SOCIAL SECURITY AND LABOUR SUPPLY IN ETHIOPIA

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ABSTRACT

This paper examines the effect of social security on labor supply using the traditional labor force participation model. Application of a logit regression to the survey data yields results that go counter to theory. That is, the availability of pension income does not reduce labor force participation rates. It is also found, that as age increases, participation in the labor force is significantly reduced for women than men and also for blue-collar jobs than white-collar ones. This result has a policy implication that there is a need for retirement age discrimination act by sex and by type of job. Logit models were estimated for different age groups and it is found that there is no problem arising due to aging or health, which are the main determinants in setting retirement age, until the age of 60 for participation in the labor force. The results also indicate that the probability to participate in the labor force reduces by 0.09 if one goes from age group of 56-60 to the age group of 61-65.

1. INTRODUCTION

It is estimated that more than half of the world's old people rely exclusively on informal and traditional arrangements for income security (Palacious 1994). They receive food, shelter and care from close relatives or extended family. The proportion of old people is on the increase due to the increase in life expectancy and decline in birth rates. But economic development weakens these informal arrangements. Families become smaller and more dispersed. In urban areas people are likely to withdraw from productive work, to live alone and to depend on non-family sources of income in their old age.

It is difficult to give a direct definition or meaning of Social Security. The expression has acquired a wider interpretation in some countries than in others, but basically it can be taken to mean "the protection which society provides for its members, through

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a series of public measures, against the economic and social distress that otherwise would be caused by the stoppage or substantial reduction of earnings resulting from sickness, maternity, employment injury, unemployment, invalidity, old age and death; the provision of medical care; and the provision of subsidies for families with children" (ILO 1989).

With their historic origins in Bismarkian Germany, societies and governments have developed mechanisms, with varying degrees of success and resources, to provide income security for their older members as part of a social safety net for reducing poverty and to protect citizens from certain social risks such as income loss due to disability, aging, illness or unemployment. These arrangements had a beneficial effect on improving labour safety and maintaining household income levels. They also contributed to increase of life expectancy and possibly reduced mortality rates. But these securities are "a concern for all of us—rich as well as poor, young as well as old—because the arrangements adopted can either help or hinder economic growth" (World Bank 1994).

Social security programs are dependent on a country's social policy and the development (strength) of the economy. ILO's Social Security (Minimum Standards) Convention identifies nine well-known programs. These are: Medical Care Benefits, Sickness Benefit, Maternity Benefit, Work Injury Benefit, Old-Age Benefit, Survivors' Benefit, Invalidity Benefit, Unemployment Benefit, and Family Benefit. However, these programs are not established at once. They are rather established step-by-step depending on the country's economic capacity and the citizens' contingency.

The most useful old-age benefit, in social security term, is a life pension. Such a pension is always granted under universal benefit schemes. A social assistance benefit, once granted, also continues for life unless the recipient acquires further resources and ceases to be in need. Established social insurance schemes are designed to pay life pensions, but members who reach the specified age without a sufficient record of employment or contributions may receive lump-sum grants. Among the nine benefits specified earlier, the one exercised in Ethiopia is the Old-Age Benefit, sometimes named as pension. Thus most of this paper's analysis is for this benefit type.

The role of social security in Ethiopia has been a subject of much interest because it affects the basic macroeconomic variables such as saving, consumption, supply of labour, investment, and thereby economic growth.

Changes in the age structure of the population affect the number of people eligible for pension and hence the benefit payments associated with them. Such changes in population may also affect the size and age composition of labour force. Therefore, there may be consequences for the supply of labour as well, by virtue of effects on the

work incentives of pension recipients. The amount received from pension may reduce the incentive for older people to continue working; and the prospect of receiving one may induce those who are not yet of eligible age to make some substitutions of leisure for income earning activities (i.e. reduce labour participation rate). On the other hand, pension contributions may be viewed as taxes that effectively reduce the current wages of workers and depending on one's assumption of labour force behaviour, they may increase participation rate, as workers seek to offset the reduction in incomes by working longer hours or more weeks in a year.

There may also be other channels of cause and effect between the pension plan and demographic variables. Changes in disposable incomes and work incentives may affect the demand for children and hence levels of fertility. Larger benefit payments to the elderly may have a positive effect on their levels of health care and a negative effect on their mortality rates. Demographic variables, which may be affected by the pension plan, may thus affect both the economic burden of a national pension plan and the ability of the economy to sustain the burden.

Moreover, the contribution process associated with the pension plan may have implications for national patterns of saving and consumption. To the extent that the propensity to save is lower for pension recipients than for the non-recipients, the process will tend to reduce aggregate savings and investments. This reduction, in turn, may lower the rate of economic expansion.

Pension plans thus may affect work incentives, savings and investment, and fertility and mortality rates. Indeed, at the level of an individual household, the decisions that underlie all the effects are best thought of as being made simultaneously. However, this study emphasizes the impact of Social Security benefit on labour supply.

This being so, the objectives of this paper are to test whether:

- the availability of retirement income sources, such as pension (social security benefit) is a powerful inducement to retirement i.e., labour force withdrawal,

- there is a need for legislation outlawing the use of mandatory retirement at age 55, which is a common practice currently

- we need an Age Discrimination Act (by job type or by sex) i.e. does a uniform age retirement policy avoid the disadvantages of discrimination between employees? Or do we need different retirement age for different jobs since for labour intensive jobs age 55 might be late while for highly skilled labour it might be a premature (early) retirement?

2. BACKGROUND OF THE FORMAL SOCIAL SECURITY SYSTEM IN ETHIOPIA

2.1. Historical Background

The history of the formal social security system in Ethiopia dates back to the formation of the Social Security Authority (SSA) in 1993 (Public Service Pension Proclamation No 209/1963). This Decree covered only the military and civil service workers. For these groups the pension scheme was funded by a mandatory contribution. A lifetime payment pension strategy was preferred to a lump-sum pay (sometimes called provident fund) since the latter arrangement may be rendered unworkable by individuals' inclinations to dissave.

The coverage of pensions was greatly expanded due to the nationalization of privately owned enterprises by the Derg Proclamation NO 49/1975: "*Employees of Government-Owned Undertakings Pension Proclamation*". The three groups of employees–civil, military and the newly-added employees of government owned undertakings, precipitated the establishment of 3 Fund categories: public service civilian pension fund, public service military pension fund, and pension fund for employees of undertakings, respectively.

The SSA, which is the responsible agency to handle the case, administers four pension schemes namely: old age pension, invalidity pension, sickness benefit/pension and work injury benefit. To maintain international standard and to benefit from international experience, the SSA became an affiliate member of the International Social Security Association (ISSA) in 1985.

In the SSA scheme, normal retirement age is 55 years for both males and females and the scheme is applicable on any type of work. Minimum years of service to qualify for pension entitlement are 10 years. The percentage of pension payroll tax to total labour cost (wage plus employer share of pension payroll tax) amounts to about 09.4 per cent of workers' income. Payroll tax for pension is paid on gross salary; the workers' contribution to payroll tax is 4 per cent of gross salary while the employer's contribution is 6 per cent of the gross salary. A retiree with 10 years of service qualifies for 30% of gross salary calculated as average of the last 36 months pay. For every additional year of service above 10 years the pension benefit is increased by 1 per cent up to a maximum of 40 years of service and 60 per cent of gross salary.

2.2. Basic Statistical Descriptions of SSA Activities

It is estimated that the population over 60 years of age in Ethiopia was 4.5 per cent of the total in 1990; it is expected to fall to 3.9 in 2020 and rise afterwards to 4.2, 6.8 and 15.1 per cent in 2030, 2050 and 2075, respectively. The dependency ratio

(population over 60/population 20-59) was 11.5 per cent in 1990 and is expected to increase in the future.

Public pension spending is 1.1 per cent of GDP while receipts as a percentage of GDP is 1.5 per cent, which gives a ratio of net saving to benefit spending as 36.0 per cent. These pension-spending indicators show that there is a surplus of pension funds. This and a relatively small old population, in the short run, allows the social security system to accumulate saving; thereby increasing national saving and stimulating investment and growth. Currently, only 4.2 per cent of the receipt of SSA is comes from financial investment. This is because it is only the "undertaking fund" that can be invested.

Moreover, since only government employees are covered by the pension scheme, large portion of the eligible age population is excluded. At present, the total number of pension beneficiaries is 439,363.

Civilian beneficiaries account for 24.2 of the total pension beneficiaries, while the military and undertaking beneficiaries are 61.6 and 14.2 per cent, respectively. The high proportion of military beneficiaries could be explained by the impact of the war that has been ravaging the country for decades.

Beneficiaries can also be classified as pensioners and survivors. Pensioners' account for 49.7 per cent while remaining is the share of survivors. Among the pensioners, 65.5 per cent are military while 21.2 and 13.3 per cent are civilian and undertaking pensioners, respectively; while, out of the total survivors, 57.8, 27.1, and 15.1 per cent are military, civilian and undertaking survivors, respectively. There are three types of survivors: children, wives/husbands and parents. The proportion of survivors in each type is 37.7, 42.6 and 19.7 per cent for children, wives/husbands and parents, respectively.

Though it is conceivable to classify beneficiaries by region as well, it is currently difficult to tell the exact number of beneficiaries in each region due to the new regional structure. However, it is estimated that more than 70 per cent of the beneficiaries live in three regions: Addis Ababa, Oromia and Amhara regions. Some 6 per cent of the beneficiaries are located in Eritrea.

3. LITERATURE SURVEY

3.1. Theoretical Framework

3.1.1. Determinants of Retirement

The mandatory retirement age of 55 is a result of the retirement policy of the government in Ethiopia. Europe and the United States appear to be moving in the opposite direction with respect to changes in the mandatory retirement age. Presumably, to help alleviate problems of youth unemployment, in Europe the tendency is to encourage a lowering of the retirement age. In the U.S., on the other hand, the trend seems to be in the opposite direction. Recent legislation has removed any mandatory retirement age in the federal public service and has forbidden a mandatory retirement age of 70 in most other sectors. The fact that the mandatory retirement age is not immutable suggests that it can change in response to other basic forces that affect the retirement decision and that accounts for the existence of mandatory retirement itself.

Economic theory, in particular the income-leisure choice theory, indicates that the demand for leisure–as indicated, for example, by the decision to retire early–is positively related to one's wealth, and is related to expected earnings. The wealth effect is positive, reflecting a pure income effect: with more wealth we buy more of all normal goods, including leisure in the form of retirement. The impact of expected earnings is indeterminate, reflecting the opposite influences of income and substitution effects. An increase in expected earnings increases the income forgone if one retires and therefore raises the (opportunity) cost of retirement: this has a pure substitution effect reducing the demand for retirement leisure. On the other hand, an increase in expected earnings also means an increase in expected wealth, and just like wealth from non-labour sources, this would increase the demand for retirement leisure. Since the income and substitution effects work in opposite directions, the impact of an increase in expected earnings on retirement is ultimately an empirical proposition.

Features of the social insurance schemes can have a substantial impact on retirement decision. The pension itself, like all fixed benefit payments, has a pure income effect inducing retirement. In addition, for those who work, the implicit tax of the pension reduction associated with the retirement tax, and the explicit payroll tax used to finance the scheme, both lower the returns to work and hence make retirement more financially attractive. That is both taxes involve a substitution effect towards retirement because the opportunity cost of leisure in the form of retirement is lowered by the amount of tax on forgone earnings. To be sure, the tax on earnings also involves an income effect working in the opposite direction, that is, our reduced after-tax income means we can buy less of everything including leisure in the form of

retirement. Thus, both the substitution effect and the (net) income effect of the features of social insurance serve to unambiguously induce retirement.

In addition to the mandatory retirement age, wealth and earnings, and the existence of social insurance, the retirement decision can be affected by other factors. The changing nature of work towards more white-collar jobs and away from physical tasks may make it feasible for many to work longer. The decline of the extended family may make retirement less attractive. On the other hand, individuals may be induced into early retirement to the extent that their jobs disappear due to economic change and dislocation.

Of prime importance in the retirement decision, however, is the potential impact of health. People approaching the usual retirement age obviously can be subject to health problems that could encourage them to retire. This may be the case, particularly if their accumulated wealth or pension income enables them to retire at a reasonable income. The various determinants of the retirement decision are obviously interrelated.

3.2. Empirical Evidence

Teshome (1995) described how non- wage incomes such as pensions adversely affect participation in work (or employment). Such incomes are inversely related to the rate of participation. The implication is that, if social security benefits are higher, participation rates of the labour force (or labour supply) are reduced. Papers by Boskin (1977), Quinn (1977) and Burkhauser (1978) argue that social security that makes benefits conditional on market employment decisions affect the labour supply of older people. Pension rules tie acceptance of a pension to leaving the job and may in some cases restrict work in other jobs. Social security restricts market employment through its effect on earnings. These studies indicate that such constraints on market employment reduce the labour supply of older people.

Feldstein (1974) argues that social security, as inter-generational transfers are not entirely offset by private inter-generational transfers. If this is the case, increase in the wealth of recipients reduces their labour supply during all ages of life. However, if there is no net change in total transfers, as Barro (1979) argues, then no wealth-induced labour supply changes occur. Vincent and David (1981) modelled the effect of social security, pensions, and other form of social insurance on individual retirement decisions. Three strong assumptions: perfect capital markets, actuarial fairness, and certain lifetimes together imply that social insurance has no effect on individuals' incentives to retire. But, they argued that any departure from the above assumptions implies that there is such an effect, which is often systematic. In particular, when capital markets do not permit consumption loans, benefits are actuarially fair and available at retirement, however early, and lifetimes are certain,

raising the level at which workers are required to participate in the social insurance plan advances retirement.

Anthony (1979), using a life cycle model, looked at the effect of social security on one's income. He shows that any change in lifetime income can affect the amount of labour that a person supplies in the market, i.e. if social security raises lifetime income the life cycle model would imply some decrease in labour supply. This could occur as a reduction in hours worked per year in all years of a person's working life or a decrease in the number of years of work, that is early retirement. And constrained to work full time, individuals may choose early retirement as the feasible response to social security's lifetime income effect. Feldstein (1985), in discussing the optimal level of social security benefits, shows that it depends on balancing the protection that these benefits offer to those who lack the foresight to provide for their own old age against the welfare costs of distorting economic behaviour. The primary such cost is the distortion in private saving. In the analysis, he shows that even if every individual is substantially myopic (and would therefore save less for his retirement than perfect foresight utility maximum would imply), it may be optimal to have either no social security retirement pay or a very low ratio of benefits to earnings.

4. MODEL, METHODOLOGY AND DATA

4.1. Retirement Age

In deciding an optimal retirement age, one has to look at the perspectives of the following four interest groups. The first group consists of the employees. By looking at his/her wage and his/her social security benefit (pension), the employee chooses a retirement age that maximizes his/her lifetime utility. The second group is that of the employer. Retiring a worker is one of the ways to deal with declining marginal product that may follow aging of workers. It is also a way to create promotion possibilities for younger ones. Thus, the employer chooses an optimal retirement age maximizing the benefit that he/she can get from each worker. Third we have the interest of the SSA. The institution chooses a retirement age whereby one's lifetime pension payment should not exceed one's contribution throughout his working years. At last, but not least, we have the government. One way to deal with unemployment is to retire older workers in order to generate new job opportunities to the young. The government has also the responsibility to care for the aged.

The fourth aspect is beyond the scope and this paper. While our main concern is the first part, i e. determining the factors that affect the employee's decision of retirement and to look at how one chooses the optimal retirement age using the Lagrangear method, we will also discuss the second and third aspects briefly.

4.1.1. From the Employer Point of View

In an interview conducted with the management of some enterprises, we have noticed that mandatory retirement at age 55 made them lose their experienced workers who can still make a good contribution to the organization. Many organizations overcome this problem by employing retired worker on a contractual basis. We have also noticed that 95% of the organizations interviewed prefer a retirement age between 57 and 62.

One drawback of this paper is that it has not analysed the factors that will affect the employers' willingness to accept a retirement age that is higher thoroughly. Besides, it is difficult to come up with a specific figure on which retirement age has to be. But, one point that the employers agreed about is that, for many groups of workers, the existing retirement age is low and needs adjustment.

Most justifications for mandatory retirement age rely on the following three notions:

a) A worker's productivity declines significantly after some age, say 55, and that mandatory retirement is the employer's way to deal with this reduced productivity.

b) Mandatory retirement creates promotion possibilities for younger workers.

c) A uniform retirement policy avoids the disadvantage of discrimination between employees.

Using the theory of agency, which provides insight on how to compensate an agent in a manner creating harmony of interest between the principal and the agent, economists respond to the defences of mandatory retirement. In this light, the following are the gist of their arguments

Granted that there is a significant diversity of talent in the labour force and no one claims that only the most talented individuals are the ones who can find jobs. Instead, economists believe that differences in wage rates reflect differences in productivity. The same is true of older workers. If older workers were less productive than younger workers, employers in a competitive labour market would pay older workers lower wage rate than they pay younger ones. There is no necessity to layoff older workers simply because their productivity is not as high as the younger workers. In fact, very young workers earn less than middle-aged workers as a reflection of their lower productivity. Yet, we do not find researchers arguing that the minimum age for employment should be 40 (or any higher age). The correct question then is, why does employment rather than wage adjust?

Some have argued that morale would be adversely affected by lowering wages of older workers. But it is not obvious that terminating workers rather than lowering their

wages will improve the morale of the remaining work force. A 50-year-old worker who is faced with approaching termination is not necessarily going to have a better attitude than one who knows his/her wage rate will be lowered 5 years from now.

Another view often expressed is that one cannot judge the decrease in productivity so that it would be impossible to adjust wages accordingly. But, laying-off a worker adjusts his/her wage rate to zero. This seems to be a poorer approximation of his/her true productivity decline than any smooth wage adjustment. Furthermore, employers face a problem of gauging productivity for all workers. There is nothing unique about 55-year-olds in this regard. Thus, a productivity decline is not a sufficient explanation for the existence of mandatory retirement.

The second explanation for maintaining mandatory retirement ignores at least two facts:

i) Young workers know that they will become old workers at some date in the future. They care about the present value of some lifetime wage path rather than the present value of any segment of it. Although they would prefer to be promoted when young, they also would prefer, if their retirement is truly mandatory, to continue working when old.

ii) Promotion may be interpreted as an increase in one's wage rate (and perhaps a change in the accompanying job title) that occurs as one's productivity rises over the life cycle. The firm will, in competition, pay the worker his/her marginal product, no matter how old he/she is. Thus, there would be no incentive for a firm to retire a worker whose marginal product is equal to or greater than his wage rate in order to "promote" a younger worker.

A uniform retirement policy raises two questions:

First, there is no requirement for a uniform retirement policy to be one with a provision for mandatory retirement age. One could easily set up a flexible retirement scheme, where payment varies with length of service and is invariant across individuals, but does not require mandatory retirement at any given age.

The second problem is that employers discriminate between employees at every level: some are promoted, others are terminated, others experience wage gain while others do not, and the existence of differences between workers is dealt with in many ways. So, why should employers or employees favour a system that reduces the ability of the employer to compensate workers differentially?

4.1.2. The SSA's Point of View

The SSA needs to make an actuarial evaluation. This is the calculation of risks involved on the pension fund, i.e., comparing the present value of the likely magnitudes of pension contributions to pension payments. It involves the analysis of life expectancy, replacement ratio and also demographic and socio-economic conditions in the country.

From the theoretical point of view, it is difficult to predict the likely effects of increase or decrease in a retirement age. For example, if we increase the retirement age from 55 to 60 we can notice two effects.

i). The workers contribute for an additional 5 years to the pension fund i.e., causes an increase in the pension fund.

ii). If employees continue to work, they will not be entitled to pension benefit i.e. had they been retired the SSA could have paid them a pension. So, the SSA will save a 5-year pension benefit payment.

But we know that pension payments or calculations are a function of average of the last 36 months salary and number of service years, which are both positively related to pension benefit. So, an addition of 5 working-years means the service years will be higher and also there might be a wage increase that in turn makes the average salary higher. These make future pension benefits larger. And if life expectancy is higher (i.e. if a pensioner is paid for longer period) the net loss will be higher than the net gain that would lead to the drowning of the pension fund. Thus, it a careful actuarial evaluation or study must be undertaken to judge which decision (increase or decrease) about the retirement age benefits the SSA or its fund.

4.1.3. The Employee's Point of View

Here we consider a rational employee (consumer) who maximizes his/her lifetime utility that is a function of his/her income. A person decides to work based on opportunities available inside and outside the market. This involves comparing the value of a pension's time in market and non-market activity, that is, the values for his work and leisure. In the life cycle model these values are influenced by social security. In this section, we deal with two topics: first using the Lagrangean approach we derive the conditions of when to retire, and second, using probit/logit analysis, based on a traditional labour force participation model to which social security benefit was added, we estimate the probability of retirement for different age groups.

4.1.3.1. Optimal Policy to Retire Human Capital

The goals of this section are to derive the conditions leading the worker to decide when to retire, given the wage structure and the retirement benefits, and to study the effects of social security retirement benefits on retirement. The basic framework is based on Chow (1997). Labour services are usually called services from human capital (see Becker 1964; and Schultz 1961). Here a worker has to decide when to retire. The decision variable is u_t, where

$u_t = 1$: the worker decides to continue working, and
$u_t = 0$: the worker decides to retire and receive a pension.

The model used is due to Lumsdain, Stock, and Wise (1992). An important characteristic of this model is its use of discrete control variable[1]. The observed state variable[2] (X_t) is the benefit (wage or pension) in year t, and the unobserved state variable (E_t) is assumed to be iid. The worker's utility function is:

$$r\left(X_t, E_t, u_t\right) = \begin{cases} X_t^{\theta_1}\mu_1 + E_t(1) & \text{if } u_t = 1 \\ \left(\mu_2\theta_2 X_t\right)^{\theta_1} + E_t(0) & \text{if } u_t = 0 \end{cases} \qquad [1]$$

Where μ_1, μ_2 represent time-invariant worker specific heterogeneity.

Concerning the wage and pension benefits X_s, in year s, a worker at age t who continues to work will receive a given wage Y_s, in subsequent years s. If a worker retires at age r, subsequent retirement benefits will be $B_s(r)$. At age t, a worker can calculate the present value of his or her future income stream if he or she retires at age r, using a discount factor β.

$$v_t(r) = \sum_{s=t}^{r-1} \beta^{s-t} U_W\left(Y_s\right) + \sum_{s=r}^{T} \beta^{s-t} U_R\left(B_s(r)\right) \qquad [2]$$

Where T = compulsory retirement age.

$U_W(Y_s) = X_s^{\theta_1} + \mu_1 + E_s(1)$ (i.e. the top half of equation [1]

$U_R(B_s(r)) = (\mu_2\theta_2 X_s)^{\theta_1} + E_s(0)$ (the bottom half of equation [1], when $u_s = 0$)

The worker is assumed to decide which year to retire (setting $u_s = 0$) by maximizing the expectation of $V_t(r)$ subject to a constraint on X_{s+1} given as:

$$X_{s+1} = u_s Y_{s+1} + (1-u_s)B_{s+1}(r)$$

The optimisation problem can be written as,

$$\begin{aligned} &Max.\ E(V_t(r)) \\ &\text{s.t. } X_{S+1} = u_S Y_{S+1} + (1-u_S)B_{S+1}(r) \end{aligned} \qquad [3]$$

Rewriting [2] and using $E_t\sum_t(\cdot) = \sum_t E_t(\cdot)$ gives

$$E_t(V_t(r)) = \sum_{s=t}^{T} \beta^{s-t} E_t\left(u_S U_W(Y_S) + (1-u_S)U_R(B_S(r))\right) \qquad [4]$$

Writing the Lagrangean L:

$$L = \sum_{s=t}^{T} \beta^{s-t} E_t\left(u_s\left(x_s^{\theta_1} + \mu_1 + E(1)\right) + (1-u_s)\left((\mu_2\theta_2 X_s)^{\theta_1}\right) + E_s(0)\right) - \qquad [5]$$

$$\lambda_{s+1}\beta\left(X_{s+1} - u_s Y_{s+1} - (1-u_s)B_{s+1}(r)\right)$$

The Lagrange multipliers, λ_{s+1} are introduced only for those state variables that are constrained by the control variables.

$\beta^{(s-t)+1}$ is introduced so that λ_{s+1} can be interpreted as the marginal contribution of X_{s+1} to total multiplied utility evaluated at period s+l; λ_{s+1} has to be discounted by $\beta^{(s-t)+1}$ to obtain the marginal contribution of X_{s+1} valued at the time t.

To make the problem operational, we need to determine the law of motion of X and Y. For simplicity let's assume that:

$$Y_{s+1} = Y_s + \gamma_{y,s+1} \qquad [6]$$

Where $\gamma_{y,s+1}$ is determined by the "promotion rule". However, it may also be a random variable.

At the beginning of period s, the worker decides whether to continue working or retire. The implications of the choices are:

a). current

$$X_s = Y_s \quad \text{if } u_s = 1 \qquad [7]$$

$$X_s = B_s(r) \quad \text{if } u_s = 0 \qquad [8]$$

i.e. if he continues working he gets a wage and if he retires he gets a pension.

b). future

$$X_{s+1} = Y_{s+1} = Y_s + \gamma_{y,s+1} \quad \text{if } u_s = 1 \qquad [9]$$

$$X_{s+1} = B_{s+1}(r) \quad \text{if } u_s = 0 \qquad [10]$$

Note that $B_{s+1}(r)$ may be equal to $B_s(r)$ depending on the pension scheme.

Thus,

$$X_{s+1} = u_s\left(Y_s + \gamma_{y,s+1}\right) + (1 - u_s)B_{s+1}(r) \qquad [11]$$

Letting $Y_s=X_s$, we can write

$$L=\sum_{s=t}^{T}\beta^{s-t}E_t\left(u_s\left(x_s^{\theta_1}+\mu_1+E_s(1)\right)+(1-u_s)\left((\mu_2\theta_2X_s)^{\theta_1}+E_s(0)\right)\right. \\ \left.-\lambda_{s+1}\beta\left(X_{s+1}-u_s\left(x_s+\gamma_{s,s+1}\right)-(1-u_s)B_{t+1}(r)\right)\right) \qquad [12]$$

Then the first order condition are obtained as follows

$$L_x:\beta^{t-s}\frac{\partial L}{\partial X}=E_t\left(u_s\theta_1x_s^{\theta_1}+\theta_1(1-u_s)(\mu_2\theta_2)^{\theta_1}X^{\theta_1-1}-\lambda_s+\beta u_s\lambda_{s+1}\right)=0 \qquad [13]$$

That is, differentiating L with respect to X_s (Leibniz's rule) and noting that X_s appears with λ_s twice (with λ_s and λ_{s+1}).

a) Expectations are formed on the basis of available information, i.e.

$$E_t(Z_s)=E\left(\frac{Z_s}{\Omega_t}\right) \qquad [14]$$

Where Ω_t is the information set at time t

(b\ The law of iterated expectation implies that

$$E_t(Z_s)=E\left(E_s\left(\frac{Z_s/\Omega_s}{\Omega_t}\right)\right) \qquad [15]$$

(c) At s; all time-s variables are known (an assumption) such that: -

$$E\left(Z_s/\Omega_s\right)=Z_s \qquad [16]$$

Using (a) - (c) we can rewrite [14] as:

$$L_x:\ u_s\theta_1 X_s^{\theta_1-1} + \theta_1(1-u_s)(\mu_2\theta_2)^{\theta_1-1} - \lambda_s + \beta u_s E_s(\lambda_{s+1}) = 0 \qquad [17]$$

Because one cannot differentiate L with respect to the discrete control variable u_t we consider the difference

$$\Delta Lu = L(u_s = 1) - L(u_s = 0) \qquad [18]$$

Noting

$$L(u_s = 1) = \beta^{s-t} E_t\left(\left(x_s^{\theta_1} + \mu_1 + E_s(1)\right) - \lambda_{s+1}\beta\left(X_{s+1} - \left(X_s + \gamma_{y,s+1}\right)\right)\right)$$
$$+\sum_{\substack{j\neq s\\ j=t}}^{T} \beta^{j-t} E_t \begin{pmatrix} u_j\left(x_j^{\theta_1} + \mu_1 + E_j(1)\right) + \left(1-u_j\right)\left(\left(\mu_2\theta_2 X_j\right)^{\theta_1} + E_j(0)\right) \\ -\lambda_{j+1}\beta\left(X_{j+1} - u_j\left(x_j + \gamma_{y,j+1}\right) - \left(1-u_j\right)B_{j+1}(r)\right) \end{pmatrix} \qquad [19]$$

$$L(u_s = 0) = \beta_{s-t} E_t\left(\left(\mu_2\theta_2 X_s\right)^{\theta_1} + E_s(0)\right) - \lambda_{s+1}\beta\left(X_{s+1} - B_{s+1}(r)\right) +$$
$$+\sum_{\substack{j\neq s\\ j=t}}^{T} \beta^{j-t} E_t \begin{pmatrix} u_j\left(x_j^{\theta_1} + \mu_1 + E_j(1)\right) + \left(1-u_j\right)\left(\left(\mu_2\theta_2 X_j\right)^{\theta_1} + E_j(0)\right) \\ -\lambda_{j+1}\beta\begin{pmatrix} X_{j+1} - u_j\left(x_j + \gamma_{y,j+1}\right) - \\ \left(1-u_j\right)B_{j+1}(r) \end{pmatrix} \end{pmatrix} \qquad [20]$$

$$t \le j \le T$$

Thus,

$$\Delta Lu = L(u_s = 1) - L(u_s = 0)$$

$$= \beta^{s-t} E_t \begin{pmatrix} \left(X_s^{\theta_1} + \mu_1 + E_s(1)\right) - \lambda_{s+1}\beta\left(X_{s+1} - \left(X_s + \gamma_{y,s+1}\right)\right) \\ -\left(\mu_2\theta_2 X_s\right)^{\theta_1} - E_s(0) \end{pmatrix} + \qquad [21]$$

$$+\lambda_{s+1}\beta\left(X_{s+1} - B_{s+1}(r)\right) = 0$$

Using the law of iterated expectations and that $E_s(Z_s) = Z_s$, and multiplying through by $\beta^{-(s-t)}$ we get

$$\Delta Lu = \left(X_s^{\theta_1} + \mu_1 + E_s(1)\right) - \left(\mu_2\theta_2 X_s\right)^{\theta_1} \qquad [22]$$

$$- E_s(0) + \beta\left(X_s + \gamma_{y,s+1}\right) - B_{s+1}(r)E_s(\lambda_{s+1}) = 0$$

Since $\left(X_s + \gamma_{y,s+1}\right) = Y_{s+1}$ and $B_{s+1}(r)$ are assumed known.

Thus, the FOCs are given by equations [17] and [22].

Note that $\left(X_s^{\theta_1} + \mu_1 + E_s(1)\right) + \beta Y_{s+1}E(\lambda_{s+1})$ is the expected discounted utility from continuing employment,

$E(\lambda_{s+1})$ converts Y_{s+1} into utility units and λ is the marginal utility of income, and

$\left(\mu_2\theta_2 X_s\right)^{\theta_1} - E_s(0) + \beta B_{s+1}(r)E(\lambda_{s+1})$ is the expected discounted utility of retiring.

Then:

(a) The worker continues in employment so long as discounted expected utility from doing so exceeds that from retiring.

(b) At the early years of employment (i.e., the further s is from T) it pays to stay in employment. As s approaches T, the differential utility from working declines. One

may postulate that there is a period s*<T at which the worker is indifferent between working and retiring because they provide equal utility, i.e. at s*

$$U^*W = U^*R$$

Assuming that U_W and U_R are monotonic, this implies that:

$$\text{if } s < s^*, \quad U_w^* > U_R^* \quad \Rightarrow u_s = 1$$
$$\text{if } s > s^*, \quad U_w^* < U_R^* \quad \Rightarrow u_s = 0$$

The question is that: what is the level of X_s^* at which $U_W^* = U_R^*$?
To find X* let $u_s = 0$, then from equation [17] we obtain:

$$\begin{aligned} \lambda(X^*) &= \theta_1(\mu_1\theta_2)^{\theta_1}(X^*)^{\theta_1-1} \\ &= \left.\frac{\partial r(0)}{\partial X}\right|_{X=X^*} \\ &= r_x^*(0) \end{aligned} \qquad [23]$$

At X_s=X*, [17] also holds for U_s=1 (since the worker is indifferent between working and retiring), such that:

$$\begin{aligned} \beta E_s(\lambda_{s+1}) &= \lambda(X^*) - \theta_1(X^*)^{\theta-1} \\ &= r_x^*(0) - r_x^*(1) \end{aligned} \qquad [24]$$

Substituting [24] for $\beta E_s(\lambda_{s+1})$ in [22] we obtain:

$$r^*(1) - r^*(0) - \left[Y_{x+1} - B_{x+1}(r)\right]\left[r_x^*(0) - r_x^*(1)\right] = 0$$

$$\Rightarrow r^*(1) - r^*(0) + \left[X^* + \gamma_{y,x+1} - B_{x+1}(r)\right]\left[r_x^*(1) - r_x^*(0)\right] = 0$$

$$\Rightarrow X^*\left[r_x^*(1) - r_x^*(0)\right] = r_x^*(1) - r_x^*(0) - \left[B_{x+1}(r) - \gamma_{y,x+1}\right]\left[r_x^*(1) - r_x^*(0)\right]$$

$$\Rightarrow X^* = \frac{-\left[r^*(1) - r^*(0)\right]}{\left[r_x^*(1) - r_x^*(0)\right]} - \left[B_{x+1}(r) - \gamma_{y,x+1}\right]$$

$$X^* = \left[B_{x+1}(r) - \gamma_{y,x+1}\right] - \frac{\left[r^*(0) - r^*(1)\right]}{\left[r_x^*(0) - r_x^*(1)\right]} \qquad [25]$$

The optimal policy is to continue working until X reaches X* given by [25]. The critical income X* is the difference between the opportunity cost of not retiring and the ratio of the period t net utility gain from retiring to the difference between the marginal utilities from retiring and not retiring.

Equation [25] can be re-written as

$$X^* = \frac{B(r)[r_x^*(0) - r_x^*(1)] - [\gamma_y[r_x^*(0) - r_x^*(1)] + [r^*(0) - r^*(1)]]}{[r_x^*(0) - r_x^*(1)]} \qquad [26]$$

$$X^*: [r^*(1) - r^*(0)] = [(X^* + \gamma_y) - B(r)][r_x^*(0) - r_x^*(1)]$$
$$= [B(r) - (X^* + \gamma_y)][r_x^*(1) - r_x^*(0)] \qquad [27]$$

$r^*(1) - r^*(0)$ = the net utility gain or return to staying in employment

$\left[B(r) - (X^* + \gamma_y)\right]\left[r_x^*(1) - r_x^*(0)\right]$ = the net loss (or opportunity cost of) from staying in employment (not retiring)

Thus, the optimal policy to retire human capital is when the net utility gain from staying in employment equals the opportunity cost of not retiring (staying in employment).

4.1.3.2. The Data

The data used in this paper was obtained from a survey undertaken in five towns including Addis Ababa. The selection of the towns was made based on the concentration of pensioners. Two hundred and seventy nine pensioners were interviewed. Though due to financial and time constraints we couldn't make the sample larger, we have noticed that the responses given are very similar. This assures us that although we do not have large samples, we will not miss much basic information. The variable names and their code are presented in Appendix I.

4.1.3.3. Econometric Specification

The Model

As discussed in section 4.1.3.1 the phenomenon we seek to model is discrete. Thus, a person is either willing to participate in labour force (=1) or not (=0). It will generally turn out that the models and techniques used for such analysis are different. Thus we apply or use **qualitative response models.**

The probability of retirement was estimated using qualitative response models (probit/logit) based on a traditional labour force participation model to which pension income was added. For a bivariate dependent variable, Logit and probit are generally equally good. Though some argue that probit is to be preferred in the bivariate case, while logit should be used for a multivariate discrete variable. In the case of a multivariate discrete variable, logit and probit might give different marginal parameters. If so, it becomes important to compare the goodness of fit of the two models, and select the model, which shows a relatively best fit, given that the results make sense. As discussed in Greene (1997), a goodness-of-fit measure is a summary statistic indicating the accuracy with which a model approximates the observed data. In the case in which the dependent variables are qualitative, accuracy can be judged either in terms of the fit between the calculated (predicted) probabilities and the observed (actual) response frequencies or in terms of the model to forecast observed responses. An analog to the R^2 in a conventional regression model is the likelihood ratio index (LRI) that is found from the maximum likelihood estimate of the models.

The LRI is obviously related to the likelihood ratio statistic for testing the hypothesis that the coefficient vector is zero. Other similar fit measures have been proposed. Although they are suggestive, it is not clear whether they have any relationship to maximizing any type of fit in the more familiar sense. The maximum likelihood estimator is not chosen so as to maximize a fitting criterion based on prediction of the dependent variable, as it is in the classical regression (which maximizes R^2). It is

chosen to maximize the joint density of the observed dependent variables. Here we choose a model with the highest LRI value

The second factor used to choose between the logit and probit is to compare their prediction power i.e. what per cent of the observations are predicted correctly. From the summary table of the models that show the frequencies of the actual and the predicted observations, we sum up only those where the actual and the predicted have the same observation and then divide it by the total frequency. This gives us the proportion or the percentage of the observations that the model predicts correctly. This value sometimes is called count R^2. Therefore, we choose the one with the highest count R^2. Such comparisons, as shown in the next sections, led us to choose the logit model.

The estimated qualitative response models are all non-linear. The coefficients of the models are, therefore, not equal to the marginal effects. Thus, in the LIMDEP package we have computed the marginal effects. The method we used in building the model is to include a lot of parameters from the beginning and then step by step remove the variable with the smallest insignificant value, though one should not remove variables of particular interest. While omitting a relevant explanatory variable is not good, including a variable that is insignificant will not harm the model.

The model included age, wage before retirement, pension income, family size, year of service, retirement age, three dummies for education (primary, secondary and tertiary) and binary variables for sex, existence of other income, job type, health condition, existence of problem that arises due to aging. The model was estimated separately for age groups: 56-60, 61-65, 66-70 and a general willingness to participate model for current age. Other models were estimated for comparing the effect of different attributes by splitting the sample. We have tried to compare the effects of men and women and also the effect of being involved in laborious type of job to the non-laborious for the above specified age groups independently. The result is two tables of estimated parameters from which one can judge the relative difference between the two sexes or type of jobs. By comparing the slope of the marginal parameters of the two groups, we can see if there is any difference in their willingness to participate in the labour force. We can "see" a difference even for insignificant variables, though we have to remember that they are point estimates that are not significant.

Prediction of Effects of Changes in the Explanatory Variable

After estimating the parameters of the explanatory variables, we would like to know the effects of changes in any of the explanatory variables on the probabilities of the dependent variable i.e. willingness to participate in the labour force. To deal with this

problem we used basic ideas underlying the logit model, following Gujarati (1995), which is given below.

The (cumulative) logistic distribution function is given as

$$P_i = E\left(Y = 1/X_i\right) = \frac{1}{1+e^{-Z_i}} \qquad [1]$$

Where $Z_i=\beta X_i$

Xi= a vector of explanatory variables

β= a vector of the coefficients

It is easy to verify that as Z_i ranges from $-\infty$ to $+\infty$, P_i ranges between 0 and 1 and that P_i is nonlinearly related to Z_i.

If P_i, the probability of participating in the labour force is given by (1), then $(1 - P_i)$, the probability of not participating in the labour force, is

$$1 - P_i = \frac{1}{1+e^{Z_i}} \qquad [2]$$

Thus we can compute the odds ratio as

$$\frac{P_i}{1-P_i} = \frac{1+e^{Z_i}}{1+e^{-Z_i}} = e^{Z_i} \qquad [3]$$

Where $\frac{P_i}{1-P_i}$ is the odds ratio in favor of participating in the labor force.

It is the ratio of the probability that an individual will participate in the labour force to the probability that it will not participate.

If we take the natural log of [3], we obtain the log of the odds ratio:

$$L_i = \ln\frac{P_i}{1-P_i} = Z_i \qquad [4]$$
$$= \beta X_i$$

equation [4] is not only linear in X, but also (from the estimation view point) linear in parameters. L is the logit and hence the name logit models for models like [4]. It is this model that is estimated in this paper.

From running regression of [4], the estimated slope coefficient suggests that for a unit increase in the explanatory variable, the log of the odds in favour of participating in the labour force changes by about the coefficient of the explanatory variable. In general, if we take the antilog of the jth slope coefficient, subtract one from it, and multiply the result by 100, we will get the per cent change in the odds for a unit increase in the jth regressor.

Thus, the coefficients of the logit model do not give the change in the probability of participating in the labour force rather they give the change in log of the odds ratio of participating in the labour force per unit change in explanatory variable. Thus, the change in the probability due to a change in the explanatory variable, say X_j, can be computed from [1] as

$$\frac{\partial P_i}{\partial X_{ij}} = \beta_j P_i\left(1 - P_i\right) \qquad [5]$$

Equation [5] shows that the rate of change in probability involves not only the coefficient β_j but also the level of probability from which the change is measured. Usually this probability value is computed at the mean values of the explanatory variables.

Willingness to Participate Model for Current Age

The LRI for probit equals 0.309 (lnL and $\ln L_o$, equals 122.24 and 176.89, respectively) while for the logit, it is 0.324 (lnL and $\ln L_o$, equals 119.56 and 176.89, respectively). The probit model predicts 230 of the 279 or 82.4 per cent of the observations correctly, while the logit model predicts 232 of the 279 or 83.1 per cent of the observations correctly. Thus, we have chosen a logit model for our analysis.

Our chosen model is a logit model that is highly significant, with a likelihood ratio test of the hypothesis that the coefficients (13 of them) are zero based on a chi-squared value of 114.65 with 13 degrees of freedom at any significance level.*

* Test for hetroskedesticity is not done since the tests are specifically for the probit model and are not well suited to the logit model - which is our choice.

The logit regression results, which are partial derivatives of probabilities with respect to the vector characteristics, are presented below. They are computed at the mean values of the explanatory variables.

Table 1. Logit Regression Result

Variable	Coefficient	S.e.	t-ratio
CONSTANT	-1.24340	0.58411	2.129
AGENOW	-0.01179	0.00853	-1.382
AGEPR	0.44305	0.09920	4.466
SECEDUC	- 0.17408	0.12590	-1.383
TEREDUC	- 0.20245	0.13892	-1.457
FS	0.02446	0.01761	1.389
HEALTH	0.38634	0.10231	3.776
RETAGE	0.04028	0.01408	2.860
SERVYR	- 0.02141	0.00831	- 2.576
SEX	- 0.04594	0.07544	- 0.609
WGBFR	-0.00065	0.00029	- 2.250
JOBTYP	- 0.03085	0.08063	- 0.383
OTHINC	- 0.01831	0.07195	- 0.254
PENINC	0.00134	0.00061	2.191

Source: Own computation.

As can be read from Table 1, the probability that an individual is willing to participate in labour force declines for the factors AGENOW, SECEDUC, TEREDUC, SERVYR, SEX, WGBFR, JOBTYP and OTHINC by the given coefficient for a unit increase in them. This probability will increase for the rest of the variables by their coefficient if they are increased by a unit value.

For this regression, family size, job type, and existence of other incomes are not significant at 10 per cent significant level, while all the rest are significant. This might be due to the small size of the sample. To the model, current age is negatively related with willingness to participate, which coincides with the theory that the higher the age the lower will be the willingness. The existence of age problem, health condition, family size, and job type are positively related to the willingness to participate which accords with the theory.

In contrast to the theory, the existence of social security benefit is positively related to the willingness to participate in the labour force. One reason could be that the substitution effect outweighs the income effect. An explanation for this can be derived from the existing pension rule that, once a person is entitled to a benefit, he/she can be employed in an enterprise which is not covered by the pension scheme and this will not yield to an implicit tax on benefits i.e. he/she can earn his/her wage as well as his/her pension. This would give incentive for an individual to participate in the labour force, thus causing a positive relationship between pension income and willingness to participate.

Regardless of the sign, the probability that the willingness to participate in the labour force will be affected due to the existence of a pension is very negligible i.e. by about 0.0013. Therefore, we can say that willingness to participate in the labour force (or labour supply) is not much affected by the existence of social security. One reason for this is that pension benefits are too small.

Table 2. Marginal Effects for Sexes

Variable	Men	Women	All Observations
CONSTANT	- 1.0408	- 1.4069	- 1.2434
AGENOW	- 0.0099	- 0.0133	- 0.0118
AGEPR	0.3709	0.5013	0.4431
SECEDUC	- 0.1457	- 0.1970	- 0.1741
TEREDUC	- 0.1695	- 0.2291	- 0.2024
FS	0.0205	0.0277	0.0245
HEALTH	0.3234	0.4371	0.3863
RETAGE	0.0337	0.0456	0.0403
SERVYR	- 0.0179	- 0.0242	- 0.0214
SEX	- 0.0385	- 0.0520	- 0.0459
WGBFR	- 0.0005	0.0007	- 0.0007
JOBTYP	- 0.0258	- 0.0349	- 0.0308
OTHINC	- 0.0153	- 0.0207	- 0.0183
PENINC	0.0011	0.0015	0.0013

Source: Own computation.

We have also tried to compare the effects of different attributes. One is for different sexes (see Table 2). The result shows that the probability that each factor will affect the willingness to participate is higher for women than men. For example, the marginal effect that women will not participate in the labour force due to the existence of other incomes is 0.021 while for men it is 0.015. The other important factor is their age. As age increases, the willingness to participate in the labour force is reduced more for women than for men. This result might need explanations such as maternity problems. Without going into detailed explanation, it can be inferred that there could be a need for Age Discrimination Act by Sex.

Table 3. Marginal Effects for Job Types

Variable	Non-laborious	Laborious	All Observations
CONSTANT	- 1.2087	- 1.2812	-1.2434
AGENOW	- 0.0115	- 0.0122	- 0.0118
AGEPR	0.4307	0.4565	0.4431
SECEDUC	-0.1692	- 0.1794	- 0.1741
TEREDUC	0.1968	- 0.2086	- 0.2024
FS	0.0238	0.0252	0.0245
HEALTH	0.3755	0.3981	0.3836
RETAGE	0.0392	0.0415	0.0403
SERVYR	- 0.0208	- 0.0221	- 0.0214
SEX	- 0.0447	- 0.0473	- 0.0459
WGBFR	- 0.0006	- 0.0007	- 0.0007
JOBTYP	- 0.0300	- 0.0318	- 0.0308
OTHINC	- 0.0176	- 0.0189	- 0.0183
PENINC	0.0013	0.0014	0.0013

Source: Own computation.

Table 3 shows that the higher the probability of being not willing to participate in the labour force is higher for those who are involved in the laborious type of job. This result has an implication for Age Discrimination Act by Job Type. The act has to be of a kind that allows early retirement for those who are involved in the intensive-intensive job and a higher retirement age for non-laborious type of job.

The above analysis is based on the reported current age. Next, we will further examine their implications within a specific age interval.

Willingness To Participate Model For Ages Between 56 And 60

The LRI for probit equals 0.314 (lnL and lnL_o equals 121.80 and 177.59, respectively), while for the logit it is 0.321 (lnL and lnL_o equals 120.59 and 177.59, respectively). The probit model predicts 229 of the 279 or 82.1 per cent of the observations correctly, while the logit model predicts 231 of the 279 or 82.8 per cent of the observations correctly. Thus, here also, we choose a logit model for our analysis. The chosen logit model is significant based on a chi-squared value of 113.99 with 13 degrees of freedom at any significance level.

The regression result shows the probability of willingness to participate in the labour force evaluated at the mean values of the explanatory variables.

The results, the signs of coefficients and implications are more or less similar to that of current age regression model except for a little difference on the magnitudes of the probabilities. One important factor which we have to see carefully here is that the effect of age on the probability of participating in the labour force. The probability that age will reduce the willingness to work is 0.108, which is still very small. The result also shows that age and health condition will not be a problem for this age group. The implication here is that if retirement age is raised from 55 to 60, there will not be much problem in the productivity of the worker due to aging or health–the main factors used in setting a retirement age.

Willingness To Participate Model for Ages Between 61 and 65

For this age group, using the same methodology and criteria, we have chosen a logit model. This logit model is significant based on a chi-squared value of 100.86 with 13 degrees of freedom at any significance level. Here also the regression result gives the probability of willingness to participate in the labour force evaluated at the mean values of the explanatory variables.

Compared to the age group of 61-65, those in the age group of 56-60, who favour participating, were larger than those who do not. Also the probability of participating in the labour force declines from 0.546 to 0.455. For all the variables, except SEX, the

change in the probability of participating in the labour force has declined as compared to the previous section.

For this age groups things get a bit complicated. Many explanatory variables, which were significant in the previous regressions, become insignificant now and also the magnitudes of the coefficients are smaller. This implies that the probability to participate in the labour force declines significantly due to health and age problems when the age group is 61-65. This result is derived because the binary variables 'health' and 'problem due to age' are coded by giving 1 for those who are healthy and at the same time do not have a problem due to their age. Thus, the coefficient of these variables being insignificant and very small implies that many have given a response in this age group that they have health or age problems.

Thus, based on our sample result, we can infer that a retirement age policy will not be optimal or best on the employee side, if it exceeds age 60.

Willingness to Participate Model for Ages Between 66 and 70

Here the probit model is not estimable at all. The only possible estimation we have for the marginal effects is the logit estimation. This logit model is significant with a likelihood ratio test based on a chi-squared value of 50.14 with 13 degrees of freedom at 1 per cent significant level. For this age group, our sample data regression shows that no variable is significant. This indicates that, irrespective of the factors, people are not willing to participate in the labour force. This holds true whether they are men or women and also whether the job is labour intensive or not.

5. CONCLUSIONS AND POLICY IMPLICATION

The results of the qualitative response model have shown that social security benefit or pension does not induce retirement or withdrawal from the labour force participation in contrast to the theory, which says that non-wage incomes such as social security benefits will affect negatively, or reduce the supply of labour. One difference between the theory and our analysis is that the theory considers all types of social security benefits while our study focuses only on old age pension. Thus, it is difficult to conclude that the results contradict to the labour force participation theory. Rather at this stage we tentatively conclude that social security (or old age pension) does not significantly influence the intended age of retirement or withdrawal from the labour force for our sample. One of the reasons given for such a result is that pension payments are small or inadequate to cover living expenses. We also found that the probability to participate in the labour force reduces by 0.09 if one goes from age group of 56-60 to the age group of 61-65.

There is also a difference in the willingness to participate in the labour force between men and women as well as between those who are involved in intensive-intensive job and non-laborious job. The result shows, compared to men, women are less willing to continue working after age 55. It is also shown that those who are involved in the labour intensive type of job are less willing to continue working as age increases as compared to those who are involved in non-laborious type of job.

The estimation result, when carried separately for different age groups, has shown that for the age group of 56-60, health and aging does not significantly affect one's productivity or willingness to participate in the labour force. But for the age groups 61-65 and 66-70, these factors significantly affect productivity or willingness to participate.

The above conclusions and observations have policy implications and support policy reforms of the SSA, which correspond to its objectives of reallocation of a person's lifetime income to provide support for his/her own retirement and redistribution of income between individuals to provide an adequate support.

In setting a retirement age, the basic factors used are health and ageing problem in that as one gets older his productivity declines and he/she will be vulnerable to health problems. But our result though should be taken cautiously in making policy, shows that there is no significant problem due to these factors until age 60. The policy implication of this result is that there is a need to revise the existing retirement age rule, which mandatorily retires workers at age 55. The reform would be to increase this mandatory retirement age to 60. This in turn makes pension payments higher and may solve the inadequacy of the pension benefits.

The other policy implication, which we can deduce from the results, is that there may be a need to have an Age Discrimination Act depending on the type of job and sex. The Job Discrimination Act reform would allow early retirement for those who are involved in blue-collar jobs. The Sex Discrimination Act reform would allow early retirement for women.

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APPENDIX 1

The variable names and their code are given as:

AGENOW	The respondent's current age and is taken as given.
AGEPR	If there is a problem that arises due to age.
AGEPR	=0 if the respondent says there is;
	=1 if there is no problem that arises due to age.
AVPRETAG	: Average proposed retirement age (from the respondent's point of view)
FS	: Family Size
HEALTH	: The respondents health condition
HEALTH	= 0 if respondent is not healthy
	= 1 if healthy (for manipulation purposes we have coded as 1 those who respond both good and fair)
JOBTYP	: Type of job that the respondent used to work
JOBTYP	= 0 if type of job is labour intensive
	= 1 if type of job is non laborious
PENINC	: Pension income
RETAGE	: Age at retirement
SERVYR	: Number of years of service
SEX	: Sex of the respondent
SEX	= 0 if respondent is male
SEX	= 1 if female
WGBFR	: Wage before retirement
PEDUC	: Dummy for primary education
PEDUC	= 1 if respondent's education level is primary
	= 0 otherwise
SECEDUC	: Dummy for secondary education
SECEDUC	=1 if education level is secondary
	= 0 otherwise
TEREDUC	: Dummy for tertiary education
TEREDUC	= 1 if education level is tertiary
	= 0 otherwise
WTPLF	: Willingness to participate in the labour force at current age
WTPLF	= 1 if willing
	= 0 otherwise
WTP1	: Willingness to participate in the labour force if age is between 56-60
WTP2	: Willingness to participate in the labour force if age is between 61-65
WTP3	: Willingness to participate in the labour force if age is between 66-70