fact does not hold for Ukrainian workers. I found that marital status does not have any significant effect on the worker's decision to retire.

Now let me discuss the influence of financial incentives. Regression results show that only amount of current wage influences the retirement decision of females. Each additional 100 UAH in salary decreases the probability to retire by 7.5%. Thus, current salary has a significant influence on the retirement decision. And wage does not influence male's retirement decision.

The fact that amount of pension does not have any effect is very interesting. Possible explanation for this phenomenon is low variability in pensions and low absolute amount of pension, compared to wage (see Figures 2 and 3 in Data Description section). Intuitively, it means that in 2003 amount of pension was so low, that it does not have a significant influence on a retirement decision.

From the estimation I found that level of household income does not affect the retirement decision. This finding is not in line with studies on US and Europe. Data suggests that on average pension forms more than 30% of household income of elder workers. Pension has no statistically significant effect on probability to retire. And this is one of the possible explanations of why a household income also has no effect on retirement decision.

In order to estimate the influence of health status I have constructed several variables for health status. First, I included dummies for each level of health, such as very good, good, average and bad. Second, I included a health status as categorical variable, assigning values from 1 to 4 for all kinds of self evaluated health from bad to very good. In each case I included a dummy for presence of chronic illnesses. In either case none of the health variables showed a significant influence on retirement decision. This result contradicts to those received from studies held on US and Europe (see literature review). One possible explanation for this phenomenon is rather low variability in dummy for chronic illnesses. Data suggests that 97% of the individuals in my sample suffer from chronic illnesses. Another explanation is that people care much about financial incentives and a working despite bad health status.

The hypothesis that people with different levels of education will make their retirement decision differently gave not found any support in the estimation results. Explanation comes from the fact that only nearly 20% of people in the

sample had higher education. Most of them have only finished school or college. Such low variability in education level causes the insignificant effect of education. However, education is significant only for females. If an elder female has a highest level of education equal to high school education, probability to retire increases by 34%. It means that women with lower levels of education tend to retire later.

Like a logical continuation, I found that a position occupied at current job also influences retirement decision. If an elder man occupies an elementary position at current job his probability to retire decreases by 9,4%. If a woman occupies an elementary position at her main job then her probability to retire decreases by 18.5%. Women are les willing to retire if they occupy a managerial position. The probability to retire of a woman occupying managerial position decreases by 15.1%. But this relationship does not hold for males.

The hypothesis concerning variation of probability to retire among regions of Ukraine found the support in the estimation results. People from Kyiv city, Donetska, Dnipropetrovska, Kharkivska, Chernigivska and Poltavska oblasts tend to retire later than in other regions. Kyiv, Dnipropetrovsk, Kharkov and Donetsk are among the most economically developed and industrialized regions of Ukraine. Therefore, people in such region retire later. Possible explanation is that less industrially developed regions have more developed agriculture. And after retirement pensioners could be engaged in agricultural production for their own consumption. Industrially developed regions usually have higher cost of living, so elder people should work for a longer time in order to keep sufficient level of income.

Robust estimates of marginal effects are shown in the following table.

TABLE 6. MARGINAL EFFECTS

VARIABLE	MARGINAL EFFECT ON PROBABILITY TO RETIRE, %		
	ON AVERAGE	MALES	FEMALES
Age	-1.4**	-1**	-1.8*
Marital Status	-	-	-
Job satisfaction	-15.5*	-11.1*	-
Tenure at current job	-	-	-
Position	Managerial: -11.1* Elementary: -14**	Elementary: -9.4*	Managerial: -15.1* Elementary: -18.5**
Wage	-0.057*	-	-0,075*
Pension	-	-	-
Health status	**- (!)**	**- (!)**	**- (!)**
Chronic Illnesses	-	-	-
Level of education	-	-	School: +34.4*
Region	Kyiv: -13.8*** Donetsk: -15.9*** Dnipropetrovsk: -13.8*** Kharkiv: -17.6*** Poltava: -15*** Chernigov: -14.3***	Kyiv: -9.2** Donetsk: -10.7** Dnipropetrovsk: -9.1** Kharkiv: -11.7** Poltava: -10** Chernigov: -9.5**	Kyiv: -18.8** Donetsk: -21.6* Dnipropetrovsk: -19** Kharkiv: -24*** Poltava: -20,7*** Chernigov: -19,8***

legend: * p<0.1; ** p<0.05; *** p<0.01

The last hypothesis that I wanted to test with the model is that financial incentives have greater influence on retirement decision. The estimated marginal effects showed the insignificance of variables describing health status, even though I have constructed and plugged into the model different kinds of health variables. Therefore, I am not able to say what set of variables has greater effect on probability to retire. The only thing that I can say based on the results is that health status does not have any influence on retirement decision.

I should point out that these results should be treated with caution because of small number of observations in the sample. In order to increase number of observations I ran the same regression for people of retirement age in ULMS. Actually such approach is not entirely correct from the methodological point of view, but allows getting greater number of observations.

I excluded variables for job satisfaction, position occupied and wage because these variables could only be relevant for a working individual. Thus, I obtained a sample of 2294 observations and run the logit regression. Estimation results gave the support to the fact that amount of pension is not correlated with retirement status. Household income turned out to have statistically significant negative correlation with retirement status, which indicates that financial incentives indeed influence the retirement decision. I found that males have lower probability to retire, other things equal. Level of education still has no significant influence on retirement decision. the finding that differs from those in previous regression is that married people are more likely to be retired than single individuals. Another finding that came from alternative regression gives the support to the findings from original regression. The finding is that health status does not have any significant correlation with retirement status.

Chapter 6

CONCLUSIONS AND DISCUSSION

On the basis of two waves of Ukrainian Longitudinal Monitoring Survey held in 2003 and 2004 I have investigated the factors of the retirement decision in Ukraine. According to previous studies on retirement decisions held on Europe and United States, I constructed an empirical model that allows estimating the effect of different factors on Ukrainian elder worker's decision concerning retirement. There are several sets of incentive variables that I included into the model. Among them are financial incentives, factors characterizing individual's health status, a number of factors that reveal working conditions and level of job satisfaction, and finally, a set of socio-demographic factors.

Among the most important findings of this research is that health status does not have a significant influence on retirement decisions of Ukrainian elder workers. Almost all studies on US and Europe found a significant correlation between health and retirement decision. Therefore, it is rather interesting and at the same time very striking result, which needs an intuitive explanation. Comparative analysis of pension and wage received by employees of retirement age and cost of living in Ukraine showed that income of elder workers is noticeably lower than cost of living. This fact brings us to one of the possible explanations for absence of the correlation between health and retirement status. The problem is that low level of income makes people to work despite poor health. Nevertheless, this result should be treated with caution, because of not very large number of observations in the sample under study.

I found that wage at the main job has statistically significant influence on retirement decision. The result is quite natural and is in line with previous studies. However, it turned out that level of pension does not have a significant influence on retirement decision. Possible explanation is low level of pension relative to cost of living and also low variability in pensions.

Previous studies found a significant correlation between job satisfaction and working conditions and retirement status. I included a job satisfaction and a position occupied into the model to proxy the working conditions. The finding that job satisfaction positively influences a retirement decision is in line with previous studies. I also found that women are less likely to retire if they occupy a managerial position, and also females retire later from elementary positions than males. Very interesting finding is that job satisfaction turned out to have no influence on females retirement decision, it means that elder females could continue working even if they are not satisfied with their job, other thing equal.

Whether a person is married or not does not influence a retirement decision. This result contradicts to the findings of previous studies, which suggest positive correlation between marital and retirement status. The investigation of leisure preferences of Ukrainian workers is beyond the scope this research. But even if Ukrainian pensioners value joint leisure with spouse, this is not taken into account while making a decision to retire.

To summarize the discussion of retirement factors, and taking into account the estimation results, I would like to point out that Ukrainian elder workers have insufficient level of income and therefore have to work even if they have poor health, despite marital status and level of education.

I should emphasize that in general the results of this research coincide with those received from studies on Europe and US. The signs of incentives

variables which are statistically significant in my research go in line with previous studies

The research also gives a support to both theoretical and intuitive expectations concerning the signs of retirement incentives variables. But unfortunately I am not able to check signs of variables, which appeared to be insignificant.

Let me discuss policy implications concerning elder workers and pension system that follow directly from this research. I found that income from current job negatively affects the probability of retirement, hence, it makes positive effect on retirement age. In order to increase a retirement age in Ukraine, pensioners should be paid higher wages. I mean that average wage for elder workers should be at least as high as average wage for Ukraine or specific sector. Pensions in Ukraine are now rather low relative to cost of living. Probably it is the main reason why they have no influence on retirement decision. To make pensioners consider a pension as a sufficient alternative source of income it should be at least as high as average cost of living. Policymakers should emphasize their pension policy on creating alternative sources of retirement benefits for pensioners. Development of private pension funds and introduction of deferred compensation plans provided by employers will create greater variability in pensions and will lead to increase in the absolute amount of pensions. It will make the retirement benefits become a significant factor influencing the retirement decision.

Finally, I should say that the problem of retirement decisions and labor force participation of elder workers in Ukraine, though being not well studied yet, needs further investigation using data that more directly describes pensioners' incentive variables as well as their preferences.

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APPENDIX 1

REGRESSION OUTPUT

```
logit worked_retired age cur_tenure  job_satisf d_male d_married  wage  pension
hh_income   d_bad_health   d_average_health   d_good_health   d_very_good_health
chronic_illnes        obl_crimea   obl_kiev_city   obl_kyivska   obl_vinnitskaya
obl_volynskaya     obl_dnepropetrovskaya     obl_donetskaya     obl_jitomirskaya
obl_zakarpatskaya  obl_zaporojskaya  obl_ivano_frankovskaya  obl_kirovogradskaya
obl_luganskaya  obl_lvovskaya  obl_nikolaevskaya  obl_odesskaya  obl_poltavskaya
obl_rovenskaya obl_sumskaya obl_ternopolskaya obl_kharkovskaya obl_khersonskaya
obl_khmelnitskaya    obl_cherkasskaya    obl_chernovitskaya    obl_chernigovskaya
d_educ_school_nf    d_educ_school    d_educ_profes    d_educ_MA    d_educ_science
d_educ_high    d_pos_mng  d_pos_profes  d_pos_clerck_serv  d_pos_agr  d_pos_craft
d_pos_operators d_pos_element  if leaved_involunt==0 & v1615==1, robust

note: obl_kirovogradskaya != 0 predicts failure perfectly
      obl_kirovogradskaya dropped and 1 obs not used
note: obl_nikolaevskaya != 0 predicts failure perfectly
      obl_nikolaevskaya dropped and 2 obs not used
note: obl_rovenskaya != 0 predicts failure perfectly
      obl_rovenskaya dropped and 3 obs not used
note: obl_sumskaya != 0 predicts success perfectly
      obl_sumskaya dropped and 2 obs not used
note: obl_cherkasskaya != 0 predicts failure perfectly
      obl_cherkasskaya dropped and 6 obs not used
note: obl_chernovitskaya != 0 predicts failure perfectly
      obl_chernovitskaya dropped and 6 obs not used
note: d_educ_MA != 0 predicts failure perfectly
      d_educ_MA dropped and 5 obs not used
note: d_educ_science != 0 predicts failure perfectly
      d_educ_science dropped and 4 obs not used
note: d_pos_agr != 0 predicts success perfectly
      d_pos_agr dropped and 4 obs not used
note: obl_ternopolskaya dropped due to collinearity
note: d_educ_high dropped due to collinearity
Iteration 0:   log pseudolikelihood = -139.45912
Iteration 1:   log pseudolikelihood = -95.576676
Iteration 2:   log pseudolikelihood = -90.158237
Iteration 3:   log pseudolikelihood = -89.460749
Iteration 4:   log pseudolikelihood = -89.439761
Iteration 5:   log pseudolikelihood =  -89.43973

Logit estimates                                   Number of obs   =        248
                                                  Wald chi2(41)   =      88.86
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood =  -89.43973                 Pseudo R2       =     0.3587

------------------------------------------------------------------------------
             |               Robust
worked_ret~d |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |   .1143678   .0550536     2.08   0.038     .0064648    .2222708
  cur_tenure |  -.0224655   .0165987    -1.35   0.176    -.0549983    .0100673
  job_satisf |  -1.102969   .5656405    -1.95   0.051    -2.211604    .0056659
      d_male |  -.8832431   .6070899    -1.45   0.146    -2.073118    .3066313
```

d_married	.5369547	.5328522	1.01	0.314	-.5074164	1.581326
wage	-.0047212	.0026775	-1.76	0.078	-.0099689	.0005266
pension	.0071038	.0069976	1.02	0.310	-.0066112	.0208188
hh_income	-.0001104	.001148	-0.10	0.923	-.0023603	.0021396
d_bad_health	.1974376	1.267763	0.16	0.876	-2.287332	2.682207
d_average_~h	.3116498	1.135744	0.27	0.784	-1.914367	2.537667
d_good_hea~h	1.155017	1.336325	0.86	0.387	-1.464132	3.774165
d_very_goo~h	2.069643	1.659207	1.25	0.212	-1.182344	5.321629
chronic_il~s	.1591713	1.810965	0.09	0.930	-3.390256	3.708598
obl_crimea	-.9672855	1.249099	-0.77	0.439	-3.415475	1.480904
obl_kiev_c~y	-2.06195	1.440382	-1.43	0.152	-4.885048	.7611476
obl_kyivska	-.6708002	1.271232	-0.53	0.598	-3.162369	1.820768
obl_vinnit~a	-.8457256	1.201485	-0.70	0.481	-3.200594	1.509142
obl_volyns~a	-.3139328	2.658571	-0.12	0.906	-5.524636	4.89677
obl_dnepro~a	-2.335979	1.312834	-1.78	0.075	-4.909085	.2371274
obl_donets~a	-2.233789	1.218082	-1.83	0.067	-4.621186	.1536088
obl_jitomi~a	-.3582935	1.425535	-0.25	0.802	-3.152292	2.435705
obl_zakarp~a	.9791939	1.362331	0.72	0.472	-1.690926	3.649314
obl_zaporo~a	-.8611664	1.301125	-0.66	0.508	-3.411324	1.688991
obl_ivano_~a	.1868743	1.251717	0.15	0.881	-2.266447	2.640195
obl_lugans~a	-.936398	1.127591	-0.83	0.406	-3.146436	1.27364
obl_lvovsk~a	-1.235148	1.369604	-0.90	0.367	-3.919522	1.449227
obl_odessk~a	-.8535652	1.290142	-0.66	0.508	-3.382198	1.675067
obl_poltav~a	-3.174864	1.610831	-1.97	0.049	-6.332034	-.0176937
obl_kharko~a	-3.262056	1.299571	-2.51	0.012	-5.80917	-.7149434
obl_kherso~a	-.3364566	1.332103	-0.25	0.801	-2.94733	2.274417
obl_khmeln~a	-.9257892	1.30894	-0.71	0.479	-3.491264	1.639685
obl_cherni~a	-2.715894	1.291224	-2.10	0.035	-5.246646	-.1851418
d_educ_sch~f	1.726676	.9415045	1.83	0.067	-.1186389	3.571991
d_educ_sch~l	.5674625	.9281367	0.61	0.541	-1.251652	2.386577
d_educ_pro~s	.81373	.7438868	1.09	0.274	-.6442612	2.271721
d_pos_mng	-1.435142	1.338796	-1.07	0.284	-4.059134	1.18885
d_pos_profes	-1.097332	.8694595	-1.26	0.207	-2.801441	.6067773
d_pos_cler~v	-.9160077	1.043901	-0.88	0.380	-2.962016	1.130001
d_pos_craft	.5606973	.9352023	0.60	0.549	-1.272266	2.39366
d_pos_oper~s	.8815502	1.049051	0.84	0.401	-1.174553	2.937653
d_pos_elem~t	-1.487395	.7722448	-1.93	0.054	-3.000967	.0261774
_cons	-6.851458	4.258581	-1.61	0.108	-15.19812	1.495208

APPENDIX 2

MARGINAL EFFECTS

```
. mfx compute
Marginal effects after logit
      y  = Pr(worked_retired) (predict)
         =   .1413814
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
     age |   .0138834      .00667    2.08   0.037   .000819  .026948   61.5242
cur_te~e |  -.0027271      .00208   -1.31   0.189  -.006796  .001342   18.1371
job_sa~f*|  -.1553888      .09196   -1.69   0.091  -.335626  .024848   .685484
  d_male*|  -.1051899       .0725   -1.45   0.147  -.247297  .036917   .455645
d_marr~d*|   .0613349      .05673    1.08   0.280  -.049845  .172515   .665323
    wage |  -.0005731       .0003   -1.89   0.059  -.001169  .000022   193.544
 pension |   .0008623      .00086    1.00   0.318  -.000829  .002554   147.124
hh_inc~e |  -.0000134      .00014   -0.10   0.923  -.000287   .00026   546.232
d_bad_~h*|   .0249451      .16711    0.15   0.881  -.302587  .352478   .217742
d_aver~h*|   .0365251      .12899    0.28   0.777  -.216292  .289342    .66129
d_good~h*|    .191142       .2791    0.68   0.493  -.355884  .738168    .08871
d_very~h*|   .4225848       .4055    1.04   0.297  -.372185  1.21735   .008065
chroni~s*|     .01832      .19627    0.09   0.926   -.36636     .403    .96371
obl_cr~a*|  -.0864022       .0762   -1.13   0.257  -.235742  .062938   .060484
obl_ki~y*|  -.1377219      .05122   -2.69   0.007  -.238104  -.03734   .076613
obl_ky~a*|  -.0650837      .09675   -0.67   0.501  -.254718   .12455   .040323
obl_vi~a*|  -.0772162      .08047   -0.96   0.337  -.234932    .0805    .03629
obl_vo~a*|  -.0340994      .25591   -0.13   0.894  -.535671  .467473   .012097
obl_dn~a*|  -.1381477      .03924   -3.52   0.000  -.215048 -.061247   .048387
obl_do~a*|  -.1593825      .05058   -3.15   0.002  -.258525  -.06024   .137097
obl_ji~a*|   -.038515      .13327   -0.29   0.773  -.299718  .222688   .032258
o~karp~a*|   .1601741      .28317    0.57   0.572   -.39483  .715178    .03629
o~jskaya*|  -.0788657      .08693   -0.91   0.364  -.249247  .091516   .048387
obl_iv~a*|   .0241127      .17179    0.14   0.888  -.312592  .360817   .040323
obl_lu~a*|  -.0854596      .07443   -1.15   0.251  -.231347  .060428   .076613
obl_lv~a*|  -.1020363      .06677   -1.53   0.126  -.232911  .028838   .064516
obl_od~a*|  -.0773079      .08247   -0.94   0.349  -.238955  .084339   .028226
obl_po~a*|  -.1498843       .0335   -4.47   0.000  -.215544 -.084225   .040323
o~arko~a*|  -.1756195      .04237   -4.14   0.000   -.25867 -.092569   .096774
o~erso~a*|  -.0365127      .12976   -0.28   0.778  -.290836  .217811   .040323
o~meln~a*|  -.0820598      .08135   -1.01   0.313  -.241504  .077384   .032258
o~igov~a*|  -.1431981      .03534   -4.05   0.000  -.212454 -.073942   .040323
d_educ~f*|   .2880526      .18416    1.56   0.118  -.072885   .64899    .21371
d_educ~l*|   .0785143      .14363    0.55   0.585     -.203  .360029   .173387
d_educ~s*|    .107686      .10301    1.05   0.296  -.094203  .309575   .358871
d_pos_~g*|  -.1107271      .06384   -1.73   0.083  -.235856  .014402   .056452
d_pos~es*|  -.1136125       .0796   -1.43   0.153  -.269627  .042402   .282258
d_pos_~v*|  -.0836228       .0695   -1.20   0.229   -.21984  .052594   .068548
d_pos~ft*|   .0780417      .14614    0.53   0.593  -.208385  .364469   .153226
d_pos~rs*|   .1384359      .19877    0.70   0.486   -.25114  .528012   .064516
d_pos~nt*|  -.1383962      .05933   -2.33   0.020  -.254676 -.022116   .229839
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1
```

For males:

```
. mfx compute, at (mean d_male=1)

Marginal effects after logit
      y  = Pr(worked_retired) (predict)
         =   .0924013
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]       X
---------+--------------------------------------------------------------------
     age |   .0095913      .00474    2.02   0.043   .000295  .018887   61.5242
cur_te~e |   -.001884      .00141   -1.34   0.181  -.004642  .000874   18.1371
job_sa~f*|   -.111065      .06699   -1.66   0.097  -.242365  .020235   .685484
  d_male*|  -.1051899       .0725   -1.45   0.147  -.247297  .036917         1
d_marr~d*|   .0421268      .03682    1.14   0.253   -.03003  .114284   .665323
    wage |  -.0003959      .00026   -1.54   0.124    -.0009  .000108   193.544
 pension |   .0005957      .00058    1.02   0.307  -.000547  .001739   147.124
hh_inc~e |  -9.25e-06       .0001   -0.10   0.923  -.000197  .000179   546.232
d_bad_~h*|   .0173361       .1175    0.15   0.883  -.212962  .247634   .217742
d_aver~h*|   .0251338       .0881    0.29   0.775  -.147537  .197805    .66129
d_good~h*|   .1416531      .22039    0.64   0.520  -.290313  .573619    .08871
d_very~h*|   .3513194      .41076    0.86   0.392  -.453755  1.15639   .008065
chroni~s*|   .0125705      .13272    0.09   0.925   -.24755  .272691    .96371
obl_cr~a*|  -.0580129      .05349   -1.08   0.278  -.162842  .046816   .060484
obl_ki~y*|  -.0915894      .04471   -2.05   0.041  -.179227 -.003951   .076613
obl_ky~a*|  -.0439281       .0667   -0.66   0.510  -.174666   .08681   .040323
obl_vi~a*|  -.0518878      .05601   -0.93   0.354  -.161672  .057896    .03629
obl_vo~a*|  -.0232462       .1728   -0.13   0.893  -.361923  .315431   .012097
obl_dn~a*|  -.0914226      .03882   -2.35   0.019  -.167518 -.015327   .048387
obl_do~a*|  -.1068904      .04383   -2.44   0.015  -.192805 -.020976   .137097
obl_ji~a*|  -.0262303      .09131   -0.29   0.774  -.205189  .152729   .032258
o~karp~a*|   .1178812      .22383    0.53   0.598  -.320816  .556578    .03629
o~jskaya*|  -.0530196      .05836   -0.91   0.364  -.167411  .061371   .048387
obl_iv~a*|   .0168093      .12073    0.14   0.889  -.219819  .253438   .040323
obl_lu~a*|   -.057478      .05041   -1.14   0.254  -.156273  .041317   .076613
obl_lv~a*|  -.0682399      .05005   -1.36   0.173  -.166331  .029851   .064516
obl_od~a*|  -.0519137      .05458   -0.95   0.342  -.158889  .055061   .028226
obl_po~a*|  -.0988986      .03809   -2.60   0.009  -.173548  -.02425   .040323
o~arko~a*|  -.1171791      .04895   -2.39   0.017  -.213118 -.021241   .096774
o~erso~a*|  -.0248913      .08859   -0.28   0.779   -.19853  .148748   .040323
o~meln~a*|  -.0550336      .05691   -0.97   0.334  -.166574  .056506   .032258
o~igov~a*|  -.0945468      .03862   -2.45   0.014  -.170248 -.018846   .040323
d_educ~f*|    .217772      .16564    1.31   0.189  -.106876   .54242    .21371
d_educ~l*|   .0554897      .10834    0.51   0.609  -.156846  .267825   .173387
d_educ~s*|   .0757665       .0803    0.94   0.345  -.081615  .233148   .358871
d_pos_~g*|  -.0738126      .05075   -1.45   0.146   -.17329  .025665   .056452
d_pos~es*|  -.0775943      .05805   -1.34   0.181  -.191368  .036179   .282258
d_pos_~v*|  -.0562321      .04915   -1.14   0.253   -.15256  .040095   .068548
d_pos~ft*|   .0552087      .10428    0.53   0.596  -.149167  .259584   .153226
d_pos~rs*|   .1007286      .15178    0.66   0.507  -.196748  .398205   .064516
d_pos~nt*|  -.0939755      .04629   -2.03   0.042  -.184703 -.003248   .229839
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1
```

For females:

```
. mfx compute, at (mean d_male=0)

Marginal effects after logit
      y  = Pr(worked_retired) (predict)
         =  .19759117
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]       X
---------+--------------------------------------------------------------------
     age |   .0181329      .00985    1.84   0.066   -.00118  .037446   61.5242
cur_te~e |  -.0035619       .0029   -1.23   0.220  -.009249  .002126   18.1371
job_sa~f*|  -.1957788      .12091   -1.62   0.105  -.432757    .0412   .685484
  d_male*|  -.1051899       .0725   -1.45   0.147  -.247297  .036917         0
d_marr~d*|   .0806779      .08057    1.00   0.317  -.077233  .238589   .665323
    wage |  -.0007485      .00039   -1.93   0.054  -.001511  .000014   193.544
 pension |   .0011263      .00118    0.95   0.340  -.001189  .003442   147.124
hh_inc~e |  -.0000175      .00018   -0.10   0.924  -.000375   .00034   546.232
d_bad_~h*|   .0323613      .21467    0.15   0.880   -.38838  .453103   .217742
d_aver~h*|    .047928      .17085    0.28   0.779  -.286929  .382784    .66129
d_good~h*|   .2318106      .31809    0.73   0.466  -.391637  .855258    .08871
d_very~h*|   .4623978        .372    1.24   0.214  -.266709  1.19151   .008065
chroni~s*|   .0241164      .26185    0.09   0.927  -.489091  .537323    .96371
obl_cr~a*|  -.1167496      .10743   -1.09   0.277  -.327301  .093802   .060484
obl_ki~y*|  -.1884502      .07797   -2.42   0.016  -.341277 -.035623   .076613
obl_ky~a*|  -.0873734      .13207   -0.66   0.508  -.346216  .171469   .040323
obl_vi~a*|  -.1042197       .1119   -0.93   0.352  -.323541  .115102    .03629
obl_vo~a*|  -.0452316      .34422   -0.13   0.895  -.719897  .629434   .012097
obl_dn~a*|  -.1901526      .06458   -2.94   0.003   -.31673 -.063576   .048387
obl_do~a*|  -.2160545      .08373   -2.58   0.010  -.380157 -.051952   .137097
obl_ji~a*|  -.0511499      .17832   -0.29   0.774  -.400649   .29835   .032258
o~karp~a*|   .1954999      .32322    0.60   0.545  -.437994  .828994    .03629
o~jskaya*|  -.1063932      .12338   -0.86   0.388  -.348207  .135421   .048387
obl_iv~a*|   .0311716      .22003    0.14   0.887  -.400088  .462432   .040323
obl_lu~a*|  -.1152409      .10724   -1.07   0.283  -.325427  .094945   .076613
obl_lv~a*|  -.1385647      .09449   -1.47   0.143  -.323756  .046627   .064516
obl_od~a*|  -.1044283      .11872   -0.88   0.379  -.337114  .128257   .028226
obl_po~a*|  -.2071123      .06096   -3.40   0.001  -.326591 -.087633   .040323
o~arko~a*|  -.2396521      .06593   -3.64   0.000  -.368868 -.110436   .096774
o~erso~a*|  -.0484339      .17357   -0.28   0.780   -.38863  .291763   .040323
o~meln~a*|  -.1110257      .11352   -0.98   0.328  -.333527  .111476   .032258
o~igov~a*|  -.1976814       .0598   -3.31   0.001  -.314886 -.080477   .040323
d_educ~f*|    .343575      .19935    1.72   0.085  -.047148  .734298    .21371
d_educ~l*|   .0999949      .17524    0.57   0.568  -.243476  .443465   .173387
d_educ~s*|   .1379137      .12679    1.09   0.277  -.110597  .386424   .358871
d_pos_~g*|  -.1509771      .08797   -1.72   0.086  -.323401  .021447   .056452
d_pos~es*|  -.1505598      .10955   -1.37   0.169  -.365267  .064147   .282258
d_pos_~v*|  -.1127855      .09776   -1.15   0.249  -.304383  .078812   .068548
d_pos~ft*|   .0992855      .18431    0.54   0.590   -.26196  .460531   .153226
d_pos~rs*|   .1709539      .23558    0.73   0.468  -.290767  .632675   .064516
d_pos~nt*|  -.1847625      .08879   -2.08   0.037  -.358784 -.010741   .229839
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1
```

APPENDIX 3

GOODNESS OF FIT TESTS

```
. lstat

Logistic model for worked_retired

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |        35            11  |         46
     -     |        27           175  |        202
-----------+--------------------------+-----------
   Total   |        62           186  |        248

Classified + if predicted Pr(D) >= .5
True D defined as worked_retired != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   56.45%
Specificity                     Pr( -|~D)   94.09%
Positive predictive value       Pr( D| +)   76.09%
Negative predictive value       Pr(~D| -)   86.63%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)    5.91%
False - rate for true D         Pr( -| D)   43.55%
False + rate for classified +   Pr(~D| +)   23.91%
False - rate for classified -   Pr( D| -)   13.37%
--------------------------------------------------
Correctly classified                        84.68%
--------------------------------------------------

. lfit

Logistic model for worked_retired, goodness-of-fit test

       number of observations =       248
 number of covariate patterns =       248
           Pearson chi2(206) =       273.55
                 Prob > chi2 =         0.0011

. fitstat


Measures of Fit for logit of worked_retired

Log-Lik Intercept Only:     -139.459     Log-Lik Full Model:          -89.440
D(206):                      178.879     LR(41):                      100.039
                                         Prob > LR:                     0.000
McFadden's R2:                 0.359     McFadden's Adj R2:             0.058
Maximum Likelihood R2:         0.332     Cragg & Uhler's R2:            0.492
McKelvey and Zavoina's R2:     0.576     Efron's R2:                    0.402
Variance of y*:                7.761     Variance of error:             3.290
Count R2:                      0.847     Adj Count R2:                  0.387
AIC:                           1.060     AIC*n:                       262.879
BIC:                        -956.887     BIC':                        126.012
```

Model with only a constant:

```
logit worked_retired if leaved_involunt==0 & v1615==1
Iteration 0:   log likelihood = -155.49591
Logit estimates                                   Number of obs   =        281
                                                  LR chi2(0)      =       0.00
                                                  Prob > chi2     =          .
Log likelihood = -155.49591                       Pseudo R2       =     0.0000

------------------------------------------------------------------------------
worked_ret~d |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |  -1.141784   .1392865    -8.20   0.000    -1.414781    -.868788
------------------------------------------------------------------------------

. lstat
Logistic model for worked_retired

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |         0             0  |          0
     -     |        68           213  |        281
-----------+--------------------------+-----------
   Total   |        68           213  |        281

Classified + if predicted Pr(D) >= .5
True D defined as worked_retired != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)    0.00%
Specificity                     Pr( -|~D)  100.00%
Positive predictive value       Pr( D| +)       .%
Negative predictive value       Pr(~D| -)   75.80%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)    0.00%
False - rate for true D         Pr( -| D)  100.00%
False + rate for classified +   Pr(~D| +)       .%
False - rate for classified -   Pr( D| -)   24.20%
--------------------------------------------------
Correctly classified                        75.80%
--------------------------------------------------
```

APPENDIX 4

SAMPLE CONSTRUCTION

The following table summarizes how I have got exactly 248 observations in the sample under study.

Set	**Number Of observations**
ULMS	**8 641**
Age between 55 and 75	2505
Worked in 2003	443
Voluntary retired in 2004	427
Have full set of explanatory variables (final sample)	**248**