Determinants of Poverty in Elderly-Headed Households in the Philippines

Mapa, Dennis S. and Bersales, Lisa Grace S. and Albis, Manuel Leonard F. and Daquis, John Carlo P.

School of Statistics University of the Philippines Diliman

February 2011

SCHOOL OF STATISTICS
UNIVERSITY OF THE PHILIPPINES DILIMAN

WORKING PAPER SERIES

Determinants of Poverty in Elderly-Headed Households in the Philippines

by

Dennis S. Mapa, Lisa Grace S. Bersales, Manuel Leonard F. Albis and John Carlo P. Daquis

UPSS Working Paper No. 2011-04
February 2011

School of Statistics
Ramon Magsaysay Avenue
U.P. Diliman, Quezon City
Telefax: 928-08-81
Email: updstat@yahoo.com

Determinants of Poverty in Elderly-Headed Households in the Philippines[1]

Dennis S. Mapa[2], Lisa Grace S. Bersales[3],
Manuel Leonard F. Albis[4] and John Carlo P. Daquis[5]

ABSTRACT

This paper looks at the impact of population dynamics on poverty in elderly-headed households in the Philippines using data from the Family Income and Expenditure Survey (FIES) from 2000 to 2006. The population of the elderly, or those 60 years and above, has increased from 3.2 million in 1990 to 4.6 million in 2000. This group is growing at a rate of 3.6% per annum and estimated to reach 7 million in 2010. Data from the FIES shows that the percentage of the elderly who are poor is increasing since 2003. Moreover, the percentage of elderly-headed household belonging to the poorest 10% of all households has been on the rise since 1997. An econometric model based on the logistic regression shows that the presence of a young dependent (aged 14 years old or below) increases the probability that the elderly-headed household will become poor by about 9 percentage points, controlling for other factors such as income of the household, education, age and gender of the household head, income transfer from abroad and regional-specific characteristics. The results of the econometric model suggest that the high proportion of young dependents create negative effects on the welfare of the elderly-headed household by increasing the probability of that household being poor. From the point of view of policy, addressing the alarming poverty incidence in the country must include measures that will manage the country's bourgeoning population and bring down the fertility rate to a level that is conducive to higher income growth.

JEL Classification: J14, I32, J13
Key words: elderly, population dynamics, poverty

[1] This paper is part of an on-going research related to Population Dynamics and its Impact on Savings and Income Growth in the Philippines. The authors acknowledge the financial support from the University of the Philippines Statistical Center Research Foundation, Inc. (UPSCRFI). The authors are grateful to the comments of Arsi M. Balisacan and Nelia Marquez and to the excellent research assistance of Manilyn Davila on the earlier version of this paper. Errors and omissions are sole responsibilities of the authors.

[2] Associate Professor and Director for Research, School of Statistics, University of the Philippines Diliman, Quezon City and Affiliate Associate Professor, School of Economics, University of the Philippines, Diliman. Email: cdsmapa@yahoo.com.
[3] Professor, School of Statistics, University of the Philippines Diliman, Quezon city
[4] Instructor, School of Statistics, University of the Philippines Diliman, Quezon City
[5] Assistant Professor, School of Statistics, University of the Philippines Diliman, Quezon City

I. Introduction

The country's performance in reducing poverty over the last three decades has been disappointing despite the many programs and past efforts of the national and local governments. The poverty incidence in the country in 2006, as officially measured using the headcount ratio, was at 32.9%, translating to about 28 million Filipinos who are poor. On the hunger mitigation efforts, the figures released by the Social Weather Stations (SWS) for the 4th quarter of 2010, "found the proportion of families experiencing involuntary hunger at least once in the past three months up to 18.1%, or an estimated 3.4 million families" (SWS, 2011). The 4th quarter hunger incidence is higher compared to the 12-year average of about 13.7%.

What might explain such dismal performance in poverty reduction and hunger mitigation efforts through these years? A quick answer is the country's poor economic growth performance. The Philippines' economic growth performance is no match relative to its East Asian neighbors, as shown in table 1. For example, Thailand's average growth rate in per capita Gross Domestic Product (GDP) from 1961 to 1990 is almost twice compared to the Philippines' growth. It was only in the 1990s that the gap in the growth rates between the two countries narrowed. What are the reasons for the country's feeble long run economic growth? An often-deliberated factor for this slow economic growth is the country's bourgeoning population.

The population debate, on whether a slower population growth[6] is good or bad for economic growth and the well-being of the Filipinos in general, continues to be contentious in the Philippines. Those opposed to the idea of slowing down the country's population growth argue on two issues: first, that there is no connection between population growth and economic development (population growth has nothing to do with economic growth; the cause of poverty lies elsewhere) and second, slowing down our population growth now will create a bigger problem in the future – the demographic winter, when a large percentage of the population consists of the elderly. The first argument has been disproven by the empirical findings (see Mapa and Balisacan, 2004; Mapa, 2009) which show that rapid population growth indeed hinders economic growth, even controlling for other factors that affect growth such as quality of public institutions (measure of corruption) and education of the individuals.

Table 1. Comparative Economic Performance for Selected Countries in East Asia

	Per capita GDP (PPP)					Per capita GDP growth				Population growth		
	1980	1990	2000	2009		1961-70	1971-90	1991-2009		1961-70	1971-90	1991-2009
China	524	1,101	2,667	6,200		4.65	7.82	10.47		2.02	1.64	0.84
Japan	18,647	25,946	28,605	29,688		10.47	4.22	0.90		1.02	0.84	0.17
Korea, Rep.	5,544	11,383	18,730	25,493		8.26	8.02	5.11		2.49	1.47	0.68
Hong Kong SAR, China	13,945	23,697	29,785	40,599		10.19	8.24	4.25		2.67	1.83	1.08
Philippines	2,618	2,385	2,587	3,216		4.93	3.86	3.71		3.02	2.67	2.04
Thailand	2,231	3,961	5,568	7,258		8.17	7.39	4.32		2.97	2.11	0.94
Indonesia	1,361	2,087	2,727	3,813		4.18	7.14	4.75		2.27	2.08	1.37

Source: World Development Indicators, World Databank http://databank.worldbank.org/ddp/home.do

[6] Most economists and demographers in the Philippines agree that an ideal population growth should coincide with the Total Fertility Rate (TFR) that is neither too high nor too low. This fertility rate that is consistent with stable population is about 2.1, also known as the replacement rate of fertility. The latest TFR based on the 2008 National Demographic and Health Survey (NDHS) is 3.3.

The core idea which links population and economic growth is demographic transition described as *"a change from a situation of high fertility and high mortality to one of low fertility and low mortality."* A country that enters into a demographic transition experiences sizable changes in the age distribution of the population and this affects economic growth. Demographic transition has three phases and each phase has a different impact on the economy.

In the course of the demographic transition, countries experience an increasing share of the working age population relative to the total population and this creates favorable effects on the per capita income. Mason and Lee (2006) refer to this effect of the demographic transition on income growth as the "first dividend." The conclusion is that countries with a population structure with heavy concentration at the working–age group have the advantage of producing high levels of per capita income, all things being the same. Cross-country and intra-country econometric analyses (Mapa and Balisacan, 2004; Mapa, Balisacan and Briones; 2006) have shown that the Philippines has not benefited from the so-called demographic dividend that is a major contributor to the economic success experienced by East Asian countries from the 1960s to 1990s (refer to Table 1)

In addition to the first dividend, Mason (2007) discusses another form of dividend resulting from the changing age-structure of the nation's population and refers to it as the second demographic dividend. The second dividend results from the society's response to the prospect of an aging population, an outcome as the nation's age structure enters into the third phase of the demographic transition. The challenge faced by societies (and governments) when there is a substantial percentage of the elderly population is on how to support their consumption, given a reduction in their income. There are common approaches to this problem. These include: (a) relying on public (or familial) transfer systems and (b) increasing saving rates and accumulating greater physical wealth or capital. Individuals accumulate saving in their working years and this serves as buffer during the retirement years. While accumulation of capital can be used to deal with the life-cycle deficit in the older ages, this capital also influences economic growth. As Mason points out, it is when society increases its saving rate that more rapid economic growth results, creating the *second demographic dividend*.

Demographic Winter – The Population Bogeyman

Having failed to argue against the impact of population growth on economic growth (now a widely accepted result), those against population management are now warning us of the catastrophic implications of slowing down our population growth–the *demographic winter* or when the country's population is ageing.

Magsino (2010), for example, argues the possibility of extinction as a result of slowing population growth, claiming that countries with negative population growth are "*literally disappearing from the world.*" Montalban II (2008) paints a bleak picture of our future population where majority will be "*aged, infirm and geriatric*". Villegas (2010) erroneously claims, that the Philippines would "*start to show the makings of an inverted pyramid which now characterizes aging countries like Japan, Spain, Italy and South Korea*."[7]

[7] This statement was based on Dr. Villegas' incorrect assertion that 146,582 babies were added to the data for the census year 2000. Dr. Villegas has since issued a public apology for his statement.

But are these arguments supported by facts? The data suggest that talk of a demographic winter occurring in the Philippines soon is greatly exaggerated and is being used as a tactic to create fear in the people's mind (Alonzo, et.al, 2004). Studies have shown, using relevant and appropriate assumptions, that the replacement fertility rate of 2.1 will be reached at the earliest in 2030 (Mapa, Balisacan and Corpuz, 2010) or the latest in 2040 (Concepcion, 2004). Moreover, the effects of the population momentum will continue for about 60 more years before the population growth becomes zero and by that time, the country's total population will be above 200 million.[8]

This paper contends that the fear of the demographic winter occurring in the country very soon is without basis and that our current population dynamics resulting from a high population growth is, in reality, negatively affecting the welfare of our elderly making them vulnerable to poverty.

II. The Elderly in the Philippines: Population and Poverty Scenarios

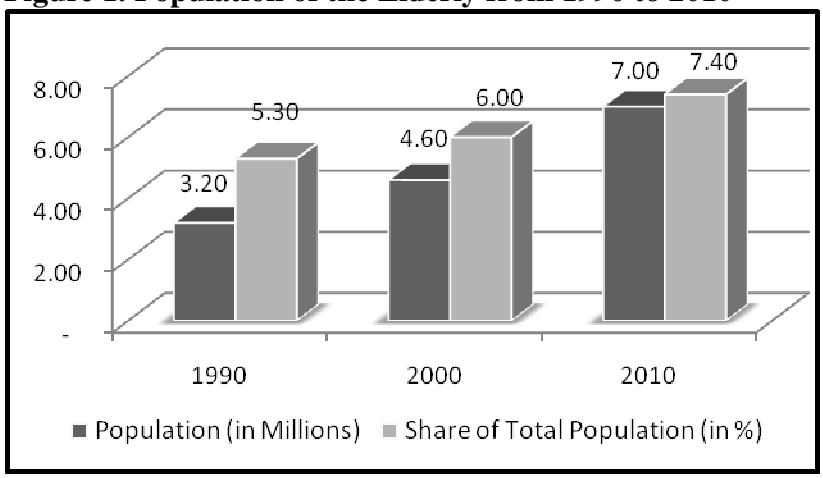
The elderly population (Filipinos aged 60 years and above) increased from 3.2 million in 1990 to 4.6 million in 2000. The elderly group in our country is growing at a rate of 3.6% every year and their number is expected to hit 7.0 million in 2010. By then, our elderly will account for about 7.4% of our total population.

A study by Cruz and Cruz (2010) showed that the Philippines can still be considered as a country with a young population where the percentage of those aged 65 years and above is less than 5%.[9] Moreover, it will only enter the *initial phase* of the aging population in 2040 when the percentage of those aged 65 years and above is 9.6% of the total population (the percentage of those aged 60 years and above will be 13.8% of the population). The results of the study by Cruz and Cruz clearly show that the so-called demographic winter will not be a concern for the Philippines for at least one generation. In the meantime, the damage that a rapid population growth (slow economic growth and high poverty incidence) will bring to this generation and the next are irreversible.

[8] Population Momentum refers to the tendency for population growth to continue beyond the time that replacement-level fertility has been achieved because of a relatively high concentration of people in the childbearing years. This phenomenon is due to past high fertility rates which results in a large number of young people. As these youth grow older and move through reproductive ages, the greater number of births will exceed the number of deaths in the older populations (World Bank).

[9] A population is considered as "young" if people aged 65 years and older comprise less than 5 percent of the total population; it is considered as "old" if the proportion of 65 years and above is 10 percent or more.

Figure 1. Population of the Elderly from 1990 to 2010*



Source: National Statistics Office (NSO); * Projected Population for 2010

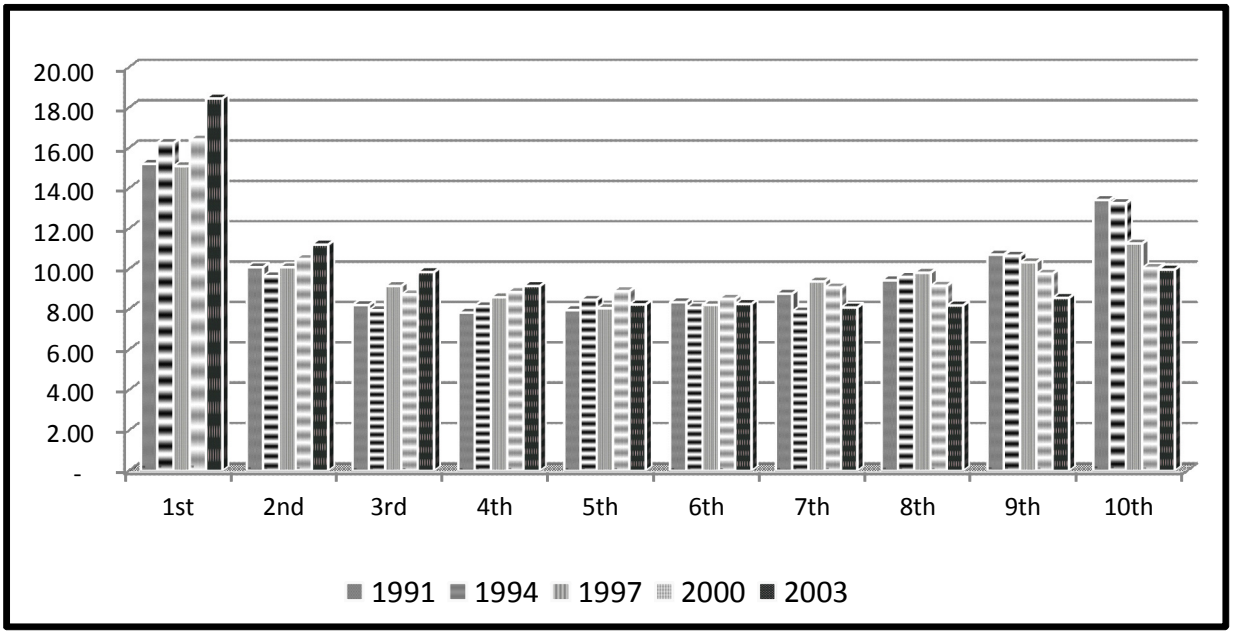
Poverty estimates using the data from the Family Income and Expenditure Survey (FIES) show that the percentage of the elderly-headed household that are considered as *poor* has been increasing since 2003, following the general trend of the increasing percentage of Filipinos who are *poor*. The figures show that about 20.68% of the elderly-headed households are considered as *poor* in 2000, the number decreased in 2003 to 19.33% and increased again in 2006 to 22.02%.

With the triple shocks that hit the country in the last two years: (a) the food crisis in 2008, (b) the global financial crisis in 2008 and (c) the natural calamities brought about by the typhoons in 2009, economists (see Balisacan, 2009) estimate that the percentage of *poor* Filipinos will remain high. It is not difficult to infer that the same scenario for the percentage of elderly-headed households who are *poor*.

While the percentage of elderly-headed households belonging to the poorest income group has been increasing, the percentage of elderly-headed households belonging to the highest income group has been decreasing, as shown in Figure 2 below. On the one hand, the percentage of elderly in the lowest-income deciles (poorest 10%) increased from 15.21% in 1991 to 18.45% in 2003. On the other hand, the percentage of elderly-headed household in the highest income class (richest 10%) decreased from 13.42% in 1991 to 9.97% in 2003. This shows that the welfare of the elderly-headed households has been deteriorating through the years.

This paper will present empirical evidence showing that presence of young dependents in the household (aged 0 to 14 years) increases the vulnerability of the elderly-headed household to poverty. It will show that rapid population growth affects the welfare of the elderly-headed household and that addressing the population problem now will not bring upon us the threat of demographic winter but will, in fact, improve the well-being of the elderly-headed household.

FIGURE 2.Percentage of the Elderly-Headed Households in the Income Deciles



Sources: FIES, NSO and Authors' Computation

Rapid Population Growth Restricts Overall Saving Rate

To empirically test that the Philippines has not benefitted from the second demographic dividend due to its high population growth, Mapa and Bersales (2008) worked on an econometric model estimating the effects of the population dynamics, particularly the impact of the young population (0 to 14 years) and the elderly population, on the aggregate household saving rate, using regional panel data from 1985 to 2003.

In effect, the paper looks at the role of the slow demographic transition in the Philippines' aggregate household saving rate. The econometric model for saving used the augmented life-cycle model to explain the saving behavior of the household. The life-cycle model predicts that both demographic variable and productivity growth will generate savings. During the first phase of the demographic transition the young dependent population (aged 0 to 14) is growing faster relative to the working-age population resulting in higher household consumption, which in turn diminishes the rate of saving (Coale and Hoover, 1956). During the second phase of the demographic transition, the working-age population is growing relative to the young dependent population resulting in higher saving rate.

The results of the study showed that the percentage of young dependents (aged 0 to 14 years) has a negative and significant impact on aggregate household saving rate. A one-percentage point reduction in the proportion of young dependents (say due to a policy that reduces fertility rate) results in an increase in the average saving rate by 0.34 percentage-point, controlling for other factors. The study also showed that the proportion of the elderly has a positive and significant impact on the aggregate household saving rate. In particular, a one percentage-point increase in the proportion of the elderly results in an estimated increase of 0.95 percentage-point in the average saving rate, all things being the same.

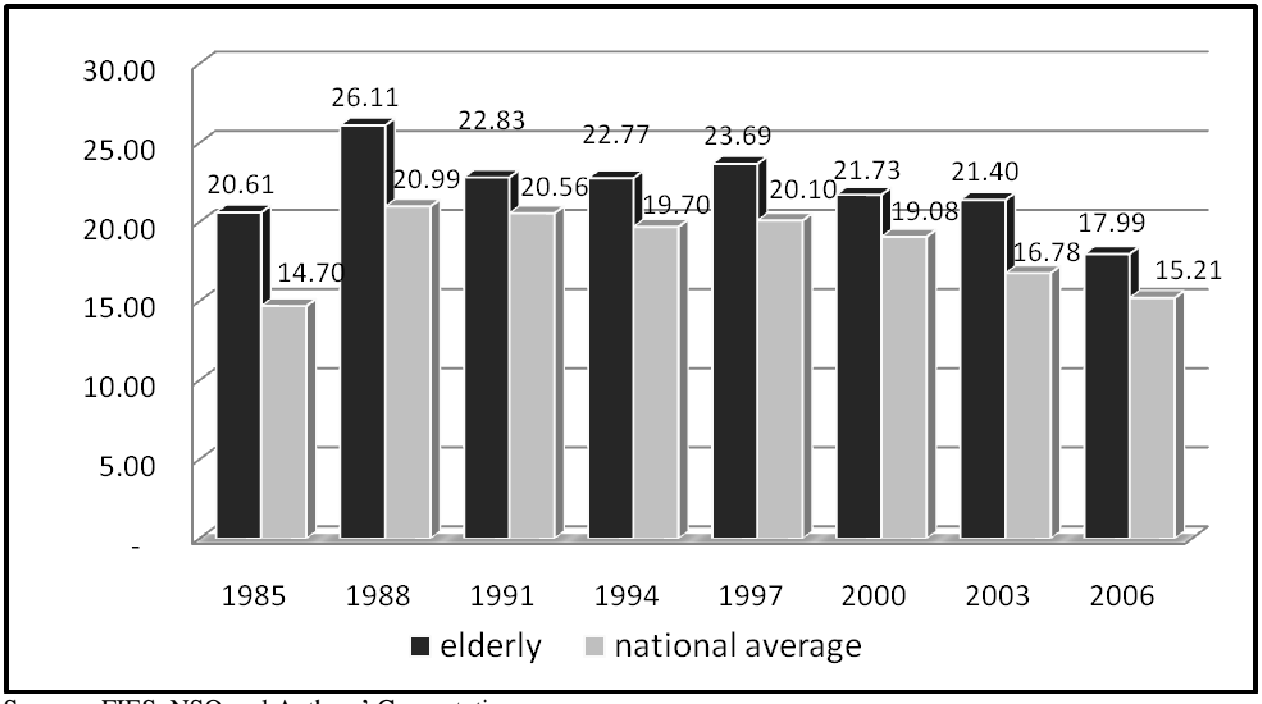
The Mapa and Bersales paper showed that the second demographic dividend is real and the Philippines missed out on this opportunity to increase its overall economic growth due to its unsustainable population growth.

Population Dynamics and the Welfare of the Elderly

What is the mechanism that links the rapid population growth to the welfare of the elderly? Using the idea behind the *second demographic dividend*, the elderly accumulate savings during their working-age years to serve as buffer in their retirement years. However, if the population continues to grow fast, resulting in a very slow demographic transition, then the percentage of the young dependents will continue to be high. This will hinder the saving rate of the elderly, particularly when the elderly is not just supporting a *single family* (his children) but an *extended family* (his children and grandchildren) as well.

The national household saving rates, as shown in figure 3 below, have been on the decline since 1997. The data from the FIES shows that in 2006, the average national household saving rate (light bars) is only 15.2%, much lower than the peak of 21% recorded in 1988. The average saving rate of the elderly headed household (dark bars), while higher than the national average in 2006 at 18%, is also lower than the peak in 1988 (26%) and has been on the decline since 1997 when the average saving rate of the elderly-headed household was 23.7%. In should be noted that if the life-cycle hypothesis holds, the saving rate is highest among working-age individuals and low among the elderly. High saving rate of elderly, as shown in figure 3, suggests that the bequest motive for saving among the elderly is strong.

FIGURE 3. Aggregate Household Savings Rate (by FIES years)



Sources: FIES, NSO and Authors' Computations

Mapa, Davila and Albis (2010) studied the saving patterns of elderly-headed households using pooled data from the Family Income and Expenditure Survey (FIES) for the years 1985,

1988, 1991, 1994, 1997, 2000, 2003 and 2006. The total number of elderly-headed households covered by the survey is more than 50,000 households. The paper looked at the impact of the presence of young dependents on the saving rate of the elderly headed households, controlling for other factors.

The results of the study show that the presence of young dependents (household members from 0 to 14 years) reduces the average saving rate of the elderly-headed household by about 2 percentage points, all things being the same. This shows that rapid population growth, resulting in a large percentage of young dependents negatively affect the welfare of the elderly by lowering their household saving rate. This result, at household level, is consistent with the impact of the young dependents on economic growth – at the macro level – during the first phase of the demographic transition: that increased spending in investment on education and health of the young creates a big challenge to the economy as it will hinder economic growth.

III. Population Dynamics and Poverty Incidence in the Elderly-Headed Households

To determine the effects of the number of young dependents on the welfare of the elderly-headed household, an econometric model is estimated using the pooled data on the elderly-headed households from the 2000, 2003 and 2006 Family Income and Expenditure Surveys (FIES).[10] The figures in table 2 show the number of poor and non-poor elderly-headed households in the sample.[11] The percentage of poor among the elderly-headed households increased in 2006 to 22% from the 2003 figure of 19.33%. While the 2006 poverty incidence among elderly-headed household is slightly lower compared to the overall national poverty incidence among families, estimated at 26.9%, the Pearson chi-square test shows that the percentage of poor among the elderly-headed households is significantly higher in 2006 compared to the figures in 2003 (19.33%) and 2000 (20.68%).

Table 2. Poor and Non-Poor Elderly-Headed Households from 2000, 2003 and 2006 FIES

Year	Poor		Non-Poor		Total
	n	%	n	%	
2000	1,917	20.68	7,351	79.32	9,268
2003	1,539	19.33	6,422	80.67	7,961
2006	1,844	22.02	6,529	77.98	8,373
Total	5,300	20.70	20,302	79.30	25,602
Pearson Chi-Square Statistic		18.01	p-value		0.0000

Sources: FIES (2000, 2003 and 2006), NSO; National Statistical Coordination Board (NSCB), Authors' Computation

[10] Only the data from the 2000, 2003 and 2006 FIES are used in building the econometric model to maintain the consistency in the definition of poor households.

[11] The poor refers to the families whose income falls below the poverty threshold as computed by the National Statistical Coordination Board (NSCB).

Econometric Model of Poverty Incidence in the Elderly-Headed Households

The econometric model used in analyzing the impact of the presence of young dependents in the elderly-headed household is the *logit model*. Consider the linear model,

$$y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki} + \varepsilon_i \qquad i = 1,2,...,n \qquad (1)$$

where the variable of interest, y_i, takes on the value 1 if the elderly-headed household is *poor* and value 0 if the elderly-headed household is *non-poor* and X_1, X_2,…, X_k represent the determinants of the elderly-headed household being *poor*.

Note that y_i is a Bernoulli random variable with probability of success,π, or $y_i \sim Be(\pi)$. The problem in economics is that most likely π is unknown and not constant across the observations.

The solution is to make π dependent on X_i. Thus, we have,

$$y_i \sim Be\left(F\left(\beta_o + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki}\right)\right) \qquad (2)$$

where the function $F(\cdot)$ has the property that maps $\beta_0+\beta_1X_1+\beta_2X_2+\ldots+\beta_kX_k$ onto the interval [0,1]. Thus, instead of considering the precise value of y, we are now interested on the probability that y = 1, given the outcome of $\beta_0+\beta_1X_1+\beta_2X_2+\ldots+\beta_kX_k$, or,

$$\Pr\left(y_i = 1 | \underline{\beta}, \underline{x_i}\right) = F(\underline{x_i}\,\underline{\beta}) \qquad (3)$$

where F is a continuous, strictly increasing function and returns a value ranging from 0 to 1. The choice of F determines the type of binary model. Given such a specification, the parameters of this model (the betas) can be estimated using the method of maximum likelihood. Once the identifiable parameters are established, the likelihood function is written as,

$$L(y;\beta) = \prod_{i=1}^{n} \left\{ \left[F(x_i\beta)\right]^{y_i} \left[1 - F(x_i\beta)\right]^{1-y_i} \right\} \qquad (4)$$

where F(.) is a cumulative density function with mean zero.

To complete the model we need to specify F and it is common to select either a standard normal distribution (*probit model*), or a logistic distribution (*logit model*).

If $F(\cdot)$ is standard normal distribution then,

$$F\left(\underline{x}_i'\,\underline{\beta}\right) = \Phi(\underline{x}_i'\,\underline{\beta}) = \int_{-\infty}^{\underline{x}_i'\underline{\beta}} \frac{1}{\sqrt{2\pi}} \exp\left\{\frac{-z^2}{2}\right\} dz \qquad (5)$$

If $F(\cdot)$ is a logistic distribution then,

$$F(\underline{x}_i'\underline{\beta}) = \Lambda(\underline{x}_i'\underline{\beta}) = \frac{\exp(\underline{x}_i'\underline{\beta})}{1+\exp(\underline{x}_i'\underline{\beta})} \tag{6}$$

In the case of the LOGIT model with a single explanatory variable the probability of success is given by,

$$\Pr(y_i = 1 | x_i) = \frac{\exp(\beta_0 + \beta_1 x_i)}{1+\exp(\beta_0 + \beta_1 x_i)} \tag{7}$$

The parameters of the model are estimated using Maximum Likelihood (ML). Using the likelihood function,

$$L(y;\beta) = \prod_{i=1}^{n} \left\{ [F(x_i\beta)]^{y_i} [1 - F(x_i\beta)]^{1-y_i} \right\} \tag{8}$$

We can obtain an expression for the log-likelihood,

$$\begin{aligned} \log(L) &= \sum_{i=1}^{n} y_i \log[F(x_i'\beta] + (1-y_i)\log[1-F(x_i'\beta)] \\ &= \sum_{i:y_i=1}^{n} \log[F(x_i\beta] + \sum_{i:y_i=0}^{n} \log[1-F(x_i\beta)] \end{aligned} \tag{9}$$

Differentiating the log-likelihood function with respect to the parameter vector β and set the vector of derivatives equal to zero:

$$\frac{\partial \log L}{\partial \beta} = \sum_{i:y_i=1} \frac{f(x_i\beta)}{F(x_i\beta)} x_i' - \sum_{i:y_i=0} \frac{f(x_i\beta)}{1-F(x_i)} x_i' = 0 \tag{10}$$

where f(.) is the probability density function associated with the F(.). Simplifying, we have,

$$0 = \sum_{i=1}^{n} \left[\frac{y_i}{F(x_i\beta)} - \frac{1-y_i}{1-F(x_i\beta)} \right] f(x_i\beta) x_i' \tag{11}$$

Combining the two terms inside the brackets, we have,

$$0 = \sum_{i=1}^{n} \frac{y_i - F(x_i\beta)}{F(x_i\beta) - [1-F(x_i\beta)]} f(x_i\beta) x_i' \tag{12}$$

In the *logit* model we can simplify the last equation using the fact that,

$$f(x) = F(x)[1-F(x)] = \frac{\exp(-x)}{(1+\exp(-x))^2} \tag{13}$$

The simplification yields:

$$0 = \sum_{i=1}^{n} \left[y_i - F(x_i \beta) \right] x_i' \quad or \quad \sum_{i=1}^{n} y_i x_i' = \sum_{i=1}^{n} F(x_i \beta) x_i' \tag{14}$$

The likelihood equations associated with the *logit* (and *probit*) models are non-linear in the parameters. Simple closed-form expressions for the ML estimators are not available, so they must be solved using numerical algorithms.

Marginal Effects

Interpretation of the coefficient values is complicated by the fact that estimated coefficients from a binary model cannot be interpreted as marginal effect on the dependent variable.

The marginal effect of X_j on the conditional probability is given by,

$$\frac{\partial E\left(y \mid \underline{X}, \underline{\beta}\right)}{\partial X_j} = f(\underline{x}_i' \underline{\beta}) \beta_j \tag{15}$$

where $f(\cdot)$ is the density function corresponding to $F(\cdot)$. In here, β_j is weighted by a factor $f(\cdot)$ that depends on the values of all the regressors in $\underline{X}$. The direction of the effect of a change in X_j depends only on the sign of the β_j coefficient. Positive values of β_j imply that increasing X_j will increase the probability of the response, while negative values of β_j will decrease the probability of the response. The marginal effect is usually estimated using the average of all the values of the explanatory variables ($\underline{\mathbf{X}}$) as the representative values in the estimation.

Average Marginal Effect

Some researchers (particularly Bartus (2005)) argue that it would be more preferable to compute the *average marginal effect*, that is, the average of each individual's marginal effect. The marginal effect computed at the *average X* is different from the average of the marginal effect computed at the individual X.

Explanatory Variables (Determinants of Poverty Incidence in Elderly-Headed Households)

The explanatory variables ($\underline{\mathbf{X}}$) used to explain the poverty incidence in the elderly-headed households include: the number of young dependents in the household (aged 0 to 14), education of the household head, gender of the household head (indicator variable with values 1 if Male and 0 if Female), age of the household head, income transfer from abroad (as a percentage of total income), indicator variable for extended family (1 if the household has an extended family and 0 otherwise), time indicator variables (for the years 2000, 2003 and 2006), and regional indicator variables to account for regional differences (16 regions).

IV. Discussion of the Empirical Results

The figures in table 3A show the summary statistics of the variables in the model. The percentage of poor among the elderly-headed households in the sample is about 21%. The results also show that the average age of the elderly head of the household is about 69 years and that two-in-three of the households are headed by a male elderly. In terms of contribution of income from abroad (as a percentage of total income), about 8% of the average income of the elderly-headed household is income transfer from abroad. The table also shows that about 40% of the elderly-headed household is considered as an extended family.

Table 3A. Summary Statistics of the Variables in the Model

Variable	Obs	Mean	Std. Dev.	Min	Max
Household Classification (1 if Poor, 0 if Non-Poor)	25,602	0.21	0.41	0.00	1.00
Income (in natural logarithm)	25,602	11.40	0.96	8.09	16.50
Age of the Household Head	25,602	68.71	7.07	60.00	99.00
Number of Young Dependents	25,602	0.87	1.27	0.00	13.00
Income from Abroad (as percentage of household income)	25,602	7.61	17.47	0.00	100.00
Type of Family (1 if Extended Family, 0 If Single Family)	25,602	0.40	0.49	0.00	1.00
Gender of the Household Head (1 if Male, 0 if Female)	25,602	0.67	0.47	0.00	1.00

Table 3B shows highest educational attainment of the elderly household head. About two-thirds of the household heads (66.6%) only finished at most elementary, while only 8% of the household heads were able to complete their college education.

Table 3B. Frequency Table of the Level of Education of the Elderly

Level of Education	N	Percent
No Education	2263	8.9
Elementary Undergraduate	9024	35.3
Elementary Graduate	5731	22.4
High School Undergraduate	2197	8.6
High School Graduate	2897	11.3
College Undergraduate	1385	5.4
College Graduated/Post Graduate	2049	8.0

The figures in table 3C provide an interesting insight on the characteristics of a poor elderly-headed household. The average number of young dependents (aged 0 to 14) is significantly higher among *poor* elderly-headed households (1.39) compared to the *non-poor* elderly-headed households (0.73). The econometric model will later support this result: that the presence of a young dependent in an elderly-headed household increases the probability of that household becoming *poor*, all things being the same. In terms of average age of the household head, the results in table 3C show no significant difference in the average age of the two groups of households. Another interesting result is the difference of income transfer from abroad (as percentage of total income) between the *poor* and *non-poor* elderly-headed households. The results show that on one hand, *poor* elderly-headed households received income transfer from

abroad equivalent to an average of 1.66% of its total income. On the other hand, *non-poor* elderly-headed households received about 9.16% of its total income from abroad.

Table 3C. Comparison of Means of Selected Explanatory Variables

Variable	Poor Elderly-Headed Household			Non-Poor Elderly Headed Household		
	Mean	Std. Dev		Mean	Std. Dev	Remarks *
Number of Young Dependents	1.39	1.60		0.73	1.13	significantly different
Age of the Household Head	68.59	7.05		68.74	7.07	not significantly different
Income from Abroad (as % of total income)	1.66	7.66		9.16	18.92	significantly different
Income (in natural logarithm)	10.53	0.61		11.62	0.90	Significantly different

* test results at the 5% level of significance

The figures in tables 4A and 4B provide measures of association between household classification (poor/non-poor elderly-headed household) and the gender of the household; and the household classification and the type of family (single/extended). Table 4A shows significant association between the gender of the household head and whether the household is *poor* or *non-poor*. The percentage of *poor* among male-headed households is 22.35% and is significantly higher compared to the percentage of female-headed households at 17.41%.

Table 4A. Household Classification (Poor/Non-Poor) and Gender of the Household Head

Gender of Household Head	Poor		Non-Poor		Total
	n	%	n	%	
Male	3,812	22.35	13,241	77.65	17,053
Female	1,488	17.41	7,061	82.59	8,549
Pearson Chi-Square Statistic		84.93	p-value		0.0000

Sources: FIES (2000, 2003 and 2006), NSO; National Statistical Coordination Board (NSCB), Authors' Computation

The information in table 4B shows that the percentage of *poor* among households with extended families (having two or more groups of families) is 23.38% and is significantly higher compared to the percentage of *poor* among single-family households at 18.93%.

Table 4B. Household Classification (Poor/Non-Poor) and Type of Family

Type of Family	Poor		Non-Poor		Total
	n	%	n	%	
Single	2,918	18.93	12,494	81.07	15,412
Extended	2,382	23.38	7,808	79.30	10,190
Pearson Chi-Square Statistic		73.75	p-value		0.0000

Sources: FIES (2000, 2003 and 2006), NSO; National Statistical Coordination Board (NSCB), Authors' Computation

The results of the econometric model in table 5 show that presence of a young dependent in an elderly-headed household increases the probability that the household will become poor by about 9 percentage points (marginal effect), controlling for other factors. Moreover, if the elderly-headed household is an *extended family* (the elderly is supporting two or more households such as his children as well as his grandchildren), the probability of becoming poor increases by about 8.5 percentage points, all things being the same. The results of the analysis show that presence of young dependents negatively affects the welfare of the elderly, making them vulnerable to poverty, particularly when the elderly-headed household is supporting an extended family (the children and grandchildren). The results strengthen the argument in favour of a policy that will slow down the country's rapid population growth.

Table 5. Logistic Regression for Determinants of Poverty in Elderly-Headed Households
Dependent Variable: Classification of the Elderly-Headed Household (1 if Poor; 0 Non-Poor)

Explanatory Variables	Coefficient	Robust Std. Err.	P-Value	Marginal Effects
Log of Income	-3.220***	0.050	0.000	-0.269
Age of Household Head	-0.028***	0.003	0.000	-0.002
Number of Dependents (aged 0 to 14)	1.0359***	0.022	0.000	0.086
Percentage of Income From Abroad	-0.020***	0.002	0.000	-0.002
Extended Family Indicator	0.9930***	0.054	0.000	0.085
Gender of Household Head (1 if Male)	1.0798**	0.051	0.000	0.086
Elementary Undergraduate	-0.086	0.071	0.223	-0.007
Elementary Graduate	-0.322***	0.081	0.000	-0.027
High School Undergraduate	-0.373***	0.105	0.000	-0.030
High School Graduate	-0.813***	0.108	0.000	-0.063
College Undergraduate	-1.063***	0.192	0.000	-0.079
College Graduate and Post Graduate	-1.211***	0.240	0.000	-0.088
Indicator for Year 2003	-0.042	0.054	0.434	-0.004
Indicator for Year 2006	0.7971***	0.053	0.000	0.068
Constant	34.244***	0.632	0.000	0.000
Number of Observations				25574
Log Pseudo Likelihood Value				-6812.51
Wald's Statistics (distributed as chi-square with 29 d.f.				5277.130
P-value				0.000
Pseudo R-squared				0.478

* significant at 10%; ** significant at 5%; *** significant at 1%;
The Time base category is Year 2000 and the regional base category is NCR.
The regional indicators are excluded in the table. All regional indicators are significant at the 10% level, except for regions 1, 14 and 16. Of the significant regional indicators, only ARMM has a significantly higher coefficient than the base category.

The results also show that if the head of the household is male, it increases the probability of that household becoming poor by about 9 percentage points, all things being the same. Moreover, increasing income transfer from abroad (as percentage of total income) is an important determinant of poverty. This result supports the notion that having an OFW-member of the household is a way out of poverty.

The regression results also show the importance of education as an instrument against poverty. If the head of the household was able to finish elementary education, the probability of the household becoming poor decreases by 2.7 percentages points compared to a household head without education or has not finished elementary education, all things being the same. The decrease in the probability of becoming poor becomes substantial when the household head is able to finish college education, where the probability of becoming poor drops by about 9 percentage points, ceteris paribus.

V. Conclusion

The prospect of an ageing population or demographic winter, while currently occurring at various stages in developed countries, is neither a concern nor a threat to the Philippines. The country's current population age structure classifies the country as a young population and at the first stage of the demographic transition, with all the economic challenges that characterize a country with a large percentage of young dependents. These challenges also hinder our long term economic growth.

At the household level, the rapid population growth resulting in a large percentage of young dependents negatively affects the welfare of the elderly, decreasing their saving rate and making them vulnerable to poverty, particularly when the elderly-headed household is supporting an extended family (the children and grandchildren). In addition, the country's inadequate social security mechanism, especially for the elderly, creates an additional problem. If we have an effective social security system, then so-called demographic winter would not be a problem.

The major policy concern that should be addressed immediately is how to speed up the demographic transition, from the first phase to the second phase, in order to harvest the demographic dividend quickly. Experiences from countries that have benefited from the demographic dividend point to the need for government support, such as providing contraceptive services and accurate information, to accelerate voluntary reduction in fertility rates as quickly as possible. Public policies should be proactive in assisting, particularly the poor households, in achieving a voluntary reduction in fertility rates.

The business as usual attitude towards the country's bourgeoning population is unacceptable. The damage that a rapid population growth will bring to this generation and the next are irreversible. The immediate danger is the country's rapid population growth, not the prospect of a demographic winter.

REFERENCES

Alonzo, Ruperto P., et. al. (2004), "Population and Poverty: The Real Score." Discussion Paper 0415, School of Economics, University of the Philippines Diliman, December 2004.

Balisacan, Arsenio M. (2009) "Pathways Out of Rural Poverty: Is Agrarian Reform Passé?" *A paper presented at the 6th Ayala Corporation-UPSE Economic Forum, at the University of the Philippines School of Economics Auditorium, July 10, 2009.*

Bartus, Tamas (2005), "Estimation of marginal effects using margeff" The Stata Journal, Vol. 5, No. 3, pp. 309-329.

Coale, A.J. and E.M.Hoover (1956). Population Growth and Economic Development in Low-Income Countries. Princeton: Princeton University Press.

Concepcion, Mercedes B. (2004), "Fertility and Poverty Linkages: Evidence from the 2003 National Demographic and Health Survey," Paper presented at the 2003 NDHS Data Dissemination Forum, Dusit Hotel Nikko, Makati (8 November).

Cruz, Christian Joy P. and Cruz, Grace T. (2010). "Revisiting Philippine Population Aging…is 60 the new 70?" *A paper presented at the Philippine Population Association (PPA) Annual Scientific Conference on February 4 to 5, 2010 at the Heritage Hotel, Pasay City.*

Magsino, Cecilio L. (2010), "An optimistic look at the population issue," Philippine Daily Inquirer, October 20, 2010 (under letter to the editor).

Mapa, Dennis S. (2009), "Young Population Matters: More is not Necessarily Merrier".Policy Brief 2009-01, Philippine Center for Population and Development (PCPD), Makati City.

Mapa, Dennis. S. and Arsenio M. Balisacan (2004)."Quantifying the Impact of Population on Economic Growth and Poverty: The Philippines in an East Asian Context." In: Population and Development in the Philippines: The Ties That Bind (Ed Sevilla, L.A.). AIM Policy Center, Makati City.

Mapa, Dennis S., Arsenio M. Balisacan, Kristine Joy S. Briones (2006), "Robust Determinants of Income Growth in the Philippines." Philippine Journal of Development (PJD), Volume XXXIII, Nos. 1-2, pp. 1-32.

Mapa, Dennis S., Arsenio M. Balisacan and Jose Rowell T. Corpuz (2010), "Population Management should be mainstreamed in the Philippine Development Agenda", Policy Brief 2010-01, Philippine Center for Population and Development (PCPD), Makati City.

Mapa, Dennis S. and Lisa Grace S. Bersales (2008), "Population Dynamics and Household Saving: Evidence from the Philippines." The Philippine Statistician, Vol .57, Nos. 1-4, pp. 1-27.

Mapa, Dennis S., Manilyn L. Davila and Manuel Leonard F. Albis (2010), "Getting Old before Getting Rich: An Analysis of the Economic State of the Elderly in the Philippines." *A paper presented at the Philippine Population Association (PPA) Annual Scientific Conference on February 4 to 5, 2010 at the Heritage Hotel, Pasay City.*

Mason, Andrew (2007), "Demographic Dividends: The Past, the Present and the Future." In Mason, A. and Yamaguchi, Mitoshi (eds.). Population Change, Labor Markets and Sustainable Growth: Towards a New Economic Paradigm. ELSEVIER.

Mason, Andrew and Ronald Lee (2006). "Reform and Support systems for the elderly in developing countries: Capturing the second demographic dividend." GENUS 62(2): 11-35.

Montalvan, Antonio J. II (2008), "Edcel's Winter" Philippine Daily Inquirer, October 06, 2008 (under the column Kris-Crossing Mindanao).

National Statistics Office (NSO), Family Income and Expenditure Survey (FIES) for years 2000, 2003 and 2006.

Social Weather Stations (2011), "Fourth Quarter 2010 Social Weather Survey: Hunger up to 18.1% of families" SWS Media Release, January 13, 2011, Website, www.sws.org.ph

Villegas, Bernardo M. (2010), "Population Statistics are being doctored," Manila Bulletin, September 19, 2010 (under Business and Society).

World Development Indicators, World Databank http://databank.worldbank.org/ddp/home.do