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Preferences for early retirement among older government employees in Egypt

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Abstract

The objective of this study is to determine the factors affecting the early retirement preferences of Egyptian government sector employees. In line with the existing literature, we consider the possibility that the early retirement and post-retirement employment decisions are made jointly. We do this by estimating a recursive bivariate probit model in which the endogenous ‘post-retirement work" variable is among the explanatory variables in the ‘early retirement" equation. Estimation results based on a 2005 survey reveal that the two decisions are in fact correlated. As expected, people who plan to work after retirement are more likely to choose early retirement.

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1. Introduction

One of the prominent features of the Egyptian economy has been the dominance of the public sector and state owned enterprises which are characterized by overstaffing and excess employment. Beginning in the early 90's, Egypt embarked on a program of economic liberalization and reform as part of the stabilization and structural adjustment policies suggested by the World Bank and the IMF. At the heart of this program was the privatization of state-owned enterprises and other branches of the public and government sectors. During the process, early retirement was considered as one of the most effective tools of downsizing. Often financed or heavily subsidized by the government, early retirement was expected to facilitate the privatization process and mitigate the adverse social impacts of layoffs. Based on the proceeds generated from privatization, a fund was created in 1997 to implement early retirement programs that offer satisfactory and fair compensation packages. More recently, with pension reforms high on their reform agenda, the Ministries of Social Insurance and Finance put together a new reform package, which went into effect in January 2006. The new package provides more generous pension plans to those who retire before the legal (i.e. mandatory) retirement age of 60.

Shortly before the package went into effect, a survey was conducted to determine its potential consequences. Issues under examination included how the retirees were planning to spend their compensation and whether they had sufficient information to make a rational decision. In the empirical work, we utilize this survey to identify the variables affecting individuals' plans for early retirement. While the focus of the study is on the early retirement decision, preferences regarding post-retirement employment also play a central role in our empirical analysis due to the theoretical reason that the two decisions are made jointly. What the joint decision implies is that when examining the retirement decision, the choice regarding post-retirement work can not be treated as an exogenous factor since it is the combination of the these decisions that determines the path of future earnings, and hence the optimal timing of retirement.[1] In line with the tradition that goes back to Burtless and Moffitt (1985) who pointed out that retirement age and post-retirement hours need to be treated as joint decisions, we estimate a two-equation model in which the endogenous "post-retirement work" variable is among the explanatory variables in the "early retirement" equation. On the other hand, "early retirement" does not appear in the "post-retirement work" equation since it makes little sense to assume that a person would want to work after retirement *because* s/he wants to retire early. Hence, a recursive model is obtained.

Employment problems in developed countries vary significantly from those of developing countries. While the former are challenged with the threat of an aging labor force and low replacement rates, the latter suffer from high rates of unemployment and population growth. Although several studies have discussed retirement benefits and related problems in Egypt such as the need to reform the pay-as-you-go system and the different investment strategies regarding the fund assets (Maait, Ismail and Khorasanee, 2000; Osman and Salah, 2001), this is the first study dealing with the early retirement preferences of government sector workers.

[1] In practice, the link between the two decisions could become even more intricate by a widely-implemented policy known as the "earnings test", i.e. a reduction in pension payments if earnings from post-retirement work exceed a certain amount.

2. The Data

The empirical analysis is based on a survey conducted by the Information and Decision Support Center in December 2005. The survey covers over 3,400 current employees of the government sector, ranging in age between 50 and 57, from seven governorates: Cairo, Giza, Behira, Sharqia; Suez, Asyout, and El-Menya. The survey provides data on basic demographics, experience, occupation, wages, health, income, skill levels, and plans regarding early retirement and financial investments after retirement. The choice of the 50-to-57 age group has to do with the purposes of the agency for conducting the survey. As mentioned above, the survey was conducted at a time when preparations were underway for a new retirement law. One of the proposed early retirement plans applied only to 50 to 57 year olds, and the survey included a question on whether that plan would be preferred by the employees.

In an empirical study on retirement, one would ideally like to work with a representative sample of retirees and non-retirees. According to the information about the survey design provided in Ramadan (2006), the population of study is "workers between the ages of 50 and 57 currently working in the Egyptian government sector". Since our sample excludes retirees, our estimates may suffer from selectivity bias. Furthermore, in an effort to alleviate the impact of early retirement on the social security system, Egypt's retirement law imposes a 10 percent reduction in pension payments for those retiring before the age of 50 and a 5 percent reduction for those retiring before the age of 55. Therefore, the sample we work with consists of those who have chosen not to take up the early retirement option and have remained employed beyond the critical age of 50.[2]

In Egypt, a government employee is eligible for early retirement if he or she has worked in the government sector for at least 20 years. Unfortunately, the only available experience variable in the data set refers to years of employment in the current institution. Therefore, we do not know whether the respondents are eligible for early retirement at the time of the survey, whether they will become eligible under the new package, or whether they will before they are 60. To ensure that we are working with a sample of people who *do* have the option to retire early, we excluded from the sample the respondents who will be not completing 20 years in their firms by the time they are sixty. The proportion of such respondents was about 3 percent of the original sample.

The importance of financial incentives has long been recognized and confirmed in the literature on retirement. Generosity of pension plans and the availability of retiree health insurance are among the various factors that have been found to be closely related with the retirement decision. Pensions that are actuarially unfair discourage early retirement, and countries with more generous

[2] As far as we understand, the respondents provided their answers with the old law in mind. In that case, the selectivity story that can be told is different for those below and above the age of 55. However, due to the lack of information regarding the time of eligibility for early retirement, along with the fact that a response of "55" does not necessarily mean that an individual is legally 55 years-old, we were unable to estimate a more complex model of early retirement preferences that incorporates this structure. We did, however, estimate a version of the model that includes a dummy for 55-to-57-year-olds in both equations and also obtained two separate set of results for the 50-to-54 and 55-to-57 age groups, but found that the key results remain mainly unchanged.

social security benefits tend to have a lower average retirement age (Gruber and Wise, 1998).[3] However, the lack of detailed data on such critical variables precludes us from investigating (and controlling for) the effect of financial incentives in the early retirement preferences of Egyptian workers. Instead, we focus on several socio-demographic and current-job related factors that may impact the joint decision of early retirement and post-retirement work.

Within the framework of a simple leisure – consumption analysis, the age of retirement is determined by a present value of lifetime earnings calculation. The effect of the wage rate on retirement is ambiguous as changes in the wage rate lead to both income and substitution effects. Borjas (2007) reports that the finding of many empirical studies has been that the substitution effect is dominant, meaning that higher wages are associated with retirement at an older age. In the absence of 'financial incentives' variables, the current wage rate variable available in our data is also expected to capture the opportunity cost of retiring as well as potential wages in the private sector in the post-retirement period, making it more difficult to sort out the income and substitution effects. Furthermore, if the wage rate is also taken as an indicator of unobserved productivity or stronger attachment to the labor market, its influence on retirement should be interpreted as a combination of the effects through all of these channels.[4]

3. The Econometric Model

This section is devoted to the presentation of the recursive bivariate probit model which will be utilized in the empirical work. Readers who are not interested in the technical details may skip to the next section without loss of continuity. The basic bivariate probit model allows the joint estimation of two equations that may or may not have a common set of regressors. The signs of the two latent variables y_1^* and y_2^* determine the values of the observed dependent variables y_1 and y_2. The recursive bivariate probit is a slight variation of the basic model with y_2 appearing on the right hand side of the equation for y_1^* such that

$$y_1^* = \beta' x_1 + \gamma \cdot y_2 + u_1, \qquad \text{and} \qquad y_2^* = \alpha' x_2 + u_2$$

where the u's are jointly standard normally distributed with correlation coefficient ρ. With this triangular structure, the model falls into the general class of simultaneous equation models with dummy endogenous variables introduced by Heckman (1978). While the fully simultaneous model is not identified when both dependent variables are binary, the recursive model can be estimated using full information maximum likelihood. Furthermore, Wilde (2000) has shown that identification by functional form is present in the recursive bivariate probit in the absence of exclusion restrictions. However, the common practice is to impose restrictions when appropriate to improve the identification of the model. In our model, all exclusions were decided by first

[3] Boskin (1977) was one of the first to pay close attention to the effects of incentives on early retirement. Others followed suit were Fields and Mitchell (1984), Stock and Wise (1990), and Meghir and Whitehouse (1996). See Herbertsson (2001) for more detailed information.

[4] A similar story could be told about the non-labor income variable. Even though an increase in non-labor income causes only an income effect that encourages earlier retirement, a relationship in the opposite direction could be expected to the extent that non-labor income reflects the accumulation of wealth through previous market earnings, and thus a stronger attachment to the labor market. It might be for this reason that the non-labor income variable we experimented with failed to yield statistically significant results.

including the variables in both equations and omitting them from the equation(s) in which they were jointly insignificant.

It turns out that, despite the issue of endogeneity, the terms that enter the likelihood function for the recursive bivariate probit model are the same as those for the usual bivariate probit (Maddala, 1983). Therefore, the probabilities of the four cells for this model are given by

$$\Pr(y_1 = 1, y_2 = 1) = \Phi_2(\beta' x_1 + \gamma, \alpha' x_2, \rho),$$
$$\Pr(y_1 = 0, y_2 = 1) = \Phi_2(-\beta' x_1 - \gamma, \alpha' x_2, -\rho),$$
$$\Pr(y_1 = 1, y_2 = 0) = \Phi_2(\beta' x_1, -\alpha' x_2, -\rho),$$
$$\Pr(y_1 = 0, y_2 = 0) = \Phi_2(-\beta' x_1, -\alpha' x_2, \rho).$$

where Φ_2 denotes the bivariate normal cumulative distribution function. Below, Φ and ϕ respectively denote the univariate normal cumulative distribution and density functions.

Since the bivariate probit's coefficient estimates by themselves are of limited use when interpreting the model's results, it is customary to report the marginal effects of the explanatory variables on the probability of observing a certain outcome, i.e. the change in the probability as a result of one unit increase in the explanatory variable. The marginal effects are usually evaluated at the sample means of the variables (as we do in this paper), but one could also evaluate them at each observation and report the average of those figures. In the recursive bivariate probit model, the computation of marginal effects is complicated by the fact that the explanatory variables appearing in the equation for the endogenous dummy have an indirect effect (through the endogenous dummy) on the outcome of primary interest as well as a direct effect if they also appear in the first equation. Building on Greene (1998) where the relevant definitions and formulas are provided for the special case of $\rho = 0$, we now show that if one is interested in changes in the expectation of y_1, the marginal effect of an explanatory variable will be the sum of a direct and/or indirect effect depending on which equation(s) the variable is included in.

First, we observe that $E(y_1 \mid x_1, x_2, y_2)$

$$= \Pr(y_2 = 1) \cdot E(y_1 \mid x_1, x_2, y_2 = 1) + \Pr(y_2 = 0) \cdot E(y_1 \mid x_1, x_2, y_2 = 0)$$
$$= \Pr(y_2 = 1) \cdot \Pr(y_1 = 1 \mid y_2 = 1) + \Pr(y_2 = 0) \cdot \Pr(y_1 = 1 \mid y_2 = 0)$$
$$= \Pr(y_1 = 1, y_2 = 1) + \Pr(y_1 = 1, y_2 = 0).$$

The expectation of y_1 equals the probability that $y_1 = 1$ due to the fact that y_1 is a 'zero-one' variable. That is, $E(y_1) = 0 \cdot \Pr(y_1 = 0) + 1 \cdot \Pr(y_1 = 1) = \Pr(y_1 = 1)$. Therefore, the marginal effects to be computed below can also be interpreted as the marginal change in the probability that $y_1 = 1$. Before moving on to the marginal effects derivations, we leave out the conditioning on the x's in the interest of simplification and introduce intermediate notation such that

$$A = \alpha' x_2, \qquad B_0 = \beta' x_1, \qquad B_1 = \beta' x_1 + \gamma,$$

$$A^*_0 = (\alpha' x_2 - \rho(\beta' x_1)) / \sqrt{1-\rho^2} = (A - \rho B_0) / \sqrt{1-\rho^2},$$
$$A^*_1 = (\alpha' x_2 - \rho(\beta' x_1 + \gamma)) / \sqrt{1-\rho^2} = (A - \rho B_1) / \sqrt{1-\rho^2},$$
$$B^*_0 = (\beta' x_1 - (-\rho)(-\alpha' x_2)) / \sqrt{1-\rho^2} = (B_0 - \rho A) / \sqrt{1-\rho^2},$$

$$B^*_1 = (\beta' x_1 + \gamma) - \rho(\alpha' x_2)) / \sqrt{1-\rho^2} = (B_1 - \rho A) / \sqrt{1-\rho^2},$$

and

$$\Pr(y_1 = 1, y_2 = 1) = \Phi_2(B_1, A, \rho) = P_{11},$$
$$\Pr(y_1 = 0, y_2 = 1) = \Phi_2(-B_1, A, -\rho) = P_{01},$$
$$\Pr(y_1 = 1, y_2 = 0) = \Phi_2(B_0, -A, -\rho) = P_{10},$$
$$\Pr(y_1 = 0, y_2 = 0) = \Phi_2(-B_0, -A, \rho) = P_{00}.$$

In the case of a continuous explanatory variable, z, the marginal effect is given by

$$\partial E(y_1|y_2)/\partial z = \partial P_{11}/\partial z + \partial P_{10}/\partial z$$

$$= \phi(B_1)\Phi(A^*_1)\cdot \beta_z + \phi(A)\Phi(B^*_1)\cdot \alpha_z + \phi(B_0)\Phi(-A^*_0)\cdot \beta_z + \phi(-A)\Phi(B^*_0)\cdot -\alpha_z.$$

where β_z and α_z are the coefficients on z in the two equations. Rearranging the expression so that the two terms multiplied by β_z are brought together (and so are the two terms multiplied by α_z), we obtain the expression for the 'total' marginal effect:

$$= [\phi(B_1)\Phi(A^*_1) + \phi(B_0)\Phi(-A^*_0)]\cdot \beta_z + [\phi(A)\Phi(B^*_1) - \phi(-A)\Phi(B^*_0)]\cdot \alpha_z.$$

The first part of this expression is referred to as the 'direct' effect and the second part as the 'indirect' effect. This formulation could be applied to binary explanatory variables especially if one is interested in decomposing the total effect into its direct an indirect components. However, a more accurate definition for the total marginal effect of a binary variable q, which belongs in x_1 and/or x_2, is

$$E(y_1 \mid y_2, q = 1) - E(y_1 \mid y_2, q = 0) = [P_{11}(q = 1) + P_{10}(q = 1)] - [P_{11}(q = 0) + P_{10}(q = 0)]$$

where $P_{ij}(q = k)$ denotes P_{ij} calculated at $q = k$.

Finally, the marginal effect of the endogenous binary variable, y_2, is defined in terms of univariate normal probabilities since

$$E(y_1 \mid y_2 = 1) - E(y_1 \mid y_2 = 0) = \Phi(B_1) - \Phi(B_0).$$

Since the expectation of y_2 is conditioned only on x_2, i.e. $E[y_2|x_2] = \Pr(y_2 = 1) = \Phi(A)$, marginal effects for this equation are also defined in terms of univariate normal probabilities as in the univariate probit model. Calculation of the marginal effects will be especially useful in our model since it turns out that, in all instances, the coefficients on the same variable have the opposite signs in the two equations, meaning that the total (or net) effect of the variable needs to be computed to determine the sign as well as the size of the impact of the variable on the early retirement decision.

4. Empirical Results

The empirical analysis is based on a sample of 3,277 workers aged 50 to 57, currently working in the Egyptian government sector. While about 58 percent of the respondents intend to retire early,

and 33 percent of the respondents plan to engage in post-retirement work, there is very little variation in the row and column percentages when the two variables are cross-tabulated (See Table I for cell and column percentages and Table II for the means of the rest of the variables). Across the two outcomes of the early retirement variable, the difference between the proportion of those who plan to engage in post-retirement work is less than two percentage points. Therefore, if there is any link between the two decisions, we need to work in a multivariate setting to uncover its nature.

Table I: The Empirical Distribution of the Dependent Variables

	Early retirement = 0	Early retirement = 1	All
Post-retirement work = 0	27.7 (41.3)	14.2 (42.9)	41.8
Post-retirement work = 1	39.4 (58.7)	18.8 (57.1)	58.2
All	67.0 (100.0)	33.0 (100.0)	100.0

Note: Table entries are sample shares in percentages. Figures in parentheses are column percentages.

Table II: Sample Means of the Explanatory Variables

Early retirement	= 0			= 1			All		
Post-retirement work	= 0	= 1	All	= 0	= 1	All	= 0	= 1	All
Share in sample (%)	27.7	14.2	41.8	39.4	18.8	58.2	67.0	33.0	100.0
Age	53.4	53.3	53.4	52.8	53.0	52.9	53.1	53.1	53.1
Female	0.50	0.14	0.37	0.62	0.13	0.46	0.57	0.13	0.42
Household head	0.60	0.91	0.70	0.48	0.88	0.61	0.53	0.89	0.65
Healthy	0.84	0.90	0.86	0.81	0.84	0.82	0.82	0.87	0.84
Education	5.58	5.74	5.63	5.57	5.27	5.47	5.57	5.47	5.54
Log-wage	-0.39	-0.38	-0.39	-0.37	-0.49	-0.41	-0.38	-0.44	-0.40
Experience	27.8	26.7	27.4	27.0	25.3	26.4	27.3	25.9	26.9
Municipality	0.34	0.35	0.35	0.34	0.26	0.31	0.34	0.30	0.33
Rural	0.14	0.12	0.13	0.09	0.10	0.09	0.11	0.11	0.11

The full information maximum likelihood estimates of our model are summarized in Table III.[5] The coefficient on the post-retirement work dummy is the largest in magnitude and translates into a positive marginal effect of 0.43, i.e. 43 percentage points, on the probability of choosing early retirement (See Table IV). The estimated value of ρ is –0.67 with a standard error of 0.13. Since the null hypothesis that $\rho = 0$ is rejected and the coefficient on post-retirement work in the early retirement equation is significant, we are reassured that our recursive model provides more reliable results than a single equation model. The negative ρ estimate, which may at first seem counter-intuitive given that the coefficient on post-retirement work is positive, is in fact of the expected sign. It implies that, once 'post-retirement work' is controlled for in Equation 1, unobserved characteristics – such as a stronger taste for leisure – that make an individual more likely to choose early retirement, also make them less likely to engage in post-retirement work.

Table III: Univariate and Recursive Bivariate Probit Estimates

	Univariate probit		Recursive bivariate probit			
	Early retirement equation		Equation 1: Early retirement		Equation 2: Post-retirement work	
	Coef.	St. error	Coef.	St. error	Coef.	St. error
Constant	3.582	0.547	2.410	0.575	-0.485	0.184
Post-retirement work	0.098*	0.053	1.154	0.182		
Age	-0.054	0.010	-0.037	0.010		
Female	0.081*	0.078	0.489	0.107	-1.150	0.091
Household head	-0.255	0.078	-0.341	0.075	0.374	0.095
Healthy	-0.215	0.062	-0.251	0.061	0.238	0.069
Education	-0.034	0.010	-0.061	0.011	0.086	0.012
Log-wage	0.056*	0.054	0.101	0.052	-0.198	0.068
Experience					-0.018	0.004
Municipality					-0.163	0.054
Rural					-0.381	0.076
ρ			-0.672	0.125		

Notes: Sample size is 3,277. "*" denotes statistical *in*significance at the 5% level. The model has been estimated using the software package Limdep. Limdep computes the marginal effects of the explanatory variables on $E(y_1 \mid y_2 = 0)$ and $E(y_1 \mid y_2 = 1)$. The probability weighted averages of those figures were taken to obtain the marginal effects reported in Table IV.

[5] The sample is stratified with respect to the work types of the respondents (i-administrative, ii-organizational and iii-local) and their professional rank which is closely related with the level of education (i-3rd and 4th levels, ii-1st and 2nd levels; and iii-superior rank). Since the empirical work is carried out at the individual level, the sampling weights employed in the estimations are defined as the product of the two weights generated for the two components discussed above. In other words, we have different weights for the $3 \times 3 = 9$ strata of the data.

Among our explanatory variables, 'age' (of the respondent in years) is the only one that appears only in the early retirement equation.[6] As mentioned before, the sample we work with suffers from a selectivity problem due to the exclusion of retirees. One sign that the selectivity problem becomes more severe as we get to older ages is that sample frequencies decline with age. There are 766 fifty-year-olds in the sample vs. 298 fifty-seven-year-olds. Therefore, when broken down by age from younger to older respondents, the sample is likely to consist of those who have a lower taste for early retirement since they have 'survived' for more years in the state of employment. Viewed in this respect, we expect the age variable to capture this pattern and, possibly, alleviate the problem of selectivity. The negative coefficient on the age variable is consistent with this interpretation. The marginal effect estimate implies that each passing year reduces the probability of the intention of early retirement by 1.5 percentage points.

Table IV: Marginal Effects of variables on $E(y_1 \mid x_1, x_2, y_2) = Pr(y_1 = 1)$.

	Univariate probit	Recursive bivariate probit				
	Marginal Effect	Direct effect	Indirect effect	Total effect	St. error	*p*-value
Post-retirement work	0.038*	*0.452*		0.425	0.059	0.000
Age	-0.021	-0.015		-0.015	0.004	0.000
Female	0.032*	*0.192*	*-0.188*	-0.009*	0.016	0.561
Household head	-0.098	*-0.134*	*0.061*	-0.027*	0.021	0.194
Healthy	-0.082	*-0.099*	*0.039*	-0.024*	0.017	0.164
Education	-0.013	-0.024	0.014	-0.010	0.004	0.010
Log-wage	0.022*	0.040	-0.032	0.007*	0.020	0.705
Experience			-0.003	-0.003	0.001	0.001
Municipality			*-0.027*	-0.016	0.006	0.009
Rural			*-0.062*	-0.037	0.010	0.000

Notes: "*" denotes statistical *in*significance at the 5% level. The marginal effects are computed at the means of the x's (See Table II). Total effects are the marginal effects obtained using the appropriate formulas given in the text for continuous and binary explanatory variables and the endogenous dummy variable. Table entries in italic are the direct and indirect effects obtained when binary variables are treated as continuous.

[6] The fact that age is excluded from the post-retirement work equation due to statistical insignificance also makes theoretical sense since employees of all ages could be planning to work following retirement. The three variables excluded from the early retirement equation are also ones that seem to be less relevant to that decision than the remaining demographic variables, the health status dummy, and the wage variable.

Dummy variables indicating females, household heads, and the health status of the respondent (=1 if the self-assessment of the respondent is "healthy") as well as 'log-wage' (which is the natural logarithm of the current monthly income measured in 1,000 Egyptian Pounds) and 'education' (i.e. years of formal schooling) appear in both equations. The coefficients on the gender dummy indicate that females are more likely to prefer early retirement, but are also less likely to seek post-retirement work. Marginal effects calculations reveal that the net effect of being a female on the probability of early retirement is close to zero and statistically insignificant. Being a household head, being in good health, and having completed more years of education all have a negative direct effect on the probability of early retirement, but a positive indirect effect on the likelihood of post-retirement work. In each case, the direct effect dominates, and so the net effect turns out to be negative, but is statistically insignificant in the case of household head and health dummies. While it makes sense that household heads and healthy people are more likely to stay in their jobs, the finding pertaining to the years of education is consistent with Quinn et al.'s (1990) suggestion that education may increase non-monetary benefits associated with work.

As mentioned earlier, the direction of the effect of the wage rate on retirement is ambiguous due to the presence of both income and substitution effects as well as the absence of financial incentives variables in our data. Since information on hours of work is also missing, we use the current monthly income as a proxy for the wage rate. Our finding is that monthly income has a positive direct effect on early retirement which is suggestive of a dominant income effect. However, the variable also has a negative indirect effect which is almost large enough to offset the direct one. We conclude that, at least for the 'average' individual, current labor market earnings are not a statistically significant determinant of the early retirement decision.

Finally, the three variables that appear only in the post-retirement work equation are 'experience' (which refers to the years of experience in the current institution) and dummy variables that indicate municipality employees and individuals residing in rural locations. All three variables have negative coefficients which means that they make post-retirement work, and so early retirement less likely. Apparently, municipality employees and those residing in rural locations expect to have more difficulty in finding jobs following retirement which, in turn, discourages them from retiring early. Those who have spent more years in their workplace, on the other hand, may be reluctant to look for a job after retirement for sentimental reasons.

For purposes of comparison, Tables III and IV also contain results from a univariate probit model of early retirement that ignores the issue of joint determination. In some instances, we see major differences in the inferences that one would make from the two models. Most importantly, the univariate model fails to produce the finding that post-retirement work has a significant positive effect on early retirement intentions. The explanation we can offer for this result is that the univariate model does not control for the role of unobservable factors common to both decisions as well as the effects of variables that are included only in the post-retirement work equation. Since the model fails to account for the indirect effect of these variables, it attributes their negative impact to the post-retirement work variable. On the other hand, the univariate probit yields statistically significant negative marginal effects for dummy variables indicating household heads and healthy individuals. However, we know from the recursive model that while these factors make early retirement less likely, they also make post-retirement work more likely, and these indirect effects are large enough to offset the direct effects.

5. Conclusion

The purpose of this study was to examine the factors affecting the early retirement preferences of Egyptian government sector employees. We considered the possibility that the early retirement and post-retirement employment decisions are made jointly by estimating a recursive bivariate probit model. Estimation results confirmed that the two decisions are in fact correlated and that the calculation of indirect and direct marginal effects provides valuable insights. As expected, people who plan to work after retirement are more likely to choose early retirement. Since a sizable proportion of early retirees plan to seek work after retirement, programs that facilitate early retirement are likely to have an adverse effect on the unemployment rate. Even though the early retirement programs in Egypt were motivated primarily by the need for public sector downsizing rather than unemployment concerns, this seems to be a point worth keeping in mind.

When designing early retirement plans, one source of concern could be that the more productive or experienced employees take advantage of them. Therefore, the model's findings should also be of some value to policy makers in identifying the characteristics of employees most likely to choose early retirement if the retirement law is amended in a way that makes more people eligible. This would be more true if our data set included information on other factors that are likely to play a key role in the decision making process. As more surveys become available, it might also be possible to compare the planned retirement decisions investigated here with the actual ones and try to determine the factors responsible for any discrepancies.

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