POVERTY TRANSITIONS FOR THE ELDERLY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the

Degree Doctor of Philosophy in the Graduate School of

The Ohio State University

By

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The Ohio State University 2008

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ABSTRACT

The purpose of this study is to examine the likelihood of poverty transition and the effects of different events on poor elderly. This study is important because the aging population has grown rapidly, and elderly poverty involves many complex relationships across an individual's life span. The contributions of this study are to improve the understanding of elderly poverty and to provide considerable policy implications for elderly demographic changes in the future.

The data for this study are from the years 1992-2006 of the Health and Retirement Study (HRS) and the sample consists of 30,405 elderly individuals from eight waves. To examine the incidence and dynamics of elderly poverty, poverty-rate decomposition and the poverty exit (re-entry) hazard rate based on Kaplan-Meier product-limit estimates are used. Entry into and exit from elderly poverty models are separately used to estimate the conditional relationship between poverty transition and multiple trigger events as well as various covariates using the discrete-time hazard model. These multivariate techniques show a more realistic picture of elderly poverty transition in terms of providing a preliminary explanation of the unobserved heterogeneity of the elderly poverty.

The major findings are: (1) the poverty rates for the HRS data fluctuated considerably during the 1990s, but the rates have had little turnover and have been relatively stable over time during the 2000s; (2) in terms of poverty entry and exit rates,

the exit rate was decreased during the 1990s, but the rate was increased during the 2000s while the entry rate fell somewhat during the 1990s and rose somewhat during the 2000s; (3) the poverty rate for the HRS cohort individuals in a given year by cross-sectional data is relatively low, and the duration of the poverty spell is also relatively short (a fifth of the HRS cohort individuals had at least one poverty spell); (4) as the length of the poverty spell increased, the probability of poverty exit decreased; (5) as the non-poverty duration increases, the poverty re-entry rates are constant at around 10 percent; (6) retirement and a negative change in health condition both have significant effects on elderly poverty entry, while retirement, increase in total wealth, and becoming insured from any government health program all have significant effects on elderly poverty exit; and (7) life history variables, such as total years of work and length of marriage have significant effects on both elderly poverty entry and exit. Results from the hazard rates (exit and reentry rate) imply that a person who falls into poverty during his or her elderly years is highly likely to remain poor because the exit probabilities fall as the length of the poverty spell increases. In addition, the results of constant re-entry rates infer that the elderly population is exposed to the risk of falling to an income that puts them below the poverty line. Results from multivariate analysis suggest that retirement has an important role in elderly poverty transition and a negative change in health condition also has positive impact on elderly poverty entry. Thus, effective income support programs and social policies for the elderly help to prevent elderly individuals from becoming poor.

DEDICATION

To my parents

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- 3. Lee, Y., & Stafford, K. (2005). Patterns and determinants of low-income family saving. American Council on Consumer Interests proceeding 2005 Annual Meeting
- 4. Moon, C., & Lee, Y. (2002). An exploratory study on the digital divide among Korean women. *Review of Business and Economics*, *32*, 67-90.
- 5. Moon, C., & Lee, Y. (2001). Consumer information and satisfaction of Ecommerce. *Review of Business and Economcis*, 31, 1-20.
- 6. Moon, C., & Lee, Y. (2000). A study of consumer fraud in the E-commerce. *Journal of Consumption Cluture*, *3*, 59-75.

 Moon, C., & Lee, Y. (1999). Cases of consumer fraud in E-commerce. Consumer Cluture in the era of Cyber Marketing, 25-31/

FIELDS OF STUDY

Major Field: Human Ecology (Consumer and Family Economics)

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CHAPTER 1

INTRODUCTION

Background of Study

Since the mid-1980s, the poverty rate of the aged population in the United States has been stabilized. In 1959, the poverty rate for the elderly was 35.2 percent, which was more than twice that of the non-elderly, and represented the highest level of impoverishment among the U.S. total population (Rank & Hirschl, 1999). However, the elderly poverty rate fell rapidly from about 24 percent in 1970 to 12 percent in 1986. During the recession of the early 1990s, the elderly poverty rate rose slightly but by the mid-1990s, the rate had slowly fallen to about 10 percent, which is equal to the poverty rate for prime-age workers (U.S. Census Bureau, 2007). Since 2000, the elderly poverty rate has been below 11 percent, and that rate has remained stable over time. This stabilization reflects the achievements of major public policies for the reduction of poverty within the elderly population over the past 40 years.

The increasing maturity of Social Security and the establishment of Medicare have been primarily credited with decreasing the elderly poverty rate (Danziger & Haveman, 2001). Social Security has had an effect on the declining poverty rate among the aged. In 1997, the Social Security benefit lifted 11.4 million elderly out of poverty and reduced the poverty rate among the elderly by three-quarters, to 11.9 percent (Porter, Larin, & Primus, 1999). Between 1969 and 1973, Social Security benefits increased by 30 percent, even though Social Security contributions remained constant (Hurd, 1989). Consequently, the increased income of the elderly has been attributed to the increase in Social Security benefits. Raising the income of the elderly has positively affected the later life of the elderly. For example, in 1960, 40 percent of elderly widows lived with their children, but by 1990 less than 20 percent did so (McGarry, 2000).

On the other hand, the elderly receive substantial benefits from Medicare, which covers almost all people over age 65 and most people under 65 who are receiving Social Security Disability Insurance benefits (Scholz & Levine, 2001). Determining the economic consequences of Medicare is difficult, because Medicare is more than a cash transfer program (Cutler & Sheiner, 2000). Nevertheless, the progress of Medicare allows us to understand that Medicare plays a prominent role in decreasing elderly poverty. For example, real Medicare outlays have grown more than ten times, from \$16.9 billion in 1967 to \$233.4 billion in 1999, and real expenditures per Medicare enrollee have increased about six times over the same time period (Scholz & Levine, 2001). As a result, it is generally recognized that the current elderly population is better able to cope with uncertainties now than they were 50 years ago.

The elderly have also benefited from an income maintenance program: the Supplementary Security Income (SSI). SSI provides a guaranteed income for all those age 65 and over as well as the blind and the disabled. To be eligible for SSI, elderly individuals must have limited countable assets, which are \$2,000 for individuals and \$3,000 for couples, as well as a limited countable income. The maximum federal SSI is adjusted to the Consumer Price Index, and in 2007, the federal benefit rate was \$623 for individuals and \$923 for couples. Accordingly, SSI is the last resort for supporting the financial well-being of the poorest elderly. Although SSI has done much to improve the situations of the poorest elderly, SSI has the potential to do more (McGarry, 2000).

Despite the well-developed social policies for the elderly poor over the past 40 years described above, there are problems to be expected with respect to supporting economic security for the elderly. First of all, the rise of the aging population is a problem in and of itself. The elderly population has grown rapidly, and it is expected to sustain this growth. The percentage of the U.S. population 65 and older was 11 percent in 1980 and 22 percent in 2000, and is projected to rise to 35 percent by 2030 (U.S. Census Bureau, 2000). The fastest-growing portion of the total population is the oldest-old population (those 85 and older). The oldest-old population is projected to rise rapidly after 2030, when the baby boomers start to move into this age group (U.S. Census Bureau, 2005). Thus, the demographic changes associated with an aging population will be a significant challenge for the government and the elderly themselves in terms of supporting their financial security.

Second, the elderly face great economical vulnerability to uncertainties, such as income loss and medical problems in the deterioration associated with the expected changes to social policies. The existing age-related social policies, such as Medicare, SSI, and retirement benefits will possibly be modified, and the Social Security system will have a financial burden to meet this larger obligation. In fact, there is a striking negative association between Social Security expenditures per capita and the elderly poverty rate: the elderly poverty rate declined rapidly as Social Security programs grew quickly in the

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1960s and 1970s, and then the rate decreased more slowly as program growth slowed in the 1980s and 1990s (Engelhardt & Gruber, 2004). The lowest income quintile depends on Social Security benefits as a major income source (Hurd, 1990), and Social Security accounted for 49.8 percent of elderly women's income versus 35 percent of their male counterparts (EBRI, 2002). Moreover, reductions in Social Security benefits would significantly alter the poverty of the elderly, because the elasticity of poverty in elderly household families to benefits is roughly unitary (Engelhardt & Gruber, 2004). Thus, changes to social systems will affect not only Social Security and private pensions but also the economic status of the elderly despite the past success of public policies for the elderly.

Third, certain sub-population groups among the elderly still remain at high levels of poverty despite the rise of economic security in the elderly population over time. Those groups include the very old, minorities, and elderly women who head their own households or who live alone. In particular, the poverty rate for older women is almost twice as high as that for men, and minority women are at an even greater disadvantage (Rupp, Strand, & Davies, 2003). As labor market involvement of women increases, older women contribute to employer-based retirement benefits for their own retirement income. However, more working men than working women (74 percent versus 69 percent) save for retirement, and women receive lower retirement benefits than men (U.S. Census Bureau, 2005). Consequently, men are better prepared for retirement, and older women are more likely to live in poverty. For women, the incidence of poverty is about four times as high among elderly widows as currently married women: 20.9 percent versus 5.3 percent (Bound, Duncan, Laren, & Oleinick, 1991), and the poverty rates among elderly widows remain considerably higher than those of the population and of the rest of the elderly (Hurd, 1990). Before the establishment of the Retirement Equity Act of 1984, the economic hardship of older women living alone was much more severe because at the death of a husband, they lost an income source and were forced to reduce their living standard. Nearly half of the elderly poor are widowed women, and their poverty rate is substantially higher than that of widowed men (Weir & Willis, 2000). The Retirement Equity Act now requires that the spouse should also agree to the refusal of the joint-and-survivor annuity (Myers, Burkhauser, & Holden, 1987). This system has positively affected the economic security of elderly women after the death of a husband. However, a woman's overall economic well-being changes as a consequence of her husband's death (Burkhauser, Giles, Lillard, & Schwarze, 2005). Thus, many elderly women would face the risk of falling into poverty because they are still more dependent on the private and public pension of deceased husbands.

Purpose of Study

Corresponding to the rapid rise of the aging population, social policies for the elderly will suffer changes to the level of benefits, and the current vulnerable elderly subpopulations face great disadvantages due to the expected changes aforementioned. Elderly poverty involves many complex relationships among individual attributions and life events over time. In particular, an event-based approach focuses on the relationship between experiencing a substantial decline in economic well-being in later life and trigger events such as changes in economic status, marital status, household compositions, sudden illness, or disability status (Crystal & Waehrer, 1996). Before concluding that

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elderly persons' risk of poverty is low in the U.S. based on a relatively low crosssectional poverty rate, study of the likelihood of poverty transitions through trigger events makes it possible to disentangle the complex relationship between various events and poverty among the elderly. Examining the impact of trigger events on elderly poverty may help lead to suggestions for reducing elderly poverty and securing the later life of the elderly. Therefore, it is worthwhile to examine the likelihood of poverty transition and the impact of different events across the elderly life span.

The contributions of this study are to improve the understanding of elderly poverty and to suggest policy implications for future elderly demographic changes. The objectives of the study are: (1) to investigate the probability associated with poverty transitions among the elderly; (2) to examine different events associated with elderly poverty transitions; and (3) to highlight implications for the further study and public policies for the elderly's economic security.

This study is organized as follows. In chapter two, poverty measurement, factors, and events associated with elderly poverty are reviewed. In addition, existing theories related to this study are described. Chapter three provides the estimation and the specification of the empirical model. The results and discussion are presented in chapter five. Finally, the conclusion and implications of this study are presented in the last chapter.

CHAPTER 2

LITERATURE REVIEW

Introduction

This chapter provides a description of the measures of poverty used in previous research, factors related to elderly poverty, and events affecting the transition of the elderly into poverty. The measurement of poverty and the characteristics of the poor have been addressed by numerous studies. However, little research has been done on events associated with the transition into poverty by the elderly. The first section of this chapter includes several measurements of poverty. The second section describes factors associated with elderly poverty. Several factors from the literature that have been found relevant to elderly poverty are addressed. The third section is a review of events affecting changes in elderly poverty. The fourth section presents the review of theories used to explain elderly poverty. The final section presents a summary of previous studies and implications for this study.

Measuring Poverty

Absolute and Relative Poverty

Poverty is often defined and operationalized with respect to income deprivation (Inceland & Bauman, 2004). There are a number of poverty measures one could use to estimate levels of economic well-being in society, and income poverty measures are perhaps the most common (Iceland, 2005). There are several ways to measure income poverty, but absolute and relative perspectives are two basic types of measurements. Absolute measures define a truly basic needs standard that is fixed over time and is updated only for inflation (Iceland, 2005). An absolute poverty line is not meant to change with the standard of living in a society, and people are defined as poor when some absolute needs are not sufficiently satisfied. This means that a completely absolute poverty line has an elasticity of 0 with respect to changes in the general standard of living in society (Ruggles, 1990). Thus, poverty as measured by an absolute level such as the U.S. official poverty threshold can be eliminated by economic growth and success.

The official U.S. poverty threshold is an absolute poverty measure developed by Molli Orshansky in 1964. The thresholds were based on the 1955 Household Food Consumption, which indicated that families of three or more people spent about one-third of their after-tax income on food in that year (Iceland, 2005). The thresholds differ by the number of family members, family composition, and the age of the family head (National Research Council, 1995). Each year, the thresholds are adjusted by the Consumer Price Index (CPI), and the poverty status is determined by gross cash income below the threshold. The official poverty threshold is not only a standard with which to determine who is in poverty, but also an important barometer for determining eligibility for government assistance programs.

In contrast, a relative approach uses a subjective or arbitrary income cutoff, such as the median, mean, or some other quintile, rather than using fixed standards of adequacy. When applying a relative measure approach, people are considered poor when they lack the amount of income equal to a certain percentage of the median or mean income in a given society (Wagel, 2002). Relative poverty thresholds do not offer a stable target against which to measure the effects of government programs because they change each year in response to an increase or decrease in the standard of living (National Research Council, 1995). The European Union and the United Kingdom have often specified a poverty threshold of half the median income as the most common guideline (Iceland, 2003). As a relative concept, poverty will always exist because some fixed proportion of the population, such as that below one-half of the median income, is always regarded as poor. Furthermore, the relative measure cannot answer the question of how desperate a poor family's situation is or how much money poor families need to reach an acceptable standard of living.

In order to define the poor based on a relative measure, 50 percent of the median income initially suggested by Fuchs (1969) or 50 percent of the mean employed by O'Higgins and Jenkins (1990) was proposed as the relative poverty line. Relative measures define poverty as a condition of comparative disadvantage to be assessed against some relative, shifting, and evolving standard of living (Iceland, 2003). To obtain the thresholds, equivalence scales should be defined because needs increase as family size grows, but not in a proportional way due to economies of scale in consumption. Equivalence scales can be represented by a single parameter, the equivalence elasticity, which is the power by which the needs of family resources grow as family size increase (Förster, 1990):

$$e = \ln(N) / \ln(S), \qquad 0 \le e \le 1 \qquad \dots \qquad (1)$$

where e is equivalence elasticity, N is economic need (economic well-being), and S is family size. For the equivalence elasticity, Buhmann, Rainwater, & Smeeding (1988) proposed equivalent income as follows:

$$EI = D / S^{e} \quad \dots \qquad (2)$$

where total family disposable income *(D)* divided by family size *(S)* raised to the power *(e)* is equal to equivalent income *(EI)*. When equivalence elasticity, *e*, equals 1, equivalent income is the same as per capita income. Where *e* equals 0, family disposable income is taken as equivalent income with no increase in the disposable income. A family is considered relatively poor under this measure if its size-adjusted income is below the threshold given.

Other Poverty Measures

There are other approaches to measuring poverty. One approach is to determine a minimum necessary income and the adequacy of various income levels for a representative sample of the population (National Research Council, 1995). Those subjective poverty thresholds are based on the feelings and opinions of individuals. Subjective poverty thresholds have been based on surveys, which asked questions about basic needs or minimum income levels, such as the following: *"Which after tax monthly income do you, in your circumstances, consider to be absolutely minimal? That is to say*

that with less you could not make ends meet. " (Kapteyn, Kooreman, & Willemse, 1988). One might define everyone as poor whose income is less than the amount they give as an answer to this question (Pradhan & Ravallion, 2000). Those thresholds have wide variation in respondents' answers and are very sensitive to question wording (National Research Council, 1995). However, if the survey was continued using the same questions and approaches, the results could provide information about how the public's view of poverty level income has changed over time (Vaughan, 1993). One such series has been conducted for the U.S. on the basis of question responses in the Gallup Poll over the period 1947-1989, and there is similar information available from the 1992 and 1993 polls (National Research Council, 1995). Subjective measures can be used not only to evaluate the situation of a particular household but also to set or provide the choice of poverty lines, equivalence scales, economies of scale, and regional cost of living differences (Goedhart, Halberstadt, Kapteyn, & Van Praag, 1977).

The other approach to poverty definition and measurement is "capability poverty" developed by Sen. Sen (1983) used a definition that indicated to what extent a person could obtain utility or happiness through "capability". This capability has four dimensions: a sequence including commodity, characteristics, capability to function, and utility. Using a bicycle for an example, the commodity is the bicycle, the characteristic is transportation, the capability to function is the ability to move, and the utility is the pleasure from moving. The poor are deprived of rights to health, food and freedom to achieve inherent potential in their capabilities (Sen, 1999). Sen (1976) suggested that along with measuring headcounts of persons in poverty, a more comprehensive measure of poverty should include the average income level of those persons in poverty and how

far this level is below the poverty threshold as well as measure the income inequality of the poor. Sen's index of poverty not only incorporates the official headcount of poverty but is also sensitive to the income shortfalls of the poor (Hoover, Formby, & Kim, 2004).

The National Research Council of the National Academy of Science (NAS) established the Panel on Poverty and Family Assistance, which first met in 1992 (Iceland & Bauman, 2004). The NAS made several recommendations based on the weakness of the current official poverty thresholds: first, the poverty threshold should represent expenditures on foods, clothing, shelter, and utilities (FCSU) rather than only considering food expenditures: second, expenses for other needs, such as household supplies and personal care expenses, should be accounted for through the use of a multiplier (a number between 1.15 and 1.25 is suggested by the NAS): third, the geographic variation by state and metropolitan area needs to be adjusted to reflect the cost of living in different areas: and fourth, family resources should be defined as the value of monetary income from all sources as well as the value of near-money benefits such as food stamps, housing subsidies, home energy assistance, or the Earned Income Tax Credit because their expenses can affect basic consumption needs (Iceland, 2005). Even though this alternative poverty measure requires complex statistical procedures, it is not only possible to effectively evaluate government programs using cash and in-kind transfers in terms of the effect on the alleviation of poverty, but it would also be an improvement over the weaknesses of the current poverty threshold.

Persistent and Transitory Poverty

Longitudinal datasets, such as the Panel Study of Income Dynamics (PSID), the National Longitudinal Survey for Youth (NLSY), and the Survey of Income and Program Participation (SIPP) have contributed to the study of poverty dynamics since the 1970s. In terms of poverty dynamics, the measurement of chronic and transitory poverty could help to capture more realistic models of poverty, such as the "underclass theory" and to provide important policy perspectives (Rodgers & Rodgers, 1993). Poverty dynamics have been developed using several different approaches.

First, Bane and Ellwood (1986) examined the dynamics of poverty depending on a spell-based measure of persistent poverty using standard life-table methods. Their approach to measuring persistent and transitory poverty avoids censoring problems by modeling the duration of the completed poverty spell (Rodgers & Rodgers, 1993). Persistent poverty is defined based on poverty spells with durations that exceed ten years. In fact Bane and Ellwood (1986) found that nearly 45 percent of poverty spells end within one year, and 70 percent are over within three years, and only 12 percent last ten years or more. The spell-based measure has an advantage if the duration of low-income status is an important aspect of persistence because this measure places more weight on consecutive years of poverty (Duncan & Rodgers, 1991). Furthermore, the duration method allows us to identify life cycle events leading into and out of poverty.

Second, Lillard and Willis (1978) proposed the estimation of components-ofvariance earning models in prime-age household head to distinguish the extent to which poverty is a permanent condition or transitory status. They derived poverty probabilities of various time sequences, using men's earning function with an error structure. Although

their approach aptly described the income dynamics of prime-age males, there are disadvantages to this approach: first, this approach fails to capture the entire population of poverty; and second, this approach is difficult to apply to families because of its focus on individual income. Lillard and Willis only considered the changes of permanent and transitory components in an individual's earnings to predict which individuals will fall into poverty. However, the changes of family formation and situations would also cause individuals to fall into poverty. To address the changes of families, Duncan and Rodgers (1991) proposed an "income-to-needs ratio" measure of household economic status obtained by dividing each household's income by its corresponding poverty threshold. This measure implied that when family situation and structure changed, both family income and needs would have to be adjusted to reflect the new situation (Bane & Ellwood, 1986). Based on the error-component earnings models of Lillard and Willis (1978) and Hause (1980), they proposed that the distribution of income-to-needs ratio is a function of a distribution of permanent income-to-needs status in the population, a set of year-specific random "shocks" such as changes in demographic structure and the composition of income, and a set of year-specific autoregressive parameters that determine how the shocks persist over time (Duncan & Rodgers, 1991). In terms of explaining poverty dynamics, the development of these model-based approaches depends on extensive data and computational capacity as well as sophisticated human capital.

The third approach is to identify persistent and transitory poverty based on the proportion of poor by some definition of poor over a fixed time frame, typically eight or ten years (Duncan, Coe, & Hill, 1984; Gaiha & Deolalikar 1991; Gottschalk 1982; Hill 1981; Rainwater, 1981). The persistently poor were defined as the proportion of people

poor in all or most study periods, and the transitorily poor were defined as the proportion of people poor during short periods (Rodgers & Rodgers, 1992). For example, Duncan, Coe, and Hill (1984) found that nearly 24.4 percent of the population were poor for at least one year between 1960 and 1978 based on the official threshold, but the persistently poor who had income below the threshold for eight or more years comprised only 2.6 percent. As a result, 10.7 (2.6/24.4) percent of the ever-poor population were persistently poor. In this approach, changing family structure does not cause a problem because the individual's poverty status is determined based on his or her family income status (Bane & Ellwood, 1986). This tabulation approach is easy to implement empirically. Yet the persistently poor defined by this method can be subjective and arbitrary, because they are counted as having remained poor over the entire study period (Bane & Ellwood, 1986).

Factors Associated with Elderly Poverty

Gender, Race, Residence, and Education

Gender is an important attribute in many studies on elderly poverty. Despite significant improvement of economic well-being for the elderly population, higher rates of poverty among elderly women persist and tend to be more common than for men (Burkhauser & Holden, 1982; Minkler & Stone, 1985; Morgan, 2000; Rupp, Strand, & Davies, 2003). In 2003, 57.3 percent of the population 65 and older were women and 69.6 percent of those elderly women lived in poverty (U.S. Census Bureau, 2005). According to several studies, the poverty rate for elderly women remains almost twice as high as that for men (Choudhury & Leonesio, 1997; Quinn, 1993; Rupp, Strand, & Davies, 2003). In 1994, Burkhauser and Smeeding found that older women were more likely to be in poverty than older men:15.7 percent versus 8.9 percent. In addition, Dalaker and Naifeh (1998) found that 7.0 percent of men 65 and older were poor, compared to 13.1 percent of women 65 and older and 22.4 percent of elderly women living alone. In 2004, 12.5 percent of elderly women had an income level below the poverty threshold compared with 7.3 percent of older men (U.S.Census Bureau, 2004). In addition, older women were more likely to live in near-poverty conditions than older men: 7.9 percent versus 5 percent (U.S. Census Bureau, 2005). Wu (2003) found that a higher percentage of older women (27.8 percent) experienced at least one year in poverty between 1988 and 1992 than did older men (17.6 percent), and about 7 percent of elderly women compared to only 2.4 percent of older men lived in poverty all five years. Major determinants of economic disadvantages among older women include lower lifetime earnings, fewer years spent in the labor force, fertility experience, relatively long life expectancy, lower pension income, marital dissolution, and major health problems (Morgan, 2000; Rupp, Strand, & Davies, 2003; Warlick, 1985).

Poverty rates among the elderly population varied considerably by race. Historically, elderly non-Hispanic Whites have been less likely to live in poverty than their Black and Hispanic counterparts. In 1975, which is the earliest year that data on Hispanics was released, 13 percent of older non-Hispanic Whites were the poor compared with 36.3 percet of older Black and 32.6 percent of older Hispanics (DeNavas-Walt, Proctor, & Mills, 2004). In 1995, the poverty rate among Black and Hispanic elderly were 25.4 percent and 23.5 percent compared to 8.3 percent of non-Hispanic white older persons (DeNavas-Walt, Proctor, & Mills, 2004). Furthermore, in 2003, older non-Hispanic Whites were less likely than older Blacks and older Hispanics to live in poverty: 8 percent compared with 24 percent and 20 percent, respectively (U.S. Census Bureau, 2005).

Single older women among the minority elderly suffer from economic disadvantages and comprise the poorest population group of all (Dressel, 1988; Wilson-Ford, 1991; Hardy & Hazelrgg, 1993; Choi, 1997; Willson & Hardy, 2002). In 2003, the poverty rate for elderly Black women was 27.4 percent, compared to 17.7 percent of their male counterparts (U.S. Census Bureau, 2005). In addition, older Black women and Hispanic women living alone were in the poorest group in 2003: 40.3 percent of older Black women and 40.8 percen of older Hispanic (U.S.Census Bureau, 2004). Older Black and Hispanic populations continue to suffer cumulative economic disadvantages from inadequate education, low life-time earnings, little accumulated wealth, and deteriorating health conditions (Chen, 1994; Choi, 1997; Crystal & Shea, 1990; O'Rand, 1996).

Another important factor associated with elderly poverty in the literature is residential location. Elderly people residing in nonmetropolitan areas have a higher poverty prevalence status and their poverty is more persistent than their metropolitan counterparts (Glasgow, 1988; McLaughlin & Holden, 1993; McLaughlin & Jensen, 1993). McLaughlin and Jensen (1993) showed that 15.4 percent of nonmetropolitan elders age 65 or older were poor, compared to 10 percent of all metropolitan elders and 13.8 percent of central-city elders. Furthermore, rural elderly women and minorities have an extremely high poverty prevalence status. For instance, approximately 27 percent of elderly women living alone were in poverty, and more than half of African-American elderly women living alone were poor (U.S. Census Bureau, 2002). Non-metropolitan elders have a significantly higher likelihood of becoming poor as they age after controlling for race, marital status, age, and education (McLaughlin & Jensen, 1995). Jensen and McLaughlin (1997) found that residing in a non-metropolitan area had a significant negative effect on poverty exit for PSID household heads who were age 55 and more at any time between 1968 and 1988.

Educational attainment has been a significant factor for earnings as well as economic outcome in later life. Cross-sectional studies have provided a clear link between poverty and having lower educational attainment (Crystal, Shea, & Krishnaswami, 1992; McLaughlin & Holden, 1993; McLaughlin & Jenses, 1993). Kart, Longino, and Ullman (1989) found that among well-off elderly people, the proportion of college-educated elderly was high compared to the general elderly population. Crystal, Shea, and Krishnaswami (1992) found that the relationship between education and economic well-being in later years of people age 65 or older was significantly strong. Those results suggested that individuals with more education had access to higher-status jobs; had the option of working longer; and were more likely to be self-employed, all tending to increase adjusted income (Crystal, Shea, & Krishnaswami, 1992). The result by Choudhury and Leonesio (1997) using data from the National Longitudinal Survey of Mature Women has shown that low levels of education in particular, when completed years of schooling were 8 or less, were strongly associated with one or more poverty spells.

Marital Status and Marital History

The influence of marital status on elderly poverty has been studied extensively. Elderly married couples are less likely to be poor than their single, widowed, or divorced counterparts. In 1987, the poverty rates of older married men and women were fewer than 6 percent, but the poverty rates for unmarried older women were three times as high for married older men, and those for unmarried older women were to three to four times as high for married older women (Burkhauser, Bulter, & Holden, 1991). In 2003, 4.9 percent of older people in married-couple families were in poverty, lower than the 13.6 percent of older single men and 20.4 percent of older single women. (U.S. Census Bureau, 2005). According to Wu (2003), 13 percent of older married couples spent at least one year in poverty, and 1.3 percent among them spent all five years in poverty during between 1989 and 1993. On the other hand, 54.2 percent of never-married older persons spent at least one year in poverty, and 11.9 percent spent all five years in poverty.

Unmarried older women are more likely to be poor compared to their married counterparts, and also poverty among elderly women is associated with being unmarried. Many studies found that widowed, divorced, and never married older women experienced higher poverty rates than did their married peers and even unmarried older men (Choudhury & Leonesio, 1997; Crown, Mutschler, Schulz, & Loew, 1993; Holde, Burkhauser, & Feaster, 1988; Weaver, 1997; Wu, 2003). In 1997, the poverty rates among unmarried women were substantially higher than rates among married older women: 22.2 percent of divorced women, 18 percent of widowed women, 20 percent of never married women, but just 4.6 percent of married women (National Economic Council Interagency Working Group on Social Security, 1998).

Longitudinal studies of the effects of widowhood and divorce indicate that both types of marital dissolutions have negative and prolonged economic consequences for women's economic well-being (Holden & Smock, 1991). In 2001, 17.3 percent of nonmarried elderly women were in poverty compared to 4.3 percent of married older couples (Anzick & Weaver, 2001). Wu (2003) found that 36.9 percent among unmarried older women experienced poverty for at least one year, and 13 percent spent all five years in poverty. In contrast, 33.4 percent of unmarried older men spent at least one year in poverty, and 7.2 percent spent all five years in poverty.

Among older women, differences in poverty status have varied across the category of marital status. Choi (1992) found that widowed elderly women on average had better financial conditions than divorced elderly women, even though both had relatively high poverty rates. The longer the years of widowhood or divorce for a woman, the more likely she is to be poor (Holden, Burkhauser, & Feaster, 1988; Holden, Burkhauser, & Meyers, 1986; Uhlenberg, Cooney, & Boyd, 1990; Zick & Smith, 1986). Historically, widowed elderly women have been cited as the highest poor group, but their economic disadvantage was improved over time by old-age policies, such as Old-Age and Survivors Insurance (OASI) benefits. In terms of trends in the poverty of widowed older women, in the late 1960s the poverty rate of widows, 40 percent, was twice as high as for married women, but their poverty rates fell substantially in the early 1970s due to increases in widows' benefits for Social Security to 100 percent of the primary insurance amount (PIA) in 1972 (Haider, Jacknowitz, & Schoeni, 2003). Between the 1980s and early 1990s, poverty rates among widowed older women had been stable at about 20 percent, but the rates have been gradually decreasing after early 1990s. However, widows have higher rates of poverty than married peers and widowers. In fact, 18 percent among widowed elderly women in 1997 were in poverty compared to 11.4 percent among widowed men and 4.6 percent among married older women (National Economic Council Interagency Working Group on Social Security, 1998). Haider, Jacknowits, and Schoeni (2003) found that 16 percent of widowed older women were in poverty compared to 5 percent of married older women. According to Wu (2003), among older widows, 32 percent lived at least one year in poverty, and 9.3 percent of older widows spent five years in poverty between 1989 and 1993. In contrast, among married older women, 15.1 percent spent at least one year in poverty, and 1.7 percent spent all five years in poverty (Wu, 2003).

Divorced elderly women have always been economically disadvantaged, even though their economic status has been little documented in previous studies. The share of divorcees among women age 65 and older has increased over time, for example, from 1.5 to 6 percent between 1960 to 1995 (Meghea, 2003; U.S. Social Security Administration, 2002). About 75 percent of divorced women remarry within 10 years (Bramlett & Mosher, 2001), and 26 percent of second marriages usually dissolve within 10 years (Haider, Jacknowithz, & Schoeni, 2003). Hence, many women enter old age as divorced, and divorced elderly women are more likely to be poor because their low socioeconomic status pre-existed (Haider, Jacknowithz, & Schoeni, 2003; Meghea, 2003). Wu (2003) found that nearly half of divorced older women spent at least one year in poverty, and 12.6 percent of these older women spent five years in poverty. According to Haider, Jacknowitz, and Schoeni (2003), poverty rates had simiar trends between widowed and divorced elderly women in the late 1960s and early 1970s. In the late 1980s and early 1990s, the poverty rate among divorced elderly women increased and about 25 percent of divorced elderly women were in poverty in 2001 (Haider, Jacknowitz, & Schoeni, 2003).

Marital history is an important dimension explaining elderly poverty, even though little is known about the impact on economic consequences in later life. Although current married elderly couples are better off economically than unmarried older persons, a question about whether or not the economic status of current married couples differs according to their marital history can be raised. Holden and Kuo (1996) found that using the Health and Retirement Study (HRS), couples in a first marriage composed only onequarter of black households and fewer than half of all white and Hispanic households. In addition, in over one-third of all married couple households, at least one spouse had a previous marriage that ended in divorce or widowhood, and then these couples had significantly lower income and assets than couples in their first marriage (Holden & Kuo, 1996). Married women who experienced a dissolved marriage had a lower economic status when compared to women in a lifelong marriage (Holden & Kuo, 1996; McNamara, O'Grady-Leshane, & Williamson, 2003). McNamara, O'Grady-Leshane, and Williamson (2003) found that among married women age 62 or older, the poverty rate of previously divorced or widowed women was 9.6 percent and 10.8 percent compared to 8.6 percent of women in a lifelong marriage. Vartanian and McNamara (2002) found that a remarriage after 5 years was not significantly related to economic outcome among older women, but remarriages within 5 years were significantly associated with more time in poverty for older women.

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Occupation and Work History

Occupation and work history have been significant predictors of economic outcomes in later life in prior studies. The post-retirement economic well-being of the elderly is determined by labor experiences and in particular, men's post-retirement economic well-being is also determined by the same factors that affect economic wellbeing before their retirement (Campbell & Henretta, 1980; Henretta & Campbell, 1976; McLaughlin & Jensen, 2000). Economic advantages obtained during employment accumulate to expanded economic outcomes during older age (Crystal & Shea, 1990; Crystal, Shea, & Krishnaswami, 1992; Henretta & Campbell, 1976; Leon, 1985, McLaughlin & Jensen, 2000). Increased income provided by professional, technical, and managerial positions strongly influences economic well-being in later life, and those with job security and protection from unemployment or the risk of occupational injury continue to work longer and increase their saving opportunity through the full life course (Crystal, Shea, & Krishnaswami, 1992). According to McLaughlin and Jensen (2000), work history was captured by using occupation (laborer, farmer, and other occupations / professional or managerial / clerical, sales, service / craftsmen, operative / worked full time but no occupation reported), years of work experience (head or wife), labor union coverage, and preretirement wages (head or wife). Among older male household heads having been employed in a professional or managerial occupation, having union coverage, having a wife who never worked full time, and having a wife who worked more years as a full time worker significantly decreased the probability of becoming poor, while having additional hours currently worked reduced the probability of becoming poor. Similarly, among older women with changes in marital status, women in households where the head

reported working in a professional or managerial occupation, who worked full time but had no reported occupation, or whose job was unionized were less likely to make a transition into poverty. In addition, a reduction in hours worked compared with the prior year increased the probability of becoming poor (McLaughlin & Jensen, 2000). More hours of labor force activity and higher wages immediately prior to retirement as well as employment in a favorable pension industry have been associated with improved postretirement economic status for older men and women (Leon, 1985; O'Rand & Henretta, 1982; O'Rand & Landerman, 1984; Vartanian & McNamara, 2002).

Prior studies have examined the impact of occupation and work history on older women's poverty. Women's labor force participation rates have increased dramatically, but substantially more older women live in poverty than older men (Caputo, 1997). Mitchell, Levine, and Phillips (1999) found that additional years of work, controlling for other factors, had only a small positive effect on unmarried women's retirement income and no effect on that of married women, whereas average earnings and occupational status had strong effects on women's economic outcomes. Among non-elderly women, their low-paying jobs and occupational segregation further contributed to their poverty status (Bassi, 1988; Danziger, Jakubson, Schwartz, & Smolensky, 1982; Heath & Kiker, 1992; Kniesner, McElroy, & Wilcox, 1988; Sawhill, 1988; Thomas, 1994), and these economic circumstances could have a lasting impact on the economic outcomes of older women's later life (Choudhury & Leonesio, 1997). Hence, women's economic vulnerability in old age is caused by their lower lifetime earnings and insufficient retirement savings (McNamara, 2003). O'Rand and Henretta (1982) found that among women, interrupted work histories – not working in midlife or entering the labor force

after 35 years old - were associated with significantly less retirement income than lifelong work histories. Smith and Zick (1986) found that female survivors with many years of work experience have a lower incidence of poverty than those who have little or no prior labor market experience. According to Choi (1992), substantial work histories were associated with less drastic deterioration of economic circumstances in widowed and divorced older women. In addition, beginning or continuing work in older age, particularly for non-married women, may be associated with a reduced risk of poverty (Crown, Mutschler, Schulz, & Loew, 1993; Shaw & Yi, 1997). According to Choudhury and Leonesio (1997), older women who reported 2 years or less of work experience faced 40 percent chance of becoming poor one or more times. Vartanian and McNamara (2002) found that low hours of paid work in midlife (less than 500 hours per year) were associated with more time spent in poverty in old age compared with women who worked at least 1,000 hours.

Health Status

There are two causal hypotheses for an association between health and economic status: first, economic status determines lifestyles or living circumstances that affect health status, the "prevention hypothesis": and second, as the reverse causality, health status influences life circumstances, and economic status is determined by the life circumstances, the "deprivation hypothesis" (Thiede, & Traub, 1997). Although the direction of causation has been debated between medical scientists and economists, there exists a strong connection between health and economic status. Moon and Juster (1995) found that poor health led to a reduced median income in married couple households of
HRS cohort: the median income for a couple with excellent health conditions was \$70,000, while that for a couple with poor health was only \$13,439. Using HRS, Smith and Kington (1997) found that individuals in excellent health had 2.5 times as much household income and 5 times as much household wealth compared as individuals in poor health. Smith (1999) found that negative self-reported health status influenced current earnings and future retirement income due to limiting work or raising medical expenses. Having chronic conditions among eight types of disease, which are high blood pressure, diabetes, cancer, lung disease, a heart condition, stroke, psychiatric problems, and arthritis has a significant influence on the wealth depletion of elders age 70 or older (Lee, & Kim, 2003). The impact of health on economic status measured by income and wealth for the elderly has received considerable attention, even though studies dealing with the effect of health status on poverty are little known.

Events Associated with Elderly Poverty

Retirement

Retirement is a major concern for individuals approaching retirement age in terms of adequacy of retirement, even though they financially prepare for their retirement. Social Security and private pension programs have an important role in maintaining the living standard of retirees. However, significant income changes sometimes occur at retirement. Moreover, wealth accumulated may not be sufficient to support economic security throughout retirement, and those assets may be eroded with the onset of poor health and the change of marital status (Butrica, 2007; Crystal & Waehrer, 1996). Ross, Danziger, and Smolensky (1987) showed that the income-to-needs ratios of retired men was significantly lower than that of working men, and Burkhauser and Duncan (1989) found that retirement was associated with at least a 50 percent decrease in economic wellbeing. Butrica (2007) found that in retirement, family income is projected to decline by 8-12 percent between 67 and 80, and 42 and 44 percent of retirees will have significantly less income at age 80 than they did at age 67. In addition, family wealth is projected to decrease by 6-8 percent between ages 67 and 80 (Butrica, 2007). Cross-sectional data showed that older adults have higher poverty rates substantiating the growth of risk of poverty after retirement (Holden, Burkhauser, and Feaster, 1988). The elderly who were the working poor in their younger years have more severe economic circumstance after retirement due to the termination of their earnings and inadequate retirement income (Callahan, 1999).

Changes in Marital Status

Marital dissolution through a spouse's death or divorce influences a sharp decline in economic status among older women. Hence, for many elderly women, poverty starts when their marriage is terminated. The death of a spouse appears to substantially increase the probability that an elderly woman will fall into poverty, but has less impact on the risk of poverty for elderly men (Burkhauser, Butler, & Holden, 1991; Crystal & Waehrer, 1996). Numerous past studies consistently found that widowhood affected transitions into poverty for older women after the death of a spouse in terms of timing, incidence, and duration of their poverty (Bound, Duncan, Laren, & Oleinick, 1991; Burkhauser, Butler, & Holden, 1991; Dodge, 1995; Holden, Burkhauser, & Feaster, 1988; Holden, Burkhauser, & Myers, 1986; Hurd & Wise, 1987; Lopata & Brehm, 1986; Minkler &

Stone, 1985; Zick & Smith, 1991). Holden, Burkhauser, and Myers (1986) found that while the poverty rate for the Retirement History Survey (RHS) widows hovered around 30 percent in any given year, their risk of being poor at some point during the 10 year period of analysis was over 50 percent. Bound, Brown, Duncan, and Katz (1991) found that roughly two-thirds of the widows who were initially poor after the deaths of their husbands moved out of poverty within 5 years. The risk of entering poverty diminishes over time for intact couples and the first period of widowhood is associated with a significant increase in the risk of poverty (Holden, Burkhauser, & Feaster, 1988). Using RHS data, Hurd and Wise (1989) concluded that poor widowed households became poor because they saved less than other widowed households during their husbands' lifetime. Their lower savings rate then translated into lower levels of pre-widowed wealth and higher levels of post-widowed poverty. The risk of poverty for widows was much higher when their husbands had life-long low earnings (indicated by educational level) or work interruptions that shortened their working lives (Shaw & Yi, 1997). While lower income women are more likely to become widowed than higher income women, the effects of widowhood on poverty status appear to remain even when income previous to widowhood is taken into account (Holden, Burkhauser, & Myers, 1986; Holden and Smock, 1991). According to Shaw and Yi (1997), nearly all elderly recent widows who became poor for at least one year had an income loss of \$50 per month or more, most frequently from loss of earnings, other pension income, or assets.

The effect of divorce on transitions into poverty has not received adequate attention because very few elderly people had ever experienced divorce until recent years. However, the divorce rate of elderly people has gradually increased, and the economic status of divorced older women was low in previous research (Haider, Jacknowits, & Schoeni, 2003; Meghea, 2003; Wu, 2003). Prior research found that women experienced economic difficulties following divorce (Duncan & Hoffman, 1985; Morgan, 1991; Stirling, 1989). With respect to changes in economic well-being among the elderly with regards to divorce, Duncan (1989), using PSID, found that the incidence of divorceinduced income loss falls at older ages. Despite the high proportion of poor among divorced older women, little is known about the effect of divorce on the transition into poverty among elderly women.

Changes in Health Status

Prior studies found that health changes, such as the onset of a chronic disease, or changes in self-reported health status influenced the economic status of the elderly. Wu (2001) found that changes in severe health conditions among married couples were associated with large declines in household wealth, in particular the effects of health events of wives on the economic status led to a considerable decrease in household wealth. Smith (1999) found that the onset of new health episodes reduced elders' wealth accumulation by approximately \$10,000. Using AHEAD data, Kim (2006) reported that new chronic conditions significantly affected the magnitude of wealth depletion for unmarried women compared to married women with the same health events. In terms of income loss, Smith (2003) found that the onset of a new condition immediately reduced the probability of work by 15 percent between two waves of HRS and decreased household income, with the reduction larger when the health event was more severe. Thus, new health events among the elderly affect the reduction of current income as well

as future income due to increasing medical expenses and restricting participation in the labor market.

Theory

Human Capital

Human capital theory proposes a relationship between skill (or human capital) acquisition and labor productivity. This theory posits that investment by individuals in human capital will be rewarded in the labor market, since individuals are believed to be fairly compensated for their productivity at work (Castle, 1993). Schultz (1961) proposed the ways to improve human capital: health activities to increase life expectacy and vigor, traning, organized education, study programs for adults, and migration for job enhancement. Gary Becker considered human capital as the effectiveness of different types of investments, such as general education and job-specific training, and calculating the distribution of returns to the investment as among the employer, the government, and the individuals (Becker, 1975; Field, 2003). Individuals' different levels of investment in education and training are explained in terms of their expected returns from the investment. According to human capital theroy, individuals whose skill levels are weak due to lack of education or relevant experience are less productive at work and are poorly rewarded in the labor market (Castle, 1993). Labor with low levles of human capital earn lower wages and experience more job instability, i.e., they are more likely to experience forms of underemployment that may result in poverty (Levitan, Mangum, & Marshall, 1981; Thurow, 1975).

Human capital theory posits the pattern of individuals; lifetime earnings. The pattern of individuals'earnings are such that they start out low (when the individual is young) and increase with age (Becker, 1975; McKernan & Ratcliffe, 2002). As workers grow older, the pace of human capital investment and labor productivity slows, leading to slower earnings growth (McKernan & Ratcliffe, 2002). At the end of a person's working life, skills may have depreciated, as a result of lack of continuous human capital investment and the aging process. This depreciation contributes to the downturn in average earnings near retirement age (Ehrenberg & Smith, 1991).

Human capital theory has addressed the major determinants of poverty as theory of earnings. Poverty is linked in fundamental ways to deficits in human capital; low schooling and inadequate general and job-specific training (Castle, 1993). For working age adults, labor force nonparticipation and unemployment are the main pathways to poverty, while a steady job is the main avenue out (Castle, 1993). There is a relationship between age and poverty, with poverty more likely for the young and elderly (McKernan & Ratcliffe, 2002). Also, individuals age 65 and over are especially vulnerable to poverty, because once they enter poverty, they are less likely to exit (McKernan & Ratcliffe, 2002).

In general, human capital theory explains the relationship between human capital investment and labor market earnings, but this theory has been only partially successful as an explanation for poverty.

Life Course Perspective

The concept of the life course has had a long and distinguished history within both social sciences and policy studies (Settersten & Mayer, 1997). The life course idea provides a holistic approach to human lives. Life course refers to "social processes extending over the individual life span or over significant portions of it, in particular the family cycle, educational and training histories, and employment and occupational careers (Mayer & Tuma, 1990). Settersten and Mayer (1997) emphasize, "while various dimensions describe the primary activities across life, a more complete picture of the life course must also include more marginal periods and events – such as brief period of training, second or part-time jobs, periods of unemployment or sickness".

Universal pathways of individuals and groups are patterned by common and similar experiences, but a multi-faceted set of social, biological, and psychological factors and experiences interact to shape the pathways of individuals and goups in unique ways (Alwin, 1995; Settersten, 2003). Neugarten (1996) presented that "lives fan out with time as people develop their own patterns of interests and commitments, their own sequences of life choices, their own psychological turning points, and their own patterns of relations with the few significant other people whose development impinges most directly on their own." In addition, Merton (1968) described that divergent pathways cumulated overtime as the effect of advantage and disadvantage on the later life through individuals became increasingly different from one another. The individual life course is shaped by social influences and the life choices people make in constrained situations (Elder & Johnson, 2003). In this regard, the life course perspective offers a framework for analysing the variability in life experiences, and the attention to considerable

heterogeneity leads to understanding the explanatory factors and casual processes of different consequences within or between groups.

Life trajectories, transitions, and events are central themes in the study of the life course (Elder, 1985). A trajectory is long-term scope, charting the course of an individual's experiences in specific life spheres over time (Settersten, 2003). Life trajectories are formed by linking states across successive years, for example, the states of employment, of earnings and health, or of a residential location (Elder, 1985; Elder & Johnson, 2003). Elder (1985) indicated that each trajectory was marked by a sequence of transitions and life events, changes in state that were more or less abrupt. In terms of analytic scope and life course dynamics, the concept of trajectory and transition represent the long and short view, and transitions are always embedded in trajectories that give them distinctive form and meaning (Elder, 1985; Elder & Johnson, 2003). Life events are evolved a change in state, such as the beginning of disability or a period of unemployment (Elder, 1985). In addition to define life events as a process or transition perspective, Goode (1956) examined marital dissolution, such as disenchantment, consideration of divorce, adjustments within the framework of marriage, separation, and postdivorce adjustments. The experience of old age has much to do with early hardship in the adult years and one's response to it (Eldery & Liker, 1982) and to career beginnings (O'Rand & Henretta, 1982).

Two kinds of change across the life course suggest a pattern of time-varying historical influences. One involves a change in social roles, tasks, and settings; the other involves the aging of the individual (Elder & Johnson, 2003). In terms of timing and life contexts, people differ in life stages and people of different ages bring different

experiences and resources to situations and consequently adapt in different ways to new condition (Ryder, 1965; Elder & Johnson, 2003). For example, the timing of exposure to poverty in childhood and adolecence may have differential effects on cognitive ability and achievement, as well as health (Elder & Johnson, 2003). Guo (1998) found that long-term poverty has substantial influences on both ability and achievement, but that the time patterns of these influences differ. Exposure to poverty in adolescence was more consequential for achievement than exposure early in childhood (Guo, 1998).

The elderly are a heterogeneous group and the elderly poverty underlies complex aspects and issues over the long run. The long run indicates an individual's life and the small transition in yearly basis substantially alters the cumulative distributions of a person's life over time. Although the life course perspectives cannot directly explain elderly poverty, the perspectives exemplify a more adequatly conceptual framework in terms of the effect of life histories or life experiences on elderly poverty.

Summary

This chapter reviews the measures of poverty as well as factors and events associated with elderly poverty. In addition, theories used to explain elderly poverty and to provide the effect of cumulative experiences and life histories on elderly poverty are presented. Previous studies addressed several important issues of elderly poverty. First, most studies of poverty used absolute or relative measures, and the persistent and transitory poverty have been examined as a result of developing longitudinal datasets. Second, elderly poverty is inversely related to several factors, such as being female, non-Hispanic whites, residing in nonmetropolitan area, having an unmarried status, having instable marriage history, and having a terminated work history. Having poor health status is relevant to reducing economic status for the elderly, but the relation between health status and poverty has rarely been examined. Third, elderly poverty is affected by several events, such as retirement and changes in marital status. In the corresponding association between health and poverty, the effect of changes in health status on elderly poverty has rarely been examined, even though new health events are related to reduce economic status. Finally, comprehensive research including all factors and events related to elderly poverty has not yet been considered. The present study contributes by using a longitudinal dataset and is understood by determining comprehensive perspectives in terms of examining elderly poverty. The empirical model and methodology that are used to understand elderly poverty will be presented and discussed in the following chapter.

CHAPTER 3

METHODOLOGY

Introduction

The purpose of this study is to disentangle the complex facts about elderly poverty dynamics. This chapter provides a description of the data set, sample selection, analytical methods, empirical model, and description of the variables. The empirical research objectives are: (1) to provide the patterns of elderly poverty dynamics including transitions in and out of poverty; and (2) to examine the relationship between multiple events and individuals' entries into and exits from poverty.

For the first research objectives, the count method is applied to calculate the number of individuals entering and exiting poverty at a point in time. Additionally, the hazard rates of exit and re-entry in elderly poverty demonstrate the pictures about how the probabilities depend on the length of time of transitions in and out of poverty. The procedures of the count method and the hazard model are described. For the second research objective, a discrete-time multivariate hazard model is used to examine trigger events associated with entries into and exits from elderly poverty. This multivariate analysis helps to identify the conditional relationship between multiple events and

poverty transition and to provide a more realistic picture of the different risks faced by the elderly. This chapter contains the specification of the empirical model and estimation method for the multivariate techniques used in this study.

Data and Sample

The data for this study are from the years 1992-2006 of the HRS. The HRS is a nationally representative longitudinal survey supported by the National Institute on Aging and conducted by the Institute for Social Research (ISR) at the University of Michigan. The base-year survey was conducted in 1992 with an initial sample of 12,654. The HRS contains five birth-year cohorts: (1) Asset and Health Dynamics Among the Oldest Old (AHEAD), born before 1924; (2) Children of the Depression Age (CODA), born 1924-1930; (3) HRS, born 1931-1941; (4) War Babies (WB), born 1942-1947; and (5) Early Baby Boomers (EBB), born 1948-1953. The original HRS sample was collected separately in 1992, 1994, and 1996, and the AHEAD sample was conducted in 1993 and 1995. The two samples were merged and the CODA and WB sample were added in 1998; the EBB cohort was added in 2004. This panel study has conducted biennial surveys to collect information such as demographics, health status, housing, family structure, marital status, employment status, work history, disability, retirement plans, net worth, and income as well as public and private support systems (Servais, 2007). The HRS is designed to collect information on individuals from pre-retirement into retirement. The majority of the sample population is approaching retirement or already retired, but the sample also includes individuals who are not currently working or who have never worked outside the home (Heeringa & Connor, 1995)

When using the HRS, consideration of the complex sample survey design and imputation issues is needed. First of all, the HRS includes oversamples of special populations. The oversamples are introduced as supplements to the core national sample and are designed to increase the numbers of black and Hispanic respondents as well as the number of HRS respondents who are residents of the state of Florida (Heeringa & Connor, 1995). Additionally, the HRS has employed a multi-stage area probability sample design. The HRS is a nationally representative (non-institutional) sample of U.S. households, and each sampling procedure is consistent with four distinct selection stages: (1) "probability proportionate to size (PPS) selection of U.S. Metropolitan Statistical Areas (MSAs) and non-MSA counties"; (2) "sampling of area segments (SSUs) within sampled primary stage units (PSUs)"; (3) "systematic selection of housing units from all housing units (HU) listings for the sample SSUs"; and (4) "selection of the household financial unit within a sample HU" (Heeringa & Connor, 1995). In order to take into account this sample survey design, compensatory weighting variables, such as stratum half-sample code and standard error stratum can be used to adjust for geographic and racial group differences and to reflect accurate standard errors in the analysis program. Additionally, household analysis weight based on birth year derived and person-level analysis weight are used for the descriptive analysis in this study.

Second, the HRS employed "bracket techniques" in order to deal with the high rates of non-responses on most survey questions about income and wealth. This method allows the respondent who is unwilling or unable to answer exact "amount" question to provide "bracket" information about the "amount" (Cao, 2001). However, the HRS public release files provide inconsistent imputations of each wave in terms of missing values. For the purpose of obtaining consistent imputations of income and wealth variables, the RAND HRS Data are used for estimating the empirical model after merging some variables in the original HRS public released data. The RAND HRS is a user-friendly version of a subset of the HRS and contains cleaned and processed variables with consistent and model-based imputations and imputation flags

(http://hrsonline.isr.umich.edu/data/index.html). The RAND HRS developed three progressive imputation steps on income and wealth variables: (1) "to impute an exact amount given that a range is known"; (2) "to impute a range given that ownership or only incomplete range is known"; and (3) "to impute ownership in case nothing is known" (Clair *et al*, 2007). Clair *et al.* (2007) indicated that explanatory covariates that fit the models best are selected in terms of model specifications and the specifications are to be parsimonious and consistent across income and asset types. Principal components of approximately 30 explanatory covariates are used. For income imputations, the underlying explanatory covariates include husband and wife's employment status, education, health status, age, race, marital status, occupation class, cognition, and bequest motive; for wealth imputation, the same set applies, but excludes employment status and includes a number of income amounts and indicators of pension or government benefit receipt (Clair *et al*, 2007).

For the purpose of this study, eight waves from the 1992-2006 HRS are used for the empirical estimation of the model. A longitudinal HRS data file is constructed based on the individual level, and total household income and household composition are measured across all waves to examine elderly poverty rates during the fifteen-year period. The unit of analysis is elderly individuals and the sample for this study includes ageeligible individuals that fit into five cohorts (HRS, AHEAD, CODA, WB, and EBB).

Analytical Method

Poverty Status

To examine the poverty status of the elderly, a poverty line should first be defined. For this study, the official poverty threshold from the U.S.Census Bureau is used to identify elderly poor who are living below the threshold during some fixed time interval. The official poverty threshold is defined by total household income and family composition, which depends upon the number of resident family members, the age of the head of household if there are one or two in the family, and the number of related children under 18 years. If certain family members live in institutions, such as nursing homes and college dormitories, those are not counted in the number of resident family members. The unit of analysis is elderly individuals, so that an individual is counted as poor during a fixed time period if his/her total household income is below this poverty threshold. The Census definition of income includes before-tax money income excluding near-money income, such as noncash benefits (food stamps) or capital gains.

To capture the percentage of the population living below the poverty line, the headcount method is the most widely used measure. Although the headcount method does not indicate the intensity or severity of poverty, it is simple to construct and easy to use for measuring poverty status. The headcount index is calculated as

$$(3-1) P_t = \frac{N_{p,t}}{N_t}$$

where P_t denotes those counted poor at a given time t, $N_{p,t}$ is the number of poor at time t, and N_t is the total population at time t. Specifically, the poor at time t can be defined as

(3-2)
$$P_{t} = \frac{1}{N_{t}} \sum_{i=1}^{N} S(\varphi_{i,t} < Z_{t})$$

where $\varphi_{i,t}$ is total income of *i*, Z_t is the poverty line at time *t*, and S(.) is an indicator function that takes 1 if it is true ($\varphi_{i,t} < Z_t$) and otherwise is 0. Thus, if total income (φ_i) is less than the poverty threshold (Z), then *i* is considered the poor as S(.) equals to 1.

The poverty rate measured by this method based on the official poverty threshold is a static measure, so that decomposing the poverty rate can be considered in order to provide the picture of poverty dynamics in year-to-year change (McKernan & Ratcliffe, 2002). The decomposed poverty rate method was used by McKernan and Ratcliffe (2002). The poverty rate decomposition is provided as

(3-3)
$$PR_{t} = \frac{N_{P,0} + \sum_{t=1}^{T} N_{P,EN_{t}} - \sum_{t=1}^{T} N_{P,EX_{t}}}{N_{0} + \sum_{t=1}^{T} N_{EN,t} - \sum_{t=1}^{T} N_{EX,t}}$$

where N_0 is the number of population (the poor) at the initial time period. EN_t indicates the number of entering poverty at time t, EX_t is the number of exiting poverty at time t. The numerator of the equation, (3-3), indicates the number of people in poverty at time T, and the denominator is the number of people in the population at time t. This decomposed poverty rate based on the headcount index provides the change pattern in the poverty rate over time.

Poverty Spell

To examine the poverty dynamic for the elderly, the first step is to identify the "poverty spell". Normally, the spell is identified by consecutive periods (one or more continuous years) during which income is below the poverty cut-off (Wu, 2003). In terms of measuring poverty status, a spell-based approach was pioneered by Bane and Ellwood (1986). The poverty spell is defined as beginning in the first year that income was below the poverty line after having been above it, and as ending when income was above the poverty line after having been below (Bane & Ellwood, 1986). The poverty spell continues from when income falls below the poverty line to when income rises above the poverty line.

Determining the state of poor and non-poor is arbitrarily defined since poverty is not a clear-cut state like employment or welfare receipt (Bane & Ellwood, 1986; Jenkins, 2000). Thus, a small change of income can put someone in or out of poverty or creating a poverty spell due to transition variation or measurement error (Jenkins, 2000). However, using the spell-based method easily incorporates poverty transitions involving the events associated with transition into and out of poverty (Stevens, 1999).

Poverty Transitions

Poverty transitions based on poverty spell duration examine how people depend on the length of time that the person spent below or above the poverty line. The calculation of spell durations involves using survival analysis, which can account for the fact that some observations are right-censored and estimate eventual spell length (Iceland, 1997). Survival analysis is a statistical method for studying the occurrence and timing of events (Allison, 1995). Measuring the timing of poverty transitions involves the survivor analysis perspective. In terms of basic quantity and model for survival data, the survival function refers to "time-to-event phenomena", which means the probability of an individual surviving beyond time x (Klein & Moeschberger, 2003). This function is defined as

$$(3-4) S(x) = \Pr(X > x)$$

where X is the time until some specified event. Based on the survival function, consider two cases, either when X is a continuous random variable or when X is a discrete random variable. Depending upon the characteristics of X, different techniques are required to estimate basic quantities.

First, when X is a continuous random variable, the survival function is defined as the complement of the cumulative distribution function (c.d.f.), that is,

(3-5)
$$S(x) = 1 - F(x)$$
, where $F(x) = \Pr(X \le x)$

The survivor function is strictly a decreasing function of time approaching zero as time elapses (Iceland, 1997; Klein & Moeschberger, 2003). In addition, the survival function is integral to the probability density function (*p.d.f.*), f(x), that is,

(3-6)
$$S(x) = \Pr(X > x) = \int_{x}^{\infty} f(x) dx$$

Thus,

$$(3-7) f(x) = -\frac{dS(x)}{dx}$$

Equation (3-7), p.d.f. is calculated by the derivative or slope of the c.d.f.

Another fundamental quantity related to survival analysis is the hazard function (Klein & Moeschberger, 2003). The hazard rate is defined as the chance of experiencing the event that occurs at time t. The hazard rate is defined by as follow

(3-8)
$$h(x) = \lim_{\Delta x \to o} \frac{P[x \le X < x + \Delta x | X \ge x]}{\Delta x}$$

The survivor function, the probability density function, and the hazard function are equivalent in terms of describing a continuous probability distribution (Allison, 1995). If time is continuous, the hazard function is defined as the relationship between the survivor function and the p.d.f. followed by equation (3-7) as

(3-9)
$$h(x) = \frac{f(x)}{S(x)} = -\frac{d \ln[S(X)]}{dx}$$

The cumulative hazard function H(x) is defined by

(3-10)
$$H(x) = \int_{0}^{x} h(u) du = -\ln[S(X)]$$

The survivor function based on the hazard function is presented by equation (3-9) as

(3-11)
$$S(x) = \exp[-H(x)] = \exp\left[-\int_{0}^{x} h(u)du\right]$$

Thus, equation (3-11) can be expressed by equation (3-9) as

(3-12)
$$f(x) = h(x) \exp\left\{-\int_{o}^{x} h(u) du\right\}$$

Second, when X is a discrete random variable, suppose that X can take on

values x_j , j = 1,2,..., with probability mass function $p(x_j) = Pr(X = x_j)$, j = 1,2,..., where $x_1 < x_2 < ...$ (Klein & Moeschberger, 2003). With discrete random variable X, the survival function is defined by

(3-13)
$$S(x) = \Pr(X > x) = \sum_{x_j > x} p(x_j)$$

When X is a discrete variable, the hazard function is defined by

(3-14)
$$h(x_j) = \Pr(X = x_j \mid X \ge x_j) = \frac{p(x_j)}{s(x_{j-1})}, \quad j = 1, 2, \dots$$

The survival function can be presented as the product of conditional survival probabilies

(3-15)
$$S(x) = \prod_{x_j \le x} \frac{S(x_j)}{S(x_{j-1})}$$

Therefore, the survival function in terms of the hazard function is given by

(3-16)
$$S(x) = \prod_{x_j \le x} [1 - h(x_j)]$$

For the examination of poverty transitions in this study, simple non-parametric estimates of the hazard rates (Kaplan-Meier product-limit estimates) in an out of poverty are used to be measured used by Jarvis and Jenkins (1997), Jenkins (2000), and Devicienti and Gualtieri (2007). The standard estimator of the survival function, proposed by Kaplan and Meier (1958), is named the Product-Limit estimator. The Kaplan-Meier estimator (hereafter, KM estimator) is nonparametric maximum likelihood estimator and provides solid theoretical justification (Allison, 1995). This method is appropriate for the study of whether the time is an event time or a censoring time for each of the individuals (Klein & Moeschberger, 2003).

The conditional probability that the survivor at prior to time t_i experiences the event at time t_i is defined as

(3-17)
$$p_i = 1 - \frac{d_i}{n_i} = \frac{n_i - d_i}{n_i}$$

where n_i is the number of individuals at risk of an event, and d_i is the number of individuals who experience it at time t_i . The survivor function is given by

(3-18)

$$S(t_i) = 1, \text{ if } t_i < t_1$$
or
$$S(t_i) = S(t_i - 1) \times p_i$$

$$= p_1 \times \dots \times p_{i-1} \times p_i$$

$$= p_1 \times \dots \times p_{i-1} \times (1 - \frac{d_i}{n_i})$$

$$= \prod_{j=1}^i \left(1 - \frac{d_j}{n_j}\right), \text{ if } t_1 \le t_i$$

The variance of the product-Limit estimator is estimated by Greenwood's formular. In order to estimate the variance of the KM estimator, suppose that the conditional survival rate based on this estimator is given by $p_j = 1 - \frac{d_j}{n_j}$ and the survival function is

estimated as equation (3-18), $S(t_j) = \prod_{j=1}^{i} p_j$.

Taking log of this survival function, equation (3-18) is given by

(3-19)
$$\log S(t_i) = \sum_{j=1}^{i} \log p_j$$

$$\operatorname{var}\{\log S(t_i)\} = \sum_{j=1}^{i} \operatorname{var}\{\log p_j\}$$

(3-20)
$$\operatorname{var}(n_j - d_j) = n_j p_j (1 - p_j)$$

where n_j is the number of individuals at risk of an event, and d_j is the number of individuals who experience it at time *t*. Together with equations (3-17) and (3-20), the variance of this binomial distribution is given by

(3-21)
$$\operatorname{var}(p_j) = \frac{\operatorname{var}(n_j - d_j)}{n_j^2} = \frac{p_j(1 - p_j)}{n_j}$$

In order to calculate the variance of equation (3-19), the variance of random variable X based on Taylor series expansion is approximated as

(3-22)
$$\operatorname{var}\{g(X)\} \approx \left\{\frac{dg(X)}{dX}\right\}^2 \operatorname{var}(X)$$

If $X = p_i$, and $g(X) = \log(X)$, equation (3-22) is denoted by

(3-23)
$$\operatorname{var}(\log(p_j)) = \frac{\operatorname{var}(p_j)}{p_j^2} = \frac{1 - p_j}{n_j p_j} = \frac{\frac{d_j}{n_j}}{n_j \frac{n_j - d_j}{n_j}} = \frac{d_j}{n_j (n_j - d_j)}$$

Together, equations (3-19) and (3-23) are given as

(3-24)
$$\operatorname{var}\{\log(S(t_i))\} \approx \sum_{j=1}^{i} \frac{d_j}{n_j(n_j - d_j)}$$

Equation (3-22) is re-written by

(3-25)
$$\operatorname{var}\{\log S(t_i)\} \approx \frac{1}{\left[S(t_i)\right]^2} \operatorname{var}\{S(t_i)\}$$

Together equation (3-24), it is given by

(3-26)
$$\operatorname{var}\{s(t_i)\} \approx [S(t_i)]^2 \sum_{j=1}^{i} \frac{d_j}{n_j(n_j - d_j)}$$

Thus, the standard error of the KM estimator is measured by

(3-27)
$$SE(S(t_i) = S(t_i) \sqrt{\sum_{j=1}^{i} \frac{d_j}{n_j (n_j - d_j)}}$$

The survival function and the standard error based on the KM estimator method aforementioned are used to estimate poverty transitions for this study. In particular, exit probability from poverty refers to a person that escapes from poverty after having a poverty spell. The exit rates after time t of poverty are measured by dividing the number of individuals who conclude the poverty spell after time t and the total number of individuals in poverty for at least time t. Likewise, the calculation of re-entry probability is based on a person that just finishes a poverty spell and faces the risk of falling back into poverty. The hazard rate refers to the instantaneous probability that an event occurs, in particular being in and out of poverty, in a time interval given that the event has not occurred before the beginning of the interval (Iceland, 1997).

To estimate poverty transitions, there are two steps involved: (1) the length of poverty spell is to be identified in terms of defining the beginning year and ending year in poverty; and (2) the exit or re-entry probabilities for poverty spell are calculated. In the HRS data for this study, poverty spell has begun from 1991 to 2005 inclusive as eight numbers of interviews. By the construction matter, most of the literature excludes leftcensored poverty spells, since the beginning year for poverty spell cannot be observed in terms of calculating exit probability. This implies that spells that begin in wave 2 or consecutive years can be included and individuals beginning a poverty spell can be observed from one to a maximum of seven interviews in the exit rate from poverty. In terms of calculating the exit rates from poverty, only the first poverty spell (single spell) is considered according to Bane and Ellwood (1986). Similar to the way for reasoning reentry rate, this probability is calculated as the duration of the nonpoverty spell.

Multivariate Model of Transition Probability

In terms of measuring poverty transitions, the basic hazard model aforementioned, it is implicitly assumed that all observed poverty spells (non-poverty spell) are homogeneous. However, individuals who experience poverty have unobservable heterogeneity or different characteristics and face different risks of poverty transitions (Stevens, 1999; Devicienti & Gualtieri, 2007). The basic form of the model does not provide for the various factors related to poverty transitions as well the trigger events that affect the likelihood of poverty transition. Thus, multivariate techniques are required in terms of reflecting a more realistic picture of poverty transitions.

Conceptually, multivariate models of poverty transition probability, in particular exit probability, can be represented by

(3-28) Pr (*non-poor person i at time t* | *poor person i at time t* -1; X_i , T_{it} , T_{it-1}) Similarly, the entry probability can be represented by

(3-29) Pr (poor person i at time t | non-poor person i at time t -1; X_i , T_{it} , T_{it-1})

where X_i is a vector of fixed covariates (control variables), T_{it} is a vector of timevarying covariate, and T_{it-1} is a vector of lagged variables. Equations (3-28) and (3-29) refer to the notion of the event history (or hazard rate or duration) model. The hazard model provides information about the probability of experiencing an event at time t given that the event has not occurred prior to time t (McKernan & Ratcliffe, 2005). Although some previous studies were used to estimate this model, Jenkins (2000) discussed some critical and unresolved issues for using this type of model in terms of studying multivariate models of poverty dynamics: (1) concerning whether event variables should be used as covariates rises because the inclusion of event variables can generate endogeneity problems and introduce the biases; and (2) event variables can be possibly over-fitted into the model. For instance, job loss can be strongly associated with transition into poverty. Although some arguments are pointed out using this model, multivariate analysis does not necessarily define a causal relationship between the event and poverty transition and the method focuses on a conditional relationship after controlling for other events and fixed covariates (McKernan & Ratcliffe, 2002). Thus, using the multivariate model of poverty transitions is reasonable in terms of examining poverty dynamics.

The discrete-time hazard model is used to estimate the relationship between poverty and multiple events as well as fixed covariates. The discrete-time hazard model based on maximum likelihood methods has advantages: (1) this method is good at handling large numbers of time dependent covariates; (2) the computations in this method are very manageable no matter the size of data sets; (3) this method is easy for testing hypotheses made about the dependence of the hazard duration time (Allison, 1995); and (4) the logit specification used in this model is quite tractable and is familiar to researchers (Allison, 1984; McKernan & Ratcliffe, 2002). The dependent variables, such as each individual's survival history, are recorded as binary outcomes denoting whether or not the event of interest occurred at time t (Allison, 1995; Box-Steffensmeier & Jones, 2004). Thus, this multivariate analysis allows us to determine the relative importance of multiple events and the fixed covariate on poverty transitions.

Some mathematical concepts underlying this method needed to be considered before explaining the empirical model for this study. When the event occurs, the probability of the event occurrence is denoted by

On the contrary, the probability of nonoccurrence event is given by

(3-31)
$$\Pr(S_{it} = 0) = 1 - \lambda_i$$

A commonly used logit function for this method is defined by

(3-32)
$$\log\left(\frac{\lambda_i}{1-\lambda_i}\right) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki}$$

where $\lambda_{ii} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki}$

In the equation (3-32), λ_i is specified by the log-odds ratio of the probability of an event occurrence to the probability of a nonoccurrence. In terms of interpretation of the logit coefficients, β_k , the log of the odds ratio in the specification is increasing as the

covariate increases, when β_k is more than 0 ($\beta_k > 0$). In contrast, when β_k is less than 0 ($\beta_k < 0$), the log of the odds ratio is decreasing (Box-Steffensmeier & Jones, 2004).

In terms of the estimation step, after breaking down into individuals' survival data as a descrete time unit, these observations are pooled by time elapsed. This means there is one record per person in the original data set, but a new data set created by time elapsed has one record for each time period that each individual is observed (Allison, 1995). After pooling the observations, the binary regression model estimated by logit or probit specification as equation (3-33) is used to predict whether or not an event interested occurs in each time unit using pooling time elapsed data set. In this study, entry into and exit from poverty model are used to estimate the conditional relationship between poverty transition and multiple events.

Censoring

In longitudinal datasets, censored observations are commonly encountered. A censored observation is one whose value is incomplete due to random factors for each subject (Hosmer & Lemeshow, 1999). In terms of poverty transition, many observations occur before the poverty spell observation begins, such observations are said to be left-censored poverty spells. On the other hand, the observation terminates before the point of falling into (or exiting from) poverty; such observations are called right-censored poverty spells. Censoring problems are involved in measuring the timing of poverty transitions. In fact, the hazard model takes account of right-censored spells with statistical techniques and software, but handling left-censored spells can be tricky (Iceland, 1997). With a left-censored poverty spell, the beginning of its exposure to the event (falling into or exiting

from poverty) cannot be observed due to insufficient observed years in the dataset. If some longitudinal survey is conducted with enough years observed, the left-censoring is not a problem. However, most longitudinal studies encounter this problem, which is due to little known about the individuals' previous history. In terms of measuring the timing of poverty transition based on the survival function (the hazard rate), previous studies discarded left-censored observations (Bane & Ellwood, 1986; Stevens, 1994, 1999; Jenkins, 2000; McKernan & Ratcliffe, 2002, 2005; Devicienti & Gualtieri, 2007). In order to calculate the rate of poverty transition based on the KM estimator, this study excludes left-censoring observation following previous studies.

However, Iceland (1997) discussed that ignoring left-censoring data can lead to selection bias and recommended ways of handling left-censoring observation in terms of multivariate analysis: (1) to run both models with and without left-censored observations and to report the substantial differences in the results; (2) to refine the research questions and to observe the exposed risk of an event; for example, childhood poverty is followed from birth as deomonstrated by Duncan and Rodgers (1988) and Ashworth, Hill, and Walker (1994); (3) to estimate simultaneous equations, where one calculated the probability of observing a left-censored spell as a function of some parameters; and (4) to estimate discrete-time logistic regression in terms of examining poverty transitions because whether the observation is left-censored or not should be included in the model as dummy variables (Allison, 1982). However, using this model, duration dependence and individual and family level covariates should be controlled. As this study focuses on poverty transitions, left-censored observations are incorporated in the multivariate model

in accordance with the recommendations of Iceland (1997) in terms of estimating the discrete-time multivariate model.

Empirical Model and Variable Choice

Empirical Model

The empirical model for this study draws from both researches on poverty dynamics and previous analytical methods. Measurements of trigger events and various characteristics related to poverty transitions for the elderly are presented, and variables used in the empirical analysis are defined. In order to examine events associated with poverty transitions for the elderly, poverty entry and exit models are estimated, respectively.

The discrete-time multivariate model is used to estimate the conditional probability that elderly individual i experiences poverty transitions (entering or exiting) at time t, given that poverty transitions have not occurred prior to time t. Thus, the empirical model based on the cumulative logistic probability function is specified as

(3-33)
$$P_{it} = F(Z_{it}) = F(\alpha + \delta T_{it} + \beta X_{it}) = \frac{1}{1 + e^{-Z_{it}}} = \frac{1}{1 + e^{-(\alpha + \delta_{it} + \beta_{it})}}$$

where, $Z_{it} = \alpha + \delta T_{it} + \beta X_{it}$

In this model, P_{it} is the probability that elderly individual *i* experiences poverty transitions at time *t*, given the vector *T* referring to multiple events, and the vector *X* referring to control variables.

The poverty entry model includes multiple transition events: (1) retirement, (2) self-reported negative changes in health status, (3) a nondisabled individual becomes disabled, (4) a decrease in total wealth, (5) a change in marital status measured as married becomes single, and (6) a change in GDP by region.

The poverty exit model includes events similar to the entry model, but it is slightly different: (1) retirement, (2) self-reported a positive change in health status, (3) a disabled individual becomes nondisabled, (4) an increase in total wealth, (5) a change in marital stautus measured as single become married, (6) a change in being covered by a federal government health insurance program, and (7) a change in GDP by region.

Control variables for both entry and exit models estimated include demographics, geographic characteristics, economic conditions, life history variables, and spell information, such as age, gender, educational attainment, health status, region, GDP by region, observed duration, and year identifiers.

Measurement

Dependent Variable

In the discrete-time model, the dependent variable is measured as a binary outcome denoting whether the event of interest is experienced at the observed point in time (Box-Steffensmeier & Jones, 2004). This model presumes the event occurs within a given period, but the exact time of the event is not known (Allison, 1995). Thus, the dependent variables for this study are measured by a binary variable indicating entering (or exiting) poverty. In order to determine whether elderly individuals are in poverty, the official U.S. poverty thresholds in a given year are used. The official poverty threshold from the U.S. Census Bureau applies to the HRS family composition and income categories. According to income sources for the poverty threshold, total household income based on before-tax money income is calculated by total HRS income including income of all resident family members. In terms of income categories for the poverty threshold of the CPS, private transfer from non-resident family members or friends is included to calculate total household income. However, when using the HRS data, this type of income is excluded, since the HRS questions on income transfers from children do not specify whether the amounts are periodic or sporadic (Clair *et al*, 2007).

Additionally, there is another data issue related to determining the dependent variable. The HRS respondents are asked the amount of any income from the last calendar year, but the family composition is determined by the current interview year. For example, total household income of 2001 was reported in 2002 (wave 6), but the family composition at the time of interview, 2002, was used to determine the poverty threshold. The CPS definition does not include family members who are living in an institution. In order to make the data of the CPS consistent, if the respondent is asked to live in the nursing home at the time of the interview, this respondent does not count in the number of household residents. Also, his/her income is subtracted from total household income given in year.

Based on the poverty threshold of the HRS, the dependent variables are coded as 1 either *non-poor elderly individual enters into poverty* or *poor elderly individual escapes from poverty*.

Independent Variables

Trigger Events

Events associated with poverty entry and exit are classified as retirement, change in health status (change in health insurance coverage), change in total wealth, change in marital status, and change in economic condition. Basically, change variables are measured as the difference between time t and time t-1.

In order to estimate the effect of prior events on current poverty transition, the lag variable enters the empirical model. The events that occur in earlier periods could affect the current poverty transition. The occurrence of certain events might not immediately affect the outcomes. For example, the individual who loses a job can be eligible for unemployment benefits preventing his/her income from instantly falling below the poverty line. Thus, one period lag variable for each event variable is included in the empirical model.

Retirement. Retired status is based on measuring the self-reported retirement status of each wave in the HRS. Retired status is determined as the respondent reports being completely retired as well as partly retired. Retirement as the event is measured as a change from the nonretiree to the retiree.

Change in Health Status. Change in health status is based on the self-reported health change, where the respondent self-reports a change in health since the last interview or in the last two years in the HRS. In each wave of the HRS, the question is presented with a slightly different wording and format, but the five categories of change

in health status can be classified as: *much better, somewhat better, about the same, somewhat worse,* and *much worse.* In the entry poverty model, the change of health status is measured as a change from good health status (including much better and somewhat better) to bad health status (including somewhat worse and much worse). Contrary to health status in the entry poverty model, the change health status in the exit poverty model is measured as a change from bad health status to good health status.

Change in Disability Status. Disabled status is measured as whether the respondent has health limitations affecting his/her employment due to an impairment. Each wave of the HRS presents slightly different questions and formats, but to create consistent variables across all waves, it is measured with yes or no answers. In the entry poverty model, the disabled status at time t is measured, and change in disabled indicates that a nondisabled individual becomes disabled. Contrary to the entry poverty model, the ondisabled individual becomes disabled. Contrary to the entry poverty model, the nondisabled individual becomes disabled at time t is measured, and a change in nondisabled indicates that a disabled individual becomes nondisabled.

Change in Total Wealth. Total wealth as net value is calculated as the sum of all wealth components except the value of IRAs and Keogh plans less all debt. Change in total wealth takes the difference between the current wave at time *t* and previous interviews at *t*-*1*. In the entry poverty model, the change in total wealth is measured as a decrease in total wealth, where in the exit poverty model, a change in total wealth is measured as an increase in total wealth.

Change in Marital Status. Marital status is measured by the current marital status answered for each wave. The questions and coding of marital status are different for each wave, and the four categories are married including partnership, separated or divorced, widowed, and never married before. After creating the current marital status variable, a change in marital status is measured as the difference between the current status at time t and the previous interview at time t-1. In the entry poverty model, a change in marital status is measured to unmarried (including separated or divorced, and widowed), where in the exit poverty model, the change in marital status is measured as a change from unmarried (including separated or divorced, widowed, and never married before) to married.

Economic Condition. Economic condition is measured by GDP by region. In the HRS, the region variable is based on the respondents' resident state. In order to measure GDP by region, the GDP of each state is placed into one of four region categories: Northeast, Midwest, South, and West including other. GDP by region at time t is measured based on the summation of state GDP, and change in GDP by region takes the difference between the current GDP at time t and previous GDP at time t-1.

Change in Health Insurance Coverage. In order to measure a change in health insurance coverage by any government programs, coverage status is measured as the dichotomous variables. Government health insurance programs include Medicare, Medicaid, VA/CHAMPUS, and other government health insurance. Change in health insurance coverage by any government program is measured as the difference between

the current wave at time t and the previous wave at time t-1. A change in being covered by any federal government health insurance program is only used in the exit poverty model.

Control Variables

As mentioned earlier, nontrigger events and control variables include age, gender, years of education, marital status, health status (disable/nondisable status), region, GDP by region, total years of work, length of marriage, and observed spell information. Age is calculated by continuous variables using the birth year of the respondent and is used to create categorical variables. In multivariate analysis, age is classified in two categories: (1) less than 75, and (2) more than or equal to 75. Education is measured by total years of education. Race is assigned by three categories: (1) white/Caucasian, (2) Black/African American, and (3) other. Census region is given as four categories based on the respondent residence: (1) Northeast, (2) Midwest, (3) South, and (4) West and other. Marital status is classified in two categories: (1) married including partnership, and (2) unmarried including separated or divorced, widowed, and never married before. Life history variables include total years of work and length of marriage. Job history variable as total years of work is measured by the total number of self-reported years worked. Marital history is measured by the maximum length of respondent's marriage including current marriages. In order to measure length of marriage, separations are treated as continuing marriage. Table 3.1 provides the description of variables used in this study.
Variables	Description				
	Poverty Entry Model	Poverty Exit Model			
<i>Dependent VA</i> Poverty Transition	1 = Poverty entry Income below poverty line	1 = Poverty exit Income above poverty line			
Events					
Change in Retirement	Self-retired in time <i>t</i> minus self-retired in time <i>t</i> -1	Self-retired in time <i>t</i> minus self-retired in time <i>t</i> -1			
Change in Health Status	Self-reported change in health since last interview (two years) (better health into worse health)	Self-reported change in health since last interview (two years) (worse health into better health)			
Disabled Status	Health problems limit work in time <i>t</i> minus health problems limit work in time <i>t</i> -1 (nondisabled into disabled)	Health problems limit work in time <i>t</i> minus health problems limit work in time <i>t</i> -1 (disabled into nondisabled)			
Change in Total Wealth	Total wealth in time <i>t</i> minus total wealth in time <i>t</i> -1 (decrease in total net wealth)	Total wealth in time <i>t</i> minus total wealth in time <i>t</i> -1 (increase in total net wealth)			
Change in Marital Status	Marital status in time <i>t</i> minus marital status in time <i>t-1</i> (unmarried into married)	Marital status in time <i>t</i> minus marital status in time <i>t-1</i> (married into unmarried)			
Change in Economic Condition	GDP by region in time <i>t</i> minus GDP by region in time <i>t</i> -1	GDP by region in time <i>t</i> minus GDP by region in time <i>t</i> -1			
Change in Health Insurance Coverage from Government Programs	-	Health Insured from gov. program in time <i>t</i> minus Health Insured from gov. program in time <i>t</i> -1			

Continued

Table 3.1 Description of the Variables

Table 3.1 continued

Variables	Description				
	Poverty Entry Model	Poverty Exit Model			
Demographics VAs					
Age (base: < 75)					
More than and	1 = YES, 0 = NO	1 = YES, 0 = NO			
Equal to 75					
Gender (base: Male)					
Female	1 = YES, 0 = NO	1 = YES, 0 = NO			
Race (base: non black)					
Black	1 = YES, 0 = NO	1 = YES, 0 = NO			
Education	Total years of Education	Total years of Education			
Marital Status					
(base: married)					
Unmarried	1 = YES, 0 = NO	1 = YES, 0 = NO			
Geographical VA					
Region (base: South)					
Northeast	1 = YES, 0 = NO	1 = YES, 0 = NO			
Midwest	1 = YES, 0 = NO	1 = YES, 0 = NO			
West & other	1 = YES, 0 = NO	1 = YES, 0 = NO			
Economic condition					
GDP by region, <i>t</i>	Amount of GDP by region	Amount of GDP by region			
Health Conditions					
Disabled Status, t	Health Problems, t	Health Problems, t			
	(disabled at time <i>t</i>)	(nondisabled at time t)			
Health Insurance		Health Insurance Covered by			
coverage by Gov.	-	Government Programs			
Life History VAs		-			
Total Years of Work	Total # of Self-Reported Years Worked	Total # of Self-Reported Years Worked			
Length of Marriage	Maximum Length of	Maximum Length of			
6 6	Marriage	Marriage			

Poverty Rate of Each Wave

Table 3.2 presents the percentage of elderly poor during eight survey years of the HRS based on a cross-sectional perspective. The table shows the number of people living in the HRS family and total annual income to determine the elderly poverty status of each wave. In earlier waves, the questions and coding of income differs from wave to wave. For example, the respondent of the first wave was asked the total household income as one question, but the formation of each income question has been changed from that point forward. How the question is asked might affect the amount of income reported, and the total household income as the sum of each income source might be affected. Based on that question, weighted total household income of wave2 and wave 3 were less than that of wave 1.

In terms of the elderly poverty rate of each wave, the poverty rate has been below 13 percent, and the rate of the HRS has fluctuated more than that from the CPS. According to the CPS, the elderly poverty rate has been below 11 percent since 2000, and this rate seems to be quite stable. However, as mentioned earlier, the original HRS cohort (born 1931-1941) and the oldest old population, AHEAD sample (born before 1924) were merged in 1998 as well as with the CODA sample (born 1924-1930). The inclusion of the old population may affect a high rate of income poor. Moreover, the HRS family size of each wave is consistent as less than 3 (Table 3.2). This means that the HRS family does not expect an increase of income level from other household members. Thus, the inclusion of a new old cohort sample may cause a relatively high poverty rate compared to the rate from the CPS. Additionally, the poverty rate for this study is measured by excluding individuals who live in nursing homes. Based on that, the poverty rate might have fallen over time.

	Wave1	Wave2	Wave3	Wave4	Wave5	Wave6	Wave7	Wave8
	('92)	('94)	('96)	('98)	('00)	('02)	('04)	('06)
Survey Year	1991	1993	1995	1997	1999	2001	2003	2005
Total Annual HH Income	\$53,599	\$46,936	\$48,647	\$57,125	\$60,766	\$61,385	\$70,362	\$79,746
# of People Living in HH	2.66	2.24	2.23	2.28	2.24	2.15	2.25	2.24
% of Elderly in Poverty	9.50	8.20	8.84	13.04	12.27	8.48	8.52	7.91
# of Individuals	12,538	19,528	17,868	21,117	19,288	17,845	19,159	17,541

Note: HRS waves 1-8, Total annual household income and poverty rate weighted using household and individual weights of

each wave. The number of individuals is unweighted. Total household income is for the last calendar year for instance, 1993 is for income reported at the 1994 interview (wave 2). Poverty rate is based on the official poverty threshold from the U.S.Census Bureau.

Table 3.2 Elderly Poverty Rate of Each Wave, 1991-2005

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CHAPTER 4

RESULTS AND DISCUSSION

Overview

Chapter 4 describes the incidence of elderly poverty from the HRS across eight waves. The percentage of the elderly who are considered poor over 15 years from 1992 through 2006 using the HRS is provided. Chapter 4 also presents some features of poverty dynamics, including decomposing poverty rates during 15 years and empirical hazard rates of the probability of transition into and out of poverty. The eight waves of the HRS can be used to examine how the elderly poverty rate has changed over time and to capture what facts lie behind those changes. In order to examine the pattern of transition into and out of elderly poverty, empirical hazard rates of the probability of being in and out of poverty by spell duration, in particular Kaplan-Meier product-limit estimates are examined. Descriptive statistics of trigger events and covariates are presented in this chapter. The multivariate framework is used to determine whether various trigger events increase or decrease the elderly's poverty transition. In order to identify the association between trigger events and poverty transition, the discrete-time multivariate hazard model is used. In this chapter, the first section describes poverty incidence and dynamics for the elderly based on decomposed elderly poverty rate and the Kaplan-Meier product-limit estimator. The second section presents the results of descriptive analysis of poverty transitions for the elderly. The last section of this chapter provides the results of multivariate analysis of the poverty entry and exit models. The results from each analysis are presented and discussed in each section.

Incidence and Dynamics of Elderly Poverty

Changes in the poverty rates over 15 years from 1991 through 2005 using the HRS data¹ are presented in Table 4.1. This poverty-rate decomposition is determined by the number of people who enter or exit poverty and the number of people who enter or exit the HRS data (referring *Equation 3-3*)². The decomposed poverty rate helps to understand variables responsible for changes in the poverty rate (McKernan & Ratcliffe, 2002). In terms of calculating the poverty rate, the annual rates are affected by the data file structure of the RAND HRS, which is basically used in this study. As noted earlier, the HRS data contains five entry cohorts, the HRS, AHEAD, CODA, WB, and EBB. Among these five cohorts, the oldest entry cohort, AHEAD (born before 1924) was interviewed in 1993 and 1995. In the RAND HRS data, the 1993 AHEAD data and the 1994 HRS cohort data were merged in wave 2, and the 1995 AHEAD data and the 1996

¹ 1991 for income reported at the 1992 interview (wave1), and 2005 for income reported at the 2006 interview (wave8).

² Poverty rate decomposition is, $PR_t = \frac{N_{P,0} + \sum_{t=1}^{T} N_{P,EN_t} - \sum_{t=1}^{T} N_{P,EX_t}}{N_0 + \sum_{t=1}^{T} N_{EN_{t}} - \sum_{t=1}^{T} N_{EX_{t}}}$ 68

HRS cohort were merged in wave 3. The CODA cohort, which was the second oldest cohort (born 1924-1930), and the WB cohort born 1942-1947 were merged in 1998 (wave 4). Additionally, the newest cohort, EBB (born 1948-1953) was interviewed in 2004 (wave 7). Elderly poverty status for this study is determined by total household income and family composition, and the income level of the old population is affected by individuals' age. Thus, considerable year-to-year turnover for certain years might be inferred from the entry of the old or the young cohort.

Under these circumstances described, the year-to-year changes fluctuated during 15 survey years in the HRS data. Between 1993 and 1999, the poverty rate increased by about 10 percent, but the rate dramatically fell from 16.2 percent in 1999 to 11.5 percent in 2001 in terms of weighted value. Conversely, the poverty rates in the 2000s are more stable than in the earlier time period. Based on calculating the decomposing method, the number of poor hits a peak in 1997, and then the poverty rate increased at 16.2 percent in 1999. On the other hand, relatively lower poverty rates in 1993 and 2003 were determined by a great number of poor in those years. The increase in the number of poor might be caused by the effect of the data file structure aforementioned. Therefore, the highest poverty rate in 1999 might be reflected by the inclusion of the old cohort, and the decrease of the poverty rate in 2003 from 11.5 percent to 8.7 percent might be reflected by the entry of the newest cohort, EBB.

When the poverty rate is increasing between 1993 and 1999, the number of elderly individuals entering poverty is greater than the number of elderly individuals exiting poverty. Contrary to the increase in poverty rate, the number of individuals

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exiting is greater than the number of individuals entering when the poverty rate is declining in 2000s. The high level of poverty entry and exit indicated that the poverty rate remained high in 1999. This high rate reflects that many individuals entered into or exited from poverty at the time.

In summary, over the past 10 years of the HRS data, the poverty rate fluctuated considerably by the turnover of the number of individuals who entered and exited poverty, as well by reflecting the data structure issues. After these past 10 years, the poverty rates have little turnover and are relatively constant over time during the 2000s.

Table 4.1 also provides the likelihood of entering and exiting poverty in each survey year for the HRS data (in last two columns). Eller (1996) and McKernan and Ratcliffe (2002) used this method in order to calculate the probability of entering or exiting poverty for the U.S. population. However, this study focuses on providing the incidence of elderly poverty using the HRS data instead of identifying poverty patterns for the population over time. These rates are calculated by the ratio of the number of people who enter (or exit) poverty in the current year and the number of non-poor (or poor) people in previous year in the HRS sample. Thus, individuals who enter poverty in the current year, *t*, indicate non-poor in the previous year, *t-1*. Conversely, individuals who exited poverty in the current year, *t*, indicated the individuals were poor during previous time, *t-1*. Generally, the numbers of poor are smaller than the number of non-poor, and the likelihood of exiting poverty is higher than that of entering poverty.

The likelihood of entering poverty in 1997 is substantial, as the highest rate reflects the inclusion of the new cohort aforementioned. During the 1990s, the likelihood

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of exiting poverty declined from 48 percent to 29 percent, while the likelihood of entering poverty generally increased including the highest peak, 9.8 percent in 1997. Thus, the likelihood of poverty entry or exit can be described as the exit rate is decreasing during the 1990s. When comparing the 2000s to the 1990s, the likelihood of entering poverty fell somewhat, while the rate of exiting somewhat rose. Although the crosssectional perspective might mislead one from the real picture that has not been revealed for elderly poverty, these year-to-year changes based on the percentage of individuals who are the poor in any given year provide the incidence of elderly poverty.

Unweight	ed Values						
Year	Sample Size	Number of Poor	Number of Entering	Number of Exiting	Poverty Rate ⁽¹⁾	Poverty Entry Rate ⁽²⁾	Poverty Exit Rate ⁽³⁾
1991	12,538	1,414	-	-	-	-	-
1993	19,528	1,832	650	619	7.40	5.84	43.78
1995	17,868	1,798	845	647	11.36	4.78	35.32
1997	21,117	2,998	1,301	528	12.18	8.10	29.37
1999	19,288	2,591	886	861	15.67	4.89	28.72
2001	17,845	1,608	620	1,230	11.10	3.71	47.47
2003	19,159	1,793	725	660	8.73	4.47	41.04
2005	17,541	1,522	696	745	9.94	4.01	41.55
Weighted	Values						
Year	Sample Size	Number of Poor	Number of Entering	Number of Exiting	Poverty Rate ⁽¹⁾	Poverty Entry Rate ⁽²⁾	Poverty Exit Rate ⁽³⁾
1991	9,793	1,100	-	-	-	-	-
1993	16,382	1,643	550	529	6.84	6.33	48.09
1995	14,589	1,587	716	558	12.34	4.86	33.96
1997	20,029	2,932	1,280	516	11.74	9.84	32.51
1999	18,184	2,525	853	837	16.21	4.99	28.55
2001	16,734	1,559	598	1,192	11.54	3.82	47.21
2003	18,588	1,774	714	652	8.72	4.71	41.82
2005	16,955	1,494	679	735	10.13	4.04	41.43

Note: (1) Poverty rate is calculated by decomposing method.

(2), (3) The probability of poverty entry (or exit) is calculated as the ratio of the number of individuals entering (or exiting) poverty in current year and the number of non-poor (or poor) individuals in the prior year.

Table 4.1 Decomposed Rate and Poverty Rate over Time

Table 4.2 describes the frequencies for incidence of elderly poverty using only the HRS cohort born 1931-1941. The results of Table 4.2 provides a clear picture of how many HRS cohort individuals experience poverty over time, as well as at a point in time. As mentioned earlier, the HRS data contains various birth cohorts and has added new cohorts across waves. In order to present preliminary evidence about the incidence and dynamic for the elderly, the original HRS cohort excluding other four cohort samples, AHEAD, CODA, WB, and EBB is only used to examine the poverty rate given in time and the duration of the poverty spell for HRS cohort individuals. The poverty spell for the HRS cohort is defined as consecutive interview periods for staying below the poverty line.

The poverty rate for the HRS cohort individuals fluctuated between roughly 6 percent and 9 percent across waves. As time goes on, the elderly poverty rate is declining, because the mortality rate is increasing for the elderly population. In terms of the duration of poverty, 77.2 percent of the HRS cohort individuals never experience poverty during the eight wave's interview period, while about 0.3 percent of them stay in poverty through the whole interview period. About 14.6 percent of HRS cohort individuals were poor only once during the interview period, 3.5 percent for two years during the interview period, around 2 percent for three years during the interview period, around 1% for four and five year during the interview period, and less than 0.4 percent for the rest of the interview period. These figures imply that during eight years of the interview period, 22.8 percent of the sample had at least one poverty spell, 8.2 percent of the sample had at least two poverty spells, and 4.7 percent of the sample had at least three poverty spells. That is about a fifth of the sample had at least one poverty spell.

In terms of these preliminary dynamic poverty examinations among the HRS cohort individuals, results indicate that the elderly poverty might be a more temporary phenomenon because the poverty rate in a given year by cross-sectional data is relatively low, and the duration of the poverty spell is also relatively short. However, these initial evidences of the dynamics of poverty among the elderly can mislead one to reason that elderly poverty is much less problematic in the economy. In other words, using cross-sectional perspectives and preliminary reasoning based on a simple tabulation method can be problematic to support these conclusions. Thus, the longitudinal approaches to analyzing elderly poverty might explain uncovered elderly poverty facts and misleading reasoning.

			HRS Coho	rt Individual	Poverty Rate	Across Wave	\$	
Wave	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8
# of Poor	591	606	690	801	790	559	553	514
Poverty Rate (%)	7.1	7.2	7.9	9.5	9.4	6.6	6.6	5.9
		То	tal Number o	of Duration	of Poverty Sp	ell for HRS C	ohort	
Duration in Poverty Spell	0	1	2	3	4	5 6	7	8
# of Individuals	5,128	1,112	271	166	104	32 31	12	37
Percent (%)	77.2	14.6	3.5	1.8	1.3 (0.9 0.3	0.1	0.3

Note: The percentage is weighted, but the number of poor and the number of individuals are unweighted.

Table 4.2 Poverty Incidence and Duration for HRS Cohort

Elderly Poverty Exit and Re-Entry Rate Estimates

In order to examine the patterns of transition in and out of elderly poverty, exit and re-entry rates can be used to predict the length of time individuals are in or out of poverty. To estimate the exit and re-entry probabilities of poverty, the general notion of these applies the spell-based methodology pioneered by Bane and Ellwood (1986) and Stevens (1995). Based on the definition of poverty spell by Bane and Ellwood (1986), a poverty spell starts at the first year when the total household income level is below the poverty line, and terminates when the income level is above the poverty line. The exit probability of the poverty spell is calculated as an elderly individual escapes from poverty after finishing a poverty spell. Analogously, the re-entry probability refers to individuals that finish a poverty spell and are at risk of re-entry thereafter. Stevens (1999) showed that combining information on poverty re-entry rates with poverty exit rates provided insightful predictions of poverty experience that depended upon single poverty spell estimates used by Bane and Ellwood (1986). The re-entry probability is calculated as elderly individuals fall back in poverty after just terminating the poverty spell.

For this study, the poverty exit hazard rate refers to the proportion of elderly individuals who are out of poverty on a year-by-year basis over the course of a given spell. Contrary to the hazard rate of poverty exit, the survivor rate represents remaining in poverty during a given spell. Based on the concept described above, the hazard rate and survivor rates for poverty exit are used in the context of remaining out of poverty. On the other hand, the poverty re-entry hazard rate refers to the proportion of elderly individuals who re-enter poverty after finishing the poverty spell. Contrary to the poverty re-entry hazard rate, the survivor rate represents the remaining in non-poverty of a given spell. Thus, hazard rates and survivor rates for poverty re-entry are used in the context of remaining remaining out of poverty.

To estimate the proportions remaining poor after given lengths of time, poverty exit rates for elderly individuals are measured by Kaplan-Meier product-limit estimates. Table 4.3 provides the results of poverty exit rates based on the KM estimates. As mentioned earlier, the concept of poverty is arbitrarily defined, and it is implausible to treat small income changes as a genuine transition out of or into poverty (Jenkins, 2000). In terms of determining the poverty status using the poverty threshold, measurement error can affect poverty transition. To reduce these threshold problems, adjustments have been implemented in most of the previous literature, such as Bane and Ellwood (1986), Duncan et al (1984), Stevens (1995), Jenkin (2000), and Devicienti (2002). According to Bane and Ellwood (1986), they eliminated the one-year spell into and out of poverty since smaller income changes affect entries into and exits from poverty, and these changes cause temporary poverty transition. Also, the household income of the PSID used by Bane and Ellwood (1986) and Stevens (1995) is less than 1.25 times the Census Bureau poverty line. Based on that adjustment, 1.25 times the poverty line was used to take into account the consistently lower rates of poverty estimated from the PSID. Jenkin (2000) applied the adjustment using the way that the exit from poverty occurs if the posttransition household income is at least 10 percent higher than the poverty line (an increase in income as a poverty exit), and into poverty occurs if the post-transition household income falls below 90 percent of the poverty line (a decrease in income as a

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poverty re-entry). These adjusted cases are considered to be the censored observation in order to estimate the hazard rates referring to the number of elderly individuals left in or falling back into the poverty. Following Jenkin, those adjustments are implemented in this study. Poverty exit and re-entry rates based on the KM estimator are presented, and the results are provided as both unadjusted and adjusted transitions in Table 4.3 and Table 4.4.

The KM estimator is defined for any time between 0 and the largest event or censoring time, and then observed event time is only reflected to estimate hazard function (Allison, 1995). This estimator accommodates the right-censored spell, which is still in progress at the end of the survey year. Contrary to the right-censored spell, the leftcensored spell, which cannot observe the beginning of the event, is simply not accommodated (Devicienti & Gualtieri, 2007). According to the previous literature, the left-censored cases are discarded in order to estimate the hazard rate, and the leftcensored spell in this study is excluded. In terms of estimating the poverty exit rate, elderly individuals who have income below the poverty line in the first survey year are excluded, since the poverty spell already in progress at the initial survey year is unknown. Contrary to the poverty exit rate, if the termination of the poverty spell can be observed, the left-spell observations are included in the estimation of the poverty re-entry rate. Thus, all individuals beginning in a poverty spell are poor for at least one year and all elderly terminating from a poverty spell are non-poor for at least one year.

Table 4.3 shows the KM product-limit estimator of poverty exit rates and their standard errors for elderly individuals beginning a poverty spell. With the modifications

to poverty transition, poverty exit occurs when household income is 10 percent higher than the poverty threshold. Based on this fact, the adjusted hazard rate for poverty exit is lower than the unadjusted hazard rate. Contrary to the hazard rate of poverty exit, the survivor rate for adjusted transition is higher than that of unadjusted transition.

As the length of the poverty spell increased, the probability of poverty exit decreased. As mentioned earlier, all elderly individuals starting a poverty spell are poor for at least a one-time interview period for this study, and then the probability of exiting from poverty in the following year is 46 percent. After poverty during two interview periods, the probability of exiting poverty falls sharply to 23 percent (39 percent as unadjusted transition); after poverty during three interview periods, the probability of escaping poverty is slightly lower, 20 percent (34 percent as unadjusted transition). After leaving poverty, about one-fifth from the poverty group with the two-yearinterview period, the probability of escaping the poverty falls further to about one-fifth (a third of the elderly individuals as unadjusted transition) for the subsequent interview years. About 15 percent (28 percent as unadjusted transition) of elderly individuals leave poverty after terminating the poverty spell at six times in an interview period. In other words, the probability of escaping poverty after spending one period in poverty is about 46 percent. It indicates that their poverty spell is short. The poverty exit rate at the seventh interview period is about 15 percent, and the rate is not low enough.

These findings cannot be strongly supported by the negative duration dependence for the elderly population, which is, the longer individuals stay in poverty, the less likely they are to escape poverty. Nonetheless, about 16 percent of the remaining poor at the seventh interview period might be speculated as thaving a very long poverty spell if it can be observed with a longer panel. Moreover, the probability of escaping the poverty in Table 4.3 is only focused on estimating a first-observed poverty spell while ignoring a multiple poverty spell. Thus, the estimation of people's total poverty experience by the length of poverty duration based on these results might be underestimated. Stevens (1995, 1999) discusses the shortcoming of focusing on a single poverty spell and suggests that combining information on poverty re-entry with poverty exit rates provides a more predictable method to assess the importance of repeated spells of poverty. In this manner, the repeated spells of poverty can be examined by the duration of consecutive nonpoverty spells. After assessing the re-entry poverty rates, the findings can provide a different picture and impression of the tendency of elderly poverty by comparing the results of poverty exit rates.

Table 4.4 provides the KM product-limit estimator of poverty re-entry rates for elderly individuals ending a poverty spell. After one interview period out of poverty, 10 percent of the former elderly poor have started a new poverty spell. After spending a second year interview period in non-poverty, 12 percent of previously elderly poor fall back into poverty. In terms of the probability of elderly individuals remaining non-poor for a given number of interview periods (survival rate of non-poverty spell) of elderly individuals escaping poverty, more than 60 percent of them return to poverty within six years. After a six-year interview period in a non-poverty spell, about 45 percent of those at risk of re-entry remain out of poverty (47 percent of remaining non-poor as unadjusted transition). When escaping poverty after five or more years of being poor, more than twofifths remain above the poverty line for the following consecutive interview period.

As the non-poverty durations increase, the poverty re-entry rates are constant from 10 percent to 14 percent (from 10 percent to 13 percent as unadjusted transition). This finding indicates that there is no evidence of negative duration dependence, which means the more elderly individuals remain nonpoor, the less likely thet are to fall into poverty in consecutive periods. Additionally, the results of re-entry rates in Table 4.4 imply that the probability of falling back into poverty for previously poor elderly is constant by the length of non-poverty duration, even though the length of a poverty spell is short based on the result of Table 4.3. Thus, it might be inferred from the findings that the elderly populations are vulnerable to falling into poverty.

	Adjusted T	ransitions	Unadjusted 7	Transitions
Number of interviews since start of poverty spell	Cumulative proportion remaining poor (%)	Exit rate from poverty	Cumulative proportion remaining poor (%)	Exit rate from poverty
1	100.0	0.00	100.0	0.00
2	54.4 (0.009)	0.46	37.7 (0.008)	0.62
3	42.1 (0.010)	0.23	23.2 (0.008)	0.39
4	33.5 (0.012)	0.20	15.2 (0.008)	0.34
5	25.5 (0.014)	0.24	10.0 (0.007)	0.36
6	18.5 (0.017)	0.28	6.0 (0.007)	0.39
7	15.8 (0.020)	0.15	4.3 (0.007)	0.28

Note: Adjusted transition refers to exits that have been regarded as censored observation if total household income is not at least 10% higher than the poverty threshold. Unadjusted transition is based on the official poverty threshold without any modification. The KM estimator is based on all non-left censored poverty spells.

Table 4.3 Percentage of remaining poor and exit rates from elderly poverty by duration for all persons beginning a poverty spell

Number of	Adjusted Transitions		Unadjusted Transitions	
interviews	Cumulative		Cumulative	
since start of	proportion	Re-entry rate	proportion	Re-entry rate
non-poverty	remaining non-	to poverty	remaining non-	to poverty
spell	poor (%)		poor (%)	
1	100.0	0.00	100.0	0.00
2	90.5 (0.004)	0.10	90.0 (0.004)	0.10
3	79.4 (0.006)	0.12	79.9 (0.006)	0.12
4	70.2 (0.008)	0.12	71.2 (0.008)	0.11
5	60.8 (0.009)	0.13	62.4 (0.010)	0.12
6	51.1 (0.012)	0.14	53.9 (0.012)	0.13
7	44.6 (0.013)	0.13	47.3 (0.014)	0.12

Note: Adjusted transition refers to re-entry that has been regarded as censored observation if total household income falls to no more than 10% below the poverty threshold. Unadjusted transition is based on the official poverty threshold without any modification. The KM estimator is based on all non-left censored non-poverty spells.

Table 4.4 Percentage of remaining non-poor and elderly poverty re-entry rates by duration for all persons ending a poverty spell

Poverty Entry and Exit Associated with Events

Descriptive Analysis

To provide the basic results of descriptive analysis for events and covariates associated with elderly poverty transitions, the HRS data for this study are divided into two sample models: poverty entry and poverty exit samples. In terms of the poverty entry sample, elderly individuals are at risk of entering poverty at current time, *t*, but not previous time, *t*-1. Conversely, elderly individuals exiting poverty at current time, *t*, but poor at previous time, *t*-1 are constructed. Table 4.5 shows the descriptive results for the association between elderly poverty transition and events (covariates). To accommodate multiple events (poverty entry or exit) in the analysis, the observations are duplicated followed by event time elapsed. As a result, a total sample size of each model estimated is increased.

Elderly Poverty Entry

The elderly poverty entry sample comprises 19,667 observations, which is defined as at the risk of entering poverty in the HRS data. Elderly individuals experiencing changes in their self-reported health status from good status to bad status enter poverty at 27 percent, and of those who experience retirement from their employment, 15 percent enter poverty. Among the elderly individuals who experience poverty, the rate of becoming disabled is 10.8 percent, and that of becoming unmarried (from married) is 9.5 percent. The 9 million dollars is the total average amount lost across all individuals entering poverty, and the average amount of change in GDP by region is about 122 billion dollars. Self-reported negative changes in health status, becoming disabled, and retirement occur most often in poverty entry sample.

Among elderly individuals entering poverty, 11.8 percent are age 75 or older, 63 percent are female, and 18 percent are black. Of those who are disabled at given in time, 36 percent enter the poverty. Total average years of work for this group are around 30 years, and total average length of marriage is also around 30 years.

Elderly Poverty Exit

In the elderly poverty exit sample, 6.4 percent of elderly individuals exiting poverty enter retirement, and 10 percent of those escaping poverty experience a chage in health status from a worse condition to a better condition. About 7 percent of those exiting poverty become nondisabled, and around 2 percent of those exiting poverty become married couple from an unmarried status. Also, 14 percent of elderly individuals exiting poverty had health insurance coverage from any government health programs. The 8 million dollars is the average total wealth increased across all individuals exiting poverty, and the average amount of GDP by region for those exiting poverty is about 22 billion dollars. Change in health insurance coverage from any government program and change in better health status occur most often. About 66 percent of elderly individuals exiting poverty are female, and about 14 percent of those are age 75 and older. The average length of education is about 10 years, and about 52 percent of these individuals are nondisabled. The average total years of work and average length of marriage for these individuals are about 25 years and 27 years, respectively.

	Poverty	y Entry	Poverty Exit	
Events	Mean	SD	Mean	SD
Change in Retirement	0.150	0.009	0.064	0.006
Change in Self-Reported Health Status ⁽¹⁾	0.272	0.011	0.100	0.009
Change in Disabled Status ⁽²⁾	0.108	0.007	0.069	0.008
Change in Total Wealth ⁽³⁾	0.009	0.002	0.008	0.001
Change in Marital Status ⁽⁴⁾	0.095	0.007	0.023	0.003
Change in GDP by Region (in billion)	122.374	3.867	22.419	3.864
Change in Health Insurance Coverage from Gov.Program	-	-	0.137	0.011
Demographic VAs				
Age: 75 and Older	0.118	0.008	0.138	0.011
Gender: Female	0.625	0.008	0.656	0.009
Race: Black	0.180	0.021	0.243	0.028
Education: Years of Education	11.250	0.157	9.99	0.276
Marital Status: Unmarried	0.425	0.014	0.495	0.015
Geographic VA				
Northeast	0.127	0.029	0.132	0.031
Midwest	0.192	0.036	0.146	0.030
West	0.150	0.032	0.133	0.034
Economic Condition				
GDP by Region (in 10 billion)	227.986	46.027	240.493	47.392
Health Condition				
Disabled Status ⁽⁵⁾	0.356	0.015	0.519	0.018
Health Insurance Coverage	-	-	0.559	0.021
Life History VAs				
Total Years of Work	29.530	0.378	24.937	0.536
Length of Marriage	29.189	0.453	27.064	0.457
# of Cases	19,0	667	9,6	59

Note: Weighted mean values are presented. This statistics are based on person-years for the HRS data. (1) In poverty entry, change in health status refers to self-reported negative changes in health status. In poverty exit, this variable refers to self-reported positive changes in health status. (2) Chage in disabled status refers to becoming disabled in poverty entry, and to becoming nondisabled in poverty exit. (3) Change in total wealth refers to a decrease in total wealth in poverty entry, and to a increase in total wealth in poverty exit. (4) Change in marital status refers to becoming unmarried in poverty entry, and to becoming married in poverty exit. (5) In poverty exit, disabled status refers to nondisabled status.

Table 4.5 Descriptive Analysis for Persons at Risk of Entering/Exiting Poverty

Multivariate Analysis of Elderly Poverty Entry and Exit

The hazard rate by the length of time is used to estimate the patterns of exit from and re-entry into poverty without considering unobserved heterogeneity in the previous section. These estimations implicitly assume that all observations have a completely homogeneous population (Devicienti & Gualtieri, 2007). To provide a more realistic picture of a poverty transition associated with trigger events or other characteristics, the results of each poverty transition model are presented in Table 4.6 for the poverty entry and in Table 4.7 for the poverty exit. The multivariate analysis confirms that trigger events are related to elderly individuals' poverty transition. As noted earlier, trigger events are defined as the change of variable status between two time periods, which are current time, *t*, and prior time *t*-1. Additionally, the event occurs at time *t*-1, like lagged variable, which occurs between *t*-2 and *t*-1. The poverty entry and exit models are estimated separately and discussed.

Poverty Entry Model

Table 4.6 provides the results of the discrete-time multivariate analysis. These results identify the conditional relationship between poverty entry and trigger events after controlling for other events and explanatory variables. Retirement and change from good health status to bad health status have significant effects on the poverty entry. Experiencing retirement during the previous time decreases the odds of falling into poverty by 9.2 percent. Experiencing a change in health status from a better condition to a worse condition at the current time increases the odds of entering poverty by 8.5

percent. These findings are similar to the descriptive analysis, since the results of the descriptive analysis demonstrate that a change into a worse health condition and retirement often occur for elderly individuals who experience poverty entry.

The total years of employment and length of marriage as life history variables play a role in elderly poverty entry. A 10-year increase in total working years has about a 2 percent decrease in the odds of entering poverty. Staying in marriage for 10 years decreases the odds of entering poverty by about 3 percent. Thus, longer marriages and more work experience have a lowering effect on poverty entry.

In terms of socio-demographic characteristics, age, years of education, marital status, resident location, GDP by region, and disabled status are important. Old age elderly individuals increase the odds of entering poverty by 23 percent, and unmarried elderly also increase the odds of experiencing poverty by 15 percent. A 1-year increase in education reduces the odds of entering poverty by 1.2 percent. Health problems due to a disabled status have an increasing effect on entering elderly poverty. Being disabled increases the odds of falling into poverty by 11.3 percent. Living in the Northeast, Midwest, and West decrease the odds of entering poverty by 24 percent, 14 percent, and 21 percent, respectively. The direction of GDP by region has a different effect expected on entering poverty.

In terms of observed spell information, the probability of entering poverty increases as the time spent out of poverty increases. This finding is consistent with the result of estimating the hazard rates of poverty exit and re-entry, as there is no evidence of negative duration dependences for the elderly population. In the result of hazard

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models for re-entering poverty, the re-entry poverty rate is constant with the length of time. This means that there might not be any evidence of duration dependence. Normally, the pattern of poverty indicates a negative duration dependence, which is, the longer individuals stay in poverty, the fewer individuals leave poverty at the next time period. Based on negative duration dependence, individuals in poverty tend to leave poverty earlier after controlling other demographic and economic variables. However, results of the effects on the observed spell for this study do not support this. The first, second, and third dummies are significant for the chance of entering elderly poverty.

		Poverty Entry	
	Estimate	SE	Chi-Square
<u>Events</u>			
Change in Retirement, t	-0.0859	0.0656	1.71
Change in Retirement, <i>t-1</i>	0.0919	0.0544	2.85*
Change in Self- Reported Bad Health Status, <i>t</i>	0.0848	0.0438	3.75**
Change in Self- Reported Bad Health Status, <i>t-1</i>	0.0475	0.0449	1.12
Becoming Disabled, t	-0.0835	0.0753	1.23
Becoming Disabled, <i>t</i> -1	0.0155	0.0690	0.05
Decrease in Total Wealth, <i>t</i> (<i>in 10million</i>)	-0.1196	0.5535	0.05
Decrease in Total Wealth, <i>t-1</i> (<i>in 10million</i>)	0.2101	1.4521	0.02
Becoming Unmarried, t	-0.0923	0.0721	1.64
Becoming Unmarried, t-1	-0.0751	0.0983	0.58
Change in GDP by Region, <i>t</i> (<i>in billion</i>)	-0.0011	0.0007	2.67
Change in GDP by Region, <i>t-1</i> (<i>in billion</i>),	-0.0011	0.0008	1.81
<u>Covariates</u> Demographic Characteristics			
Age: 75 and Older	0.2336	0.0466	25.19***
Gender: Female	-0.0151	0.0477	0.10
Race: Black	0.0469	0.0454	1.06
Education: Years of Education	-0.0129	0.0056	5.29**
Marital Status: Unmarried	0.1477	0.0487	9.18**

Continued

Table 4.6 Poverty Entry from Poverty Duration Hazard Model

Table 4.6 continued

		Poverty Entry	
	Estimate	SE	Chi-Square
Geographic Characteristics			•
Northeast	-0.2383	0.0704	11.44***
Midwest	-0.1419	0.0716	3.93**
West	-0.2136	0.0644	11.00***
Economic Condition			
GDP by Region (in billion)	0.0002	0.0001	9.83**
Health Condition			
Disabled Status	0.1132	0.0487	5.40**
Life History Vas			
Total Years of Work, t	-0.0022	0.0013	2.83*
Length of Marriage, t	-0.0026	0.0014	3.54**
Spell Information			
Observed Spell			
1 st year in the spell	1.3839	0.1500	85.09***
2^{nd} year in the spell	0.6324	0.1429	19.57***
3 rd year in the spell	0.3770	0.1442	6.84***
4 th year in the spell	0.1828	0.1441	6.84
5 th year in the spell	0.0277	0.1482	1.61
6 th year in the spell	-0.0416	0.1519	0.08
Left-censored spell	-0.5841	0.2756	1.70
Calendar Year			
2001-2005	-0.0345	0.0665	0.27
Sample Size		16,270	

Note: * p < 0.1, ** p < 0.05, ***p < 0.01

Poverty Exit Model

Table 4.7 presents the results of the discrete-time multivariate analysis based on the poverty exit model. Among the trigger events variables, changes in retirement at time t, increases in the total wealth at t, if the elderly are insured by any government health program during the previous time, t-1, and a change in GDP by region at time t has significant effects on poverty exit. Experiencing the retirement at time t decreases the odds of escaping the poverty by 27.5 percent, and being insured by any government health program at previous time, t-1, also reduces the exiting of poverty by 37.5 percent. A one hundred million-dollar increase in total wealth raise the odds of exiting poverty about 47.3 percent, and a one-billion-dollars increase in GDP by region decrease the odds of exiting poverty about 0.3 percent.

In terms of life history variables measured by total years of employment and length of marriage, both variables have significantly positive effects on escaping poverty. A 10-years increase in total working years is associated with about a 0.6 percent increase in the odds of exiting poverty. Staying in marriage for 10 years increases the odds of exiting poverty about 0.8 percent. Thus, longer marriages and more work experience have positive effects on exiting poverty. Greater years of education and the amount of GDP by region are positively associated with exiting poverty. A 1-year increase in years of education raises the odd of exiting poverty by about 5 percent. A 1 percent increase in the amount of GDP by region increases the odd of exiting poverty by about 0.02 percent. In terms of an observed poverty spell, as the time spent in poverty increases, the probability of exiting poverty increases. The first and second dummies of the poverty spell are significant effects on escaping the poverty.

]	Poverty Exit	
-	Estimate	SE	Chi-Square
Events			
Change in Retirement, <i>t</i>	-0.2747	0.1409	20.15**
Change in Retirement, <i>t</i> -1	-0.1052	0.1354	0.4374
Change in Self- Reported Better Health Status, <i>t</i>	-0.0639	0.1179	0.29
Change in Self- Reported Better Health Status, <i>t-1</i>	0.0765	0.1243	0.38
Becoming Nondisabled, t	-0.1544	0.1428	1.17
Becoming Nondisabled, <i>t</i> -1	-0.0917	0.1399	0.43
Becoming Insured from Gov.Program, t	0.0532	0.1341	0.16
Becoming Insured from Gov.Program, t-1	-0.3751	0.1089	11.87***
Increase in Total Wealth, t (in 10 million)	4.7312	2.3586	4.02**
Increase in Total Wealth, t-1(in 10 million)	-4.0363	8.7130	0.21
Becoming Married, t	0.1214	0.2174	0.31
Becoming Married, t-1	-0.2460	0.3945	0.39
Change in GDP by Region, t (in billion)	-0.0029	0.0010	8.31**
Change in GDP by Region, <i>t-1 (in billion)</i>	-0.0005	0.0015	0.14
<u>Covariates</u> Demographic Characteristics			
Age: 75 and Older	0.0247	0.0979	0.06
Gender: Female	-0.0871	0.0902	0.93
Race: Black	-0.0888	0.0839	1.12
Education: Years of Education	0.0464	0.0102	20.54***
Marital Status: Unmarried	-0.0676	0.0918	0.54

Continued

Table 4.7 Poverty Exit from Poverty Duration Hazard Model

Table 4.7 continued

	Poverty Exit				
	Estimate	SE	Chi-Squar		
Geographic VA					
Northeast	-0.1010	0.1279	0.62		
Midwest	-0.1190	0.1414	0.71		
West	-0.0183	0.1139	0.03		
Economic Condition					
GDP by Region (in billion)	0.0002	0.0001	3.23*		
Health Condition					
Nondisabled Status	0.1188	0.0809	2.16		
Health Insurance Coverage, t	-0.0372	0.1119	0.11		
Life History VAs					
Total Years of Work, <i>t</i>	0.0069	0.0024	8.56**		
Length of Marriage, t	0.0078	0.0025	9.82**		
Spell Information					
Observed Spell					
1 st year in the spell	2.4247	0.4186	33.55***		
2^{nd} year in the spell	1.0282	0.4171	6.08**		
3 rd year in the spell	0.6086	0.4246	2.05		
4 th year in the spell	0.3561	0.4244	0.70		
5 th year in the spell	0.1574	0.4428	0.13		
6 th year in the spell	0.0902	0.4938	0.03		
Left-censored spell	-0.4561	0.3417	1.65		
Calendar Year					
2001-2005	2.424	1.5691	0.01		
Sample Size		15,556			

Note: * p < 0.1, ** p< 0.05, ***p<0.01

CHAPTER 5

SUMMARY, CONCLUSIONS, LIMITATIONS, AND IMPLICATIONS

This chapter presents the overall findings and conclusions of this study. The next section addresses the limitations of findings and the research. The last section presents implications of policy markers and future research on the elderly poor.

Summary and Conclusion

The purpose of this study is to examine the likelihood of elderly poverty transitions and the impact of different events and associated covariates on elderly poverty. The rise of the aging population and the pressure of social policy changes for the elderly will directly affect the later years of the elderly's lives. Elderly poverty involves many complex factors including elderly individual's attributes, life history, and various experiences across the elderly person's life span. Additionally, elderly poverty is a controversial issue in terms of determining whether or not the elderly are a vulnerable group for obtaining social support. Some previous literature reports that elderly poverty is a much less permanent status, and the elderly poverty rate is considerably lower over time. Even though the poverty rate for the elderly is relatively low over time based on cross-sectional perspectives, utilizing data from the longitudinal approach provides a more realistic picture of elderly poverty and reveals uncovered facets of the elderly poor. As a result, a longitudinal examination of elderly poverty is needed as the results can provide a significant fraction of elderly poverty. This study contributes to improving the understanding of elderly poverty and offers considerable policy implications for preparing for elderly demographic changes in the future, such as an increase in the elderly population.

The objectives of this study were: (1) to investigate the probability associated with poverty transitions among the elderly; (2) to examine different events associated with elderly poverty transitions; and (3) to highlight implications for the further study and public policies for the elderly's economic security.

The empirical research objectives were: (1) to provide the patterns of elderly poverty dynamics including transitions into and out of poverty; and (2) to examine the relationship between multiple events and individual's entries into and exits from poverty. The data for this study were from the HRS from the years 1992-2006 (eight waves), and a longitudinal HRS data file was constructed based on individual level data. In this study, poverty status for the elderly, poverty spell, and poverty transition were defined and empirical specification for multivariate model of poverty transition probability was addressed. In order to explain the complex facts of elderly poverty, the poverty-rate decomposition method, the KM estimator, descriptive analysis for poverty, and the discrete-time multivariate analysis for poverty entry and exit models were employed.

The major finding of this study is that the poverty rate for the elderly in a given

year is relatively low, and the duration of the poverty spell using the HRS cohort is also relatively short. The preliminary elderly poverty pattern based on the tabulation method is not sufficient to explain more realistic pictures of elderly poverty. Thus, a longitudinal examination needs to be considered to explain the facts of elderly poverty more clearly. In order to examine the patterns of transition into and out of elderly poverty, exit and reentry hazard rates based on the KM estimates were used. Generally, as the length of the poverty spell increased, the probability of poverty exit decreased. However, the poverty exit rate at the last interview period is not low enough, even though the poverty spell is short. These findings based on the hazard exit rate cannot be strongly supported by the negative duration dependence for the HRS individuals. Also, the hazard re-entry rates are constant with the length of the non-poverty spell. This finding indicates that negative duration dependence is not an issue when explaining the elderly poverty transition. Thus, the elderly populations are a vulnerable group for facing at the risk of falling into poverty. To provide the association between elderly poverty transitions and trigger events as well as various explanatory variables, a multivariate analysis of elderly poverty entry and exit model was estimated. In the poverty entry model, experiencing the retirement at a previous time and a change in health status from good to bad at current time have significant effects on elderly poverty entry. Life history variables, such as total years of employment and length of marriage have a lessening effect on entering poverty. In terms of the elderly poverty exit model, a change in retirement at time t and an increase in total wealth at time t, becoming insured under any government health programs at previous time, *t*-1 and a change in GDP by region at time, *t* have significant effects on elderly
poverty exit. The life history variables are positively associated with escaping poverty. On both the entry and exit models, years of education have a significant effect on experiencing (or escaping) poverty.

In summary, the determinant of the probabilities of poor elderly individuals escaping (or entering) from poverty are determined by certain trigger events, such as retirement, a change in health condition from a good to bad status (for entry model), an increase in total wealth (for exit model), and a transition from uninsured to insured, life history variables (length of marriage and total years of work), and years of education. In terms of the hazard rates of poverty exit and re-entry, the patterns of poor elderly individuals are dynamic based on no evidence of negative duration dependence and a constant re-entry hazard rate. The policies for reducing risk factors associated with elderly poverty entering or exiting can contribute to alleviating the elderly poverty. Life history variables, such as length of marriage or total years of employment, and years of education play important roles in exiting elderly poverty. Thus, the effect of midlife on poverty in the elderly years is considered when establishing the social policy for the elderly.

Limitations of the Study

There are several limitations in this study that should be considered. The first limitation is the HRS data issues about the questions and coding across waves. In particular, the questions and coding of income differs from wave to wave. The first wave contains a format that is totally different from that of other waves, and the second and third waves of questions are slightly different. How the question is asked might affect the amount of income reported, and the total household income as the sum of each income source might be affected in terms of measuring poverty rate based on the official poverty threshold.

The second limitation is that this study focuses on the poverty experience in the elderly years from a longitudinal perspective. According to previous literature, people that have had long stays in poverty in the past might be more likely to experience long spells again. Also, people who spent a long time out of poverty in the past might be less likely to experience long spells of poverty in the future. However, the HRS data contains very limited information toward inferring the life span for the midlife or even young groups. Although this study examines the effect of life history on experiencing poverty, the variables used are limited. As mentioned earlier, people who are below the poverty line are involved in many complex problems across their life span. This study tried to make an effort to explain those complex factors related to poverty, but there is always the limitations of unobserved information in the data. Thus, the results of this study can suggest focusing on the causes of elderly poverty in his or her elderly years.

Implications

Combined with the results of the relationship between elderly poverty and trigger events, the low probability of exit and constant probability of re-entry as increasing the duration of the poverty (non-poverty) spell provides two of the broader policy implications. First of all, income maintenance programs for the elderly would need to be intensified. In terms of the conditional relationship between retirement and elderly poverty transitions after controlling other variables, retirement has an important role in elderly poverty transitions. In particular, experiencing retirement during the previous time has positive effect on poverty entry, and that at time *t* has negative effect on poverty exit. After retirement, individuals' asset may be eroded with the onset of chronic diseases or insufficient financial preparation for their later life may not ensure at least a minimum standard of living. Significant income changes or economic hardship sometimes occur at retirement. Based on the result of the poverty exit hazard rate, an individual who falls into poverty during his or her elderly years is very likely to remain poor, since the exit probabilities fall as the length of the poverty spell increases. These results infer that individuals who are approaching retirement age may face intrinsic vulnerability to poverty. Thus, income support programs for the elderly help to prevent elderly individuals from becoming poor.

Second, improving the provision of health care for the elderly is needed in terms of accessing adequate care or preventive services. The results from multivariate analysis suggest that a negative change in health condition has a positive impact on elderly poverty entry as well as disabled status. Financially vulnerable elderly groups are more likely to face an unavailability of adequate health care due to financial barriers, and most frail elderly have a high probability of a reduced standard of living later in their lives. Moreover, despite the overall improvement in health status for the elderly over time, gaps in the provision of health care or services between low-and higher-income elderly remain. Thus, identifying disparities and expanding eligibility or benefits levels for those in the frail elderly group, such as elderly disabled with low economic status, is paramount in supporting poor elderly and preventing the near-poor elderly from becoming elderly poor.

REFERENCES

Allison, P.D. (1984). Event history analysis. Newbury Park: Sage Publications.

- Allison, P. D. (1995). Survival analysis using SAS: A practical guide. Cary, NC: SAS Institute Inc.
- Alwin, D. (1995). Taking time seriously: Studying social change, social structure, and human lives. In Phyllis Moen, Glen H. Elder, Kurt Luscher, and Urie Bronfenbrenner (Eds.), *Examing lives in context: Perspectives on the ecology of human development* (pp.211-262). Washington, D.C.: American Psychological Association.
- Anzick, M.A., & Weaver, D. (2001). *Reducing poverty among elderly women*. ORES Working Paper series. Washington, DC: Social Security Administration.
- Ashworth, K., Hill, M., & Walker, R. (1994). Patterns of childhood poverty: New challenges for policy. *Journal of Policy Analysis and Management, 13*, 658-680.
- Bane, M. J., & Ellwood, D. (1986). Slipping into and out of poverty: The dynamics of spells. *Journal of Human Resources*, 21, 1-23.
- Becker, G. (1975). Human Capital. New York: Columbia University Press.
- Bound, J., Brown, C., Duncan, G., & Katz, L. (1991). Poverty dynamics in widowood. *Journal of Gerontology: Social Sicences, 46*, 115-24.
- Box-Steffensmeier, J.M., & Jones, B.S. (2004). *Event history modeling*. New Yrok: Cambridge University Press

- Bramlett, M.D., & Mosher, W.D. (2001). *First marriage dissolution, divorce, and remarriage: United States.* Advance Data No.323. National Center for Health Statistics, Division of Vital Statistics.
- Buhmann, B.L., Rainwater, G.S., & Smeeding, T.M. (1988). Equivalence scales, wellbeing inequality, and poverty: Sensitivity estimates across ten countries using the Luxembourg income study (LIS) database, *The Review of Income and Wealth*, 34, 115-142.
- Burkhauser, R.V., & Duncan, G.J. (1989). Economic risks of gender roles:income loss and life events over the life course. *Social Science Quarterly*, 70, 4-20.
- Burkhauser, R.V., & Holden, K.C. (1982). A challenge to Social Security: The changing roles of women and men in American society. New York: Academic Press.
- Burkhauser, R.V., Bulter, J.S., & Holden, K.C. (1991). How the death of a spouse affects economic well-being after retirement: A hazard model approach. *Social Science Quarterly*, *72*, 504-519.
- Burkhauser, R.V., & Smeeding, T.M. (1994). Social Security reform: A budget neutral approach to reducing older women's disproportionate risk of poverty. Policy Brief No 2/1994, Syracuse. New York: Syracuse University Center for Policy Research.
- Burkhauser, R.V., Giles, P., Lillard, D.R., & Schwarze, J. (2005). Until death do us part: An analysis of the economic well-being of widows in four countires. *Journal of Gerontology: Social Sciences, 60B*, S238-S246.
- Burtless, G., & Smeeding, T.M. (2001). The level, trend, and composition of poverty. In Sheldon Danziger, & Robert Haveman (Eds.), *Understanding poverty* (pp.27-68). New York: Havard University Press.
- Butrica, B.A. (2007). *How economic security changes during retirement*. Center for Retirement Research Working Papers. WP2007-06. Bostorn College.
- Callahan, D. (1999). Still with us: elderly poverty in America. In *The Cheating Culture*. New York: Harcourt.

- Cao, Honggao (2001). HRS 1996 Imputation. Institute for Social Research Documentation. University of Michigan.
- Castle, E.N. (1993). Human capital, labor supply, and poverty in rural America In *Persistent Poverty in Rural America*. Colorado: Westview Press.
- Chen, Y.P. (1994). Improving the economic security of minority persons as they enter old age. In *Minority elders: Five golas toward building a public policy base*. Washington, DC: The Gerontological Society of America.
- Choi, N.G. (1997). Racial differences in retirement income: The roles of public and private income sources. *Journal of Aging & Social Policy*, *9*, 21-42.
- Choudhury, S., & Leonesio, M.V. (1997). Life-cycle aspects of poverty among older women. *Social Security Bulletin, 60*, 17-36.
- Clair, P., Blake, D., Bugliari, D., Chien, S., Hayden, O., Hurd, M., Ilchuk, S., Kung, F., Miu, A., Panis, C., Pantoja., P., Rastegar, A., Rohwedder, S., Roth, E., Wedell, J., Zissimopoulos, J. (2007). RAND HRS Data Documentation, version G. Labor & Population Program RAND Center for the Study of Aging.
- Crown, W.H., Mutschler, P.H., Schulz, J.H., & Loew, R. (1993). *The economic status of divorced older women*. Policy Center on Aging, Heller School, Brandeis University.
- Crystal, S., & Shea, D. (1990). Cumulative advantage, cumulative disadvantage, and inequality among elderly people. *The Gerontologist, 30*, 437-443.
- Crystal, S., & Waehrer, K. (1996). Later-life economic inequality in logitudinal perspective. *Journal of Gerontology: Social Sciences*, *51B*, S307-S318.
- Cutler, D.M., & Sheiner, L. (2000). Generational aspects of medicare. *American Economic Review*, *90*, 303-307.
- Dalaker, J., & Naifeh, M. (1998). *Poverty in the United States: 1997.* U.S. Bureau of the Census, Current Population Reports, Series, P60-201. Washington, DC:

U.S.Government Printing Office

- DeNavas-Walt, C., Proctor, B.D., & Mills, R.J. (2004). Income, poverty, and health insurance coverage in the United States: 2003, U.S.Census Bureau, Current Population Report, P60-225, Washington, DC: Government Printing Office.
- DeNavas-Walt, C., Proctor, B.D., & Smith, J. (2007). Income, poverty, and health insurance coverage in the United State: 2006, U.S.Census Bureau, Current Population Report, P60-233, Washington, DC: U.S.Government Printing Office.
- Devicienti, F., & Gualtieri, V. (2007). *The dynamics and persistence of poverty: Evidence from Italy*. Laboratorio R. Revelli, Collegio Carlo Alberto. Working paper no.63.
- Dressel, P.L. (1988). Gender, race, and class: Beyond the feminization of poverty in later life. *Gerontologist, 28*, 177-180.
- Duncan, G.J., Coe, R.D., & Hill, M.S. (1984). The dynamics of poverty. In Greg J. Duncan, Richard D. Coe, Mary E. Corcoran, Martha S. Hill, Saul D. Hoffman, and James N. Morgan (Eds.), *Years of Poverty Years of Plenty* (33-70). Ann Arbor, Michigan: Institute for Social Research.
- Duncan, G. J., & Rodgers, W. L. (1988). Longitudinal aspect of childhood poverty. *Journal of Marriage and the Family, 50*, 1007-1021.
- Duncan, G. J., & Rodgers, W. L. (1991). Has children's poverty become more persistent? *American Sociological Review*, 56, 538-550.
- Elder, G.H. Jr. (1985). Perspectives on the life course . In Glen H. Elder (Ed.), *Life course dynamics: trajectories and transitions, 1968-1980* (pp.23-49). Ithaca, New York: Cornell University Press.
- Elder, G.H., & Liker, J.K. (1982). Hard times in women's lives: Historical influences across 40 years. *American Journal of Sociology*, 88, 241-269.

- Elder, G.H., & Johnson, M.K. (2003). The life course and againg: Challenges, lessons, and new directions. In Richard A. Settersten (Ed.), *Invitation to the life course: toward new understandings of later life* (pp.49-81). Amityville, New York: Baywood Publishing Company, Inc.
- Eller, T. J. (1996). Who stays poor? Who doesn't? Current Population Report. Dynamics of Economic Well-Being: Poverty. 1992-1993. http://www.census.gov/hhes/www/prevsipp.html
- Ehrenberg, R.G., & Smith, R.S. (1991). *Modern labor economics*. New York: Haper Collins Publishers Inc.
- Engelhardt, G.V., & Gruber, J. (2004). *Social Security and the evolution of elderly poverty*. NBER Working Paper No.10466. Cambridge, Mass.: National Bureau of Economic Research.

Field, J. (2003). Social capital. London & New York: Routledge.

- Förster, M. (1990). Measure of low incomes and poverty in a perspective of international comparisons, Labor Market and Social Policy Occasional Paper No.14, Paris: OECD.
- Fuchs, V. (1969). Comment on measuring the size of the low-income population. In Lee Soltow (Eds.), Six papers on the size distribution of wealth and income (pp. 198-202). New York: National Bureau of Economic Research.
- Gaiha, R., & Deolalikar, A. B. (1991). Persistent, expected and innate poverty: Estimates for Semi-Arid Rural South India, 1975-1984, *Econometric Society's European Meetings Proceeding*, England: Cambridge.
- Gist, Y.J., & Hetzel, L. (2004). *We the people: Aging in the United State*, U.S.Census Bureau, Census 2000 Special Report, Washington, DC: U.S.Government Printing Office.
- Glasgow, N. (1988). *The nonmetro elderly: Economic and demographic status*, Washington, D.C.: Economic Research Service.

Goedhart, T., Halberstadt, V., Kapteyn, A., & Van Praag, B. (1977). The poverty line: Concept and measurement. *Journal of Human Resources*, *12*, 503-520.

Goode, W.J. (1956). After divorce. Glencoe: Free Press.

- Gottschalk, P. (1982). Earnings Mobility: Permanent change or transitory fluctuations? *Review of Economics and Statistics, 64*, 450-456.
- Guo, G. (1998). The timing of the influences of cumulative poverty on children's ability and achievement. *Social Forces*, 77(1), 257-288.
- Haider, S.J., Jacknowitz, A., & Schoeni, R.F. (2003). *The economic status of elderly divored women*. Michigan Retirement Research Center Working Paper, WP 2003-046, Ann Arbor: University of Michigan.
- Hardy, M.A., & Hazelrigg, L.E. (1993). The gender of poverty in an aging population. *Research on Aging*, *15*, 243-278.
- Hause, J.C. (1980). The fine structure of earnings and the in-the-job-training hypothesis. *Econometrica*, 48, 1013-1029.
- Heeringa, S.G., & Connor, J.H. (1995). Technical Description of the Health and Retirement Survey Sample Design. Sampling Section Reports, Ann Arbor, MI: Institute for Social Research University of Michigan.
- He, W., Sengupta, M., Velkoff, V., & Debarros, K.A. (2005). 65+ in the United States: 2005. U.S.Census Bureau, Current Population Reports, P23-209, Washington, DC: U.S.Government Printing Office.
- Hill, M.S. (1981). Some dynamic aspects of poverty. In Martha S. Hill, Daniel, H. Hill, and James N. Morgan (Eds.), *Five Thousand American Families: Patterns of Economic Progress*, Ann Arbor, Michigan: Institute for Social Research.
- Holden, K.C., Burkhauser, R.V., & Feaster, D.M. (1988). The timing of falls into poverty after retirement and widowhood. *Demography*, 25, 405-414.

- Holden, K.C., Burkhauser, R.V., & Myers, D.A. (1986). Income transitions at older stages of life: The dynamics of poverty. *Gerontologist*, *26*, 292-297.
- Holden, K.C., & Kuo, H.D. (1996). Complex marital histories and economic well being: The continuing legacy of divorce and widowhood as the HRS cohort approaches retirement. *The Gerontologist, 36*, 383-390.
- Holden, K., & Smock, P.J. (1991). The economic costs of marital dissolutions: Why do women bear a disproportionate cost? *Annual Review of Sociology*, *17*, 51-78.
- Hoover, G.A., Formby, J.P., & Kim, H. (2004). Poverty, non-white poverty, and the Sen index. *Review of Income and Wealth*, *50*, 543-559.
- Hosmer, D.W., & Lemeshow, S. (1999). *Applied survival analysis: Regression modeling of time to event data*. New York: John Wiley & Sons, Inc.

Hurd, M.D. (1989). The economic status of the elderly. Science, 244, 659-664.

- Hurd, M.D. (1990). Research on the elderly: Economic status, retirement, and consumption and saving. *Journal of Economic Literature*, 28, 565-637.
- Iceland, J. (1997). *The dynamics of poverty spells and issues of left-censoring*. PSC Research Report Series, Ann Arbor, MI: Population Studies Center

_____ (2003). Why poverty remains high: The role of income growth, economic inequality, and changes in family strucutre, 1949-1999. *Demography, 40*, 499-519.

(2005). Measuring poverty: a rejoinder. *Measurement*, *3*, 261-266.

- Iceland, J., & Bauman, K. (2004). Income poverty and material harship: How strong is the association? *National Poverty Center Working Paper, No.04-17*.
- Jarvis, S., & Jenkins, S.P. (1997). Low income dynamics in 1990s Britain. *Fiscal Studies*, 18, 123-142.

- Jenkins, S. P. (2000). Modeling household income dynamics. *Journal of Population Economics*, 13, 529-567.
- Jensen, L., & McLaughlin, D.K. (1997). The escape from poverty among rural and urban elders. *The Gerontologist, 37*, 462-468.
- Kapteyn, A., Kooreman, P., & Willemse, R. (1988). Some methodological issues in the implementation of subjective poverty definitions. *Journal of Human Resources*, 23, 222-242.
- Kim, H. (2006). Older women's health and its impact on wealth. *Journal of Women & Aging, 18*, 75-91.
- Klein, J., & Moeschberger, M.L. (2003). Survival analysis: Techniques for censored and truncated data. New York: Springer Science Business Media, Inc.
- Lee, J., & Kim, H. (2003). An examination of the impact of health on wealth depletion in elderly individuals. *Journal of Gerontology: Social Sciences*, 58, S120-S126.
- Levitan, S.A., Mangum, G.L., & Marshall, R. (1981). *Human resources and labor markets: Employment and training in the American Economy*. New York: Harper and Row.
- Lillard, L.A., & Willis, R. J. (1978). Dynamic aspects of earning mobility. *Econometrica*, 46, 985-1012.
- Mayer, K.U., & Tuma, N.B. (1990). Life course research and event history analysis: an overview. In K.U. Mayer & N.B. Tuma (Eds.), *Event hisotry analysis in life course research* (pp.3-20). Madison, WI: University of Wisconsin Press.
- Mcdonnell, K.J. (2000). Understanding the income of the older population. *Employee* Benefit Research Institute(EBRI) Notes, 21, 5-7.

McGarry, K. (2000). Guaranteed income: SSI and the well-beig of the elderly poor.

NBER Working Paper No.7574. Cambridge, Mass.: National Bureau of Economic Research.

- McKernan, S., & Ratcliffe, C. (2002). *Transition events in the dynamics of poverty*. Washington, D.C.: The Urban Institute.
- McLaughlin, D.K., & Holden, K. (1993). Nonmetropolitan elderly women: A portrait of economic vulnerabilit. *Journal of Applied Gerontology*, *12*, 320-334.
- McLaughlin, D.K., & Jensen, L. (1993). Poverty among older Americans: The plight of nonmetropolitan elders. *Journal of Gerontology: Social Sciences, 48*, S44-54.
- McLaughlin, D.K., & Jensen, L. (1995). Becoming poor: The experiences of elderlys. *Rural Sociology*, 60, 202-223. Poverty among older Americans: the plight of nonmetropolitan elders. *Journal of Gerontology: Social Sciences*, 48, S44-54.
- McNamara, T.K., O'Grady-LeShane, R., & Williamson, J.B. (2003). *The role of marital history, early retirement benefits, and the economic status of women.* Center for Retirement Research at Boston College: Chestnut Hill, MA. CRR WP 2003-01.
- Meghea, C. (2003). *Social Security and elderly divorced women living arrangements*. Center for Policy Research, Syracuse: Syracuse University.
- Merton, R. (1968). The Matthew effect in science: The reward and communications systems of science. Science, 199, 55-63.
- Minkler, M., & Stone, R. (1985). The feminization of poverty and older women. *The Gerontologist, 25*, 351-357.
- Moon, M., & Juster, F.T. (1995). Economic status measures in the health and retirement study. *Journal of Humand Resources*, *30*, 138-157.
- Morgan, L.A. (2000). The continuing gender gap in later life economic security. *Journal* of Aging & Social Policy, 11, 157-165.

- Myeres, D.A., Burkhauser, R.V., & Holden, K.C. (1987). The transition from wife to widow: The importance of survivor benefits to widows. *Journal of Risk and Insurance*, *54*, 752-759.
- National Economic Council (1998). *Women and Retirement Security*. Washington, DC: National Economic Council, Interagency Working Group on Social Security. October.
- National Research Council (1995). Measuring poverty: A new approach. Washington, DC: National Academy Press.
- Neugarten, D.A. (1996). *The meanings of age: Selected papers of Bernice, L.Neugarten.* Chicago, IL: University of Chicago Press.
- O'Grady-LeShane, R. (1990). Older women and poverty. Social Work, 35, 422-424.
- O'Higgins, M., & Jenkins, S. (1990). Poverty in the EC: Estimates for 1975, 1980, and 1985. In Rudolph Teekens and Bernard M.S. van Praag (Eds.), *Analysing poverty in the European Community: Policy issues, research options and data sources* (PP.187-212). Luxembourg: Office of Official Publications of the European Communities.
- O'Rand, A.M. (1996). The precious and the precocious: understanding cumulative disadvantage and cumulative advantage over the life course. *The Gerontologist*, *36*, 230-238.
- O'Rand, A.M., & Henretta, J.C. (1982). Delayed career entry, industrial pension structure, and early retirement in a cohort of unmarried women. *American Sociological Review*, 47, 365-474.
- Pradhan, M., & Ravallion, M. (2000). Measuring poverty using qualitative perceptions of consumption adequacy. *Review of Economics and Statistics*, 82, 462-471.
- Porter, K.H., Larin, K., & Primus, W. (1999). *Social Security and poverty among the elderly: A national and state perspective*. Washington, D.C.: Center on Budget and Policy Priorities.

- Quinn, J.F. (1993). *Poverty and income security among older persons*. Executive Seminar: Overview of Proceedings. Washington, DC: National Academy on Aging.
- Rainwater, L. (1981). *Persistent and transitory poverty: A new look*. Joint Center for Urban Studies of the Massachusetts Institute of Technology and Harvard University Working Paper No.70, Cambridge.
- Rank, M.R., & Hirschl, T.A. (1999). The likelihood of poverty across the American adult life span. *Social Work, 44,* 201-216.
- Rank, MR., & Hirschl, T.A. (2001). The occurrence of poverty across the life cycle: Evidence from the PSID. Journal of Policy Anlsysis and Management, 20, 737-755.
- Rodgers, J.R., & Rodgers, J.L. (1993). Chronic poverty in the United States. *Journal of Human Resources*, 28, 25-54.
- Ross, C., Danziger, S., & Smolensky, E. (1987). The level and trend of poverty in the United States: 1939–1979. *Demography*, 24, 587-600.
- Ryder, N.B. (1965). The Cohort as a concept in the study of social change. *American Sociological Review, 30* (6), 843-861.
- Ruggles, P. (1990). Drawing the line: Alternative poverty measures and their implications for public policy. Washington, DC: Urban Institute Press.
- Rupp, K., Strand, A., & Davies, P.S. (2003). Poverty among elderly women: Assessing SSI options to strengthen Social Security reform. *Journal of Gerontology Series* B: Psychological Sciences and Social Sciences, 58, S359-S368.
- Scholz, J.K., & Levine, K. (2001). The evolution of income support policy in recent decades. In Sheldon Danziger, & Robert Haveman (Eds.), Understanding poverty (pp.193-228). New York: Havard University Press.

Schultz, T.W. (1961). Investment in human capital. American Economy Review, 51, 1-17.

- Sen, A. K. (1976). Poverty: An ordinal approach to measurement. *Econometrica*, 44, 219-231.
- Sen, A. K. (1983). Poor, relatively speaking. Oxford Economic Papers, 35, 153-169.
- Sen, A. K. (1999). Democracy as a unicersal value. Journal of Democracy, 10, 3-17.
- Servais, M. (2007). Overview of HRS public data files for cross-sectional and longitudinal analysis. Survey Research Center Institute for Social Research University of Michigan, Ann Arbor, MI: Institute for Social Research
- Settersten, R.A. (2003). Propositions and controversies in life-course scholarship. In Richard A. Settersten (Ed.), *Invitation to the life-course* (pp.15-48). Amityville, New York: Baywood Publishing Company.
- Settersten, R.A., & Mayer, K.U. (1997). The measurement of age, age structuring, and the life course, *Annual Review of Sociology, 23*, 233-261.
- Shaw, L.B., & Yi, H.Y. (1997). How elderly women become poor: Findings from the New Beneficiary data system. *Social Security Bulletin, 60*, 46-49.
- Smith, J. P. (1999). Healthy bodies and thick wallets: The dual relation between health and economic status. *Journal of Economic Perspectives*, 13, 145-166.
- Smith, J.P. (2003). *Consequences and predictors of new health events*. NBER working paper 10063. National Bureau of Economic Research.
- Smith, J. P., & Raynard, K. (1997). Race, socioeconomic status and health in later life. In Linda Martin, & Beth Soldo (Eds.), *Racial and ethnic differences in the health of* older Americans (pp.106-162). Washington, DC: National Academy Press.

Smith, K. R., & Zick, C.D. (1986). The incidence of poverty among the recently widowed: mediating factors in the life course. *Journal of Marriage and the*

Family, 48, 619-630.

Stevens, A.H. (1995). The dynamics of poverty spells: Updating Bane and Ellwood, *AEA Papers and Proceedings, 84*, 34-37.

(1999). Climbing out of poverty, falling back in: Measuring the persistence of poverty over Multiple Spells. *Journal of Human Resources, 34*, 557-588.

- Thiede, M., & Traub, S. (1997). Mutual influences of health and poverty: Evidence from German panel data. *Social Science Medicine*, *45*, 867-877.
- Thurow, L.C. (1975). *Generating Inequality: Mechanisms of distribution in the U.S. economy*. New York: Basic Books.
- Uhlenberg, P., Cooney, T., & Boyd, R. (1990). Divorce for women after midlife. *Journal* of Gerontology, 45, S3-11.
- U.S. Census Bureau (2002). *Current population survey: Annual demographic Survey,* March Supplement 2000. Washington, DC.
- U.S. Census Bureau (2004). National compensation survey: Employee benefits in private industry in the United State, March 2004. Washington, DC.
- U.S. Census Bureau (2005). 65+ in the United States: 2005. Washington, DC.
- U.S. Social Security Administration (2002). *Annual Statistical Supplement to the Social Security Bulletin, 2000.* Washington DC: Government Printing Office.
- Vartanian, T.P., & McNamara, J.M. (2002). Older women in poverty: the impact of midlife factors. *Journal of Marriage and Family*, 64, 532-548.

Vaughan, D.R. (1993). Exploring the use of the public's views to set income poverty

thresholds and adjust them over time. Social Security Bulletin, 56, 22-46.

- Wagle, U. (2002). *Rethinking poverty: Definition and measurement*. MA: Blackwell Publishers.
- Warlick, J.L. (1985). Why is poverty after 65 a woman's problem? *Journal of Gerontology*, 40, 751-757.
- Weaver, D.A. (1997). The economic well-being of Social Security beneficiaries with an emphasis on divorced beneficiaries. *Social Security Bulletin, 60*, 3-17.
- Weir, D.R., & Willis, R.J. (2000). Prospects for widow poverty in the finances of married couples in the HRS. In O. Mitchelle, P.B. Hammond, & A. Rappaport (Eds.), *Forecasting retirement needs and retirement wealth* (pp. 208-234). Philadelphia: University of Pennsylvania Press.
- Willson, A.E., & Hardy, M.A. (2002). Racial disparities in in income security for a cohort of aging American women. *Social Forces*, *80*, 1283-1306.
- Wilson-Ford, V. (1991). Poverty among Black elderly women. *Journal of Women and Aging*, 2, 5-20.
- Wu, K.B. (2003). *Poverty experience of older persons: A poverty study from a long-term perspective*. AARP Public Policy Issues. Washington, DC: AARP.
- Zick, C.D., & Smith, K.P. (1986). Immediate and delayed effects of widowhood on poverty: Pattern from the 1970s. *Gerontologist, 26*, 669-675.