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CHANGES IN SUBJECTIVE AND OBJECTIVE MEASURES OF ECONOMIC WELL-BEING AND THEIR INTERRELATIONSHIP AMONG THE ELDERLY IN SINGAPORE AND TAIWAN

INTRODUCTION

The importance of economic status as a focus of inquiry is well recognized in the field of gerontology. For the elderly, as well as others, economic status is a major dimension of their well-being, determining in large part their level of comfort and the resources they can command for maintaining health and achieving a variety of personal and familial goals. Economic well-being also plays a prominent role in theory and policy aspects of gerontology. One line of theory centers on the effect of economic development on the welfare of the elderly. Cowgill (1974), for example, argued that in nearly all respects the factors of development would adversely affect the economic status of the elderly by trapping them in more traditional and less rewarding jobs and separating them from their families as children migrate to urban areas in pursuit of better jobs. Others (Treas and Logue, 1986) have mitigated this thesis to some extent on the basis of subsequent tests and analyses.

From the standpoint of policy, deliberations about the level and structure of social security, health insurance and other welfare measures reflect recognition of the need to sustain income after retirement and to protect the elderly against financial shocks that might arise from poor health or other contingencies. At the same time, in many developing and newly industrialized countries policy-makers would like to maintain to the degree possible the traditional family arrangements, in which children provide a good deal of support for the older parents, as a way of minimizing the high costs often associated with formal social welfare systems.

Despite the centrality of economic status from substantive, theoretical and policy perspectives, measurement issues have not received sufficient attention, particularly in studies within developing and newly industrialized countries. Even when attention has been given to the material well-being of the older population in these countries, the measures employed typically center on their living arrangements or continued receipt of some support from children or other family members. As noted elsewhere (Hermalin, 1995, 1997), undue reliance on simple measures of coresidence may confuse "form" and "function" by failing to describe the actual directions and magnitudes of support across generations. More specifically, one cannot infer from the fact of coresidence or occasional receipt of money from children how well off the elderly are in terms of economic well-being. For this purpose one needs more objective measures of income and assets, complemented by the elderly's own perception of sufficiency of financial resources and satisfaction with their economic status.

Obtaining such measures at any one point in time is beset with a number of conceptual and operational issues, as touched on below. Confounding the problem is the desirability of tracing changes in the economic well-being of the elderly over time. Transitions in the level and sources of income, work status, and health are hallmarks of the older population, and it is important to gauge the nature and magnitude of these changes and their determinants for the insights they provide and for their implications for policies and programs.

The four countries associated with the project, Rapid Demographic Change and the Welfare of the Elderly (AG07637) – the Philippines, Thailand, Taiwan and Singapore – collected a variety of measures of economic well-being in surveys conducted during the mid-1990s.[1] In the latter two countries, the surveys are part of a panel study, allowing investigations of change in status. In Taiwan, the interviews have been conducted at regular intervals since 1989, and in Singapore in 1995 and 1999.

In the next section we review several issues associated with the measurement of economic status and identify the objective and subjective measures which will be the focus of this analysis and the relevant literature concerning their interrelationship. This is followed by the background characteristics of each country and

the nature of the data. The analytic portion of the paper has three primary objectives:

- To describe the degree of change over four years for panel respondents in both objective and subjective measures of economic well-being.
- To describe the interrelationship between the objective and subjective measures at each point of time and in terms of degree of change.
- To model change in perceived adequacy of income in terms of actual change in income and other relevant factors.

MEASUREMENT ISSUES RELATED TO ECONOMIC WELL-BEING

The measurement of economic well-being is beset with a number of conceptual and operational issues. There are clearly multiple dimensions involved and, for many, eliciting reliable estimates is problematic. Income is often a prime indicator of economic well-being, but in this regard there is a question of whose income should be assessed: the respondent, the couple, or the household? In many developing and newly industrialized countries (as well as Japan) a high proportion of the elderly live with children, and many, whether or not they co-reside, receive financial support from their children (Hermalin, 1995; Knodel and Debavalya, 1997; Ofstedal et al., 1999). As a result one needs to distinguish between the income of the elderly respondent or couple and the income of the household, and take account of allocations within the household – both direct and indirect. Even the elderly living alone may have certain expenses paid for by others, instead of or in addition to receiving money income from children. Beyond income, the asset and debt situation of an elderly individual or couple is also a major determinant of their ability to obtain vital resources for living and becomes more critical after retirement.

In addition to the large array of objective measures suggested by the foregoing dimensions, interest often centers on the degree to which people are satisfied with their economic condition, or on the extent to which their income and assets are adequate for their needs. These subjective measures tap into a number of

economic and psychological considerations, ranging from consumption levels, perceived economic needs, and past and expected levels of economic well-being. Some economists view such subjective measures as an opportunity to capture directly the economic utility level of the individual or couple. Utility is a concept reflective of overall well-being and is derived through maximizing one's consumption of goods, services and leisure subject to price and income constraints (Douthitt et al., 1992). One detailed model using subjective assessments of income adequacy is known as the Leyden model (for its place of origin), and a review of its characteristics as well as an alternate strategy is given by Kushman and Ranney (1990).

From a psychological standpoint a subjective measure of economic well-being may be considered a component of overall subjective well-being, or quality of life, which focuses on people's evaluation of their lives. As Diener (2000) states, these evaluations are "both affective and cognitive. People experience abundant subjective well-being when they feel many pleasant and few unpleasant emotions, when they are engaged in interesting activities, when they experience many pleasures and few pains, and when they are satisfied with their lives" (p. 34).

Over the last 30 years a voluminous literature in subjective well-being has developed, giving attention to methods of measuring the concept (from single global questions to utilizing multiple domains), assessing the factors associated with subjective well-being, measuring the variation within and across populations, and generating theoretical models to capture observed patterns (For a recent overview see Diener, 2000).

Despite this considerable attention, several key issues remain, which intersect with the goals of this analysis. One centers on how subjective well-being varies with age and how stable levels of well-being are for the same individual over time. Horley and Lavery (1994) note that the relationship between age and subjective well-being is equivocal. Based on a survey of volunteer respondents in Canada that used composite measures of several indices, they found that subjective well-being increased with age to ages 65–74 and then declined slightly. At the same time, reinterviews with a small subsample found no within-subject effects over time, concluding

that "knowing an individual's well-being at any point in time, and knowing nothing further about that person will not lead to accurate predictions of that individual's well-being" (p. 179).

At the same time, persistence of levels of subjective well-being has been often noted in studies of populations and groups despite sharp changes in objective wealth or health conditions (See Diener, 2000, for several examples). These findings and the generally low correlation between objective circumstances and subjective well-being have led to the hypothesis of a "hedonic treadmill" (Brickman and Campbell, 1971) which leads people to adjust their expectations as their material conditions improve, or to adapt to misfortunes so that their initial unhappiness is short-lived. This has led to the concept of a long-run hedonic neutrality or of a personal hedonic set point (See Cummins, 2000, p. 61, for a discussion and empirical evidence for a set point).

Cummins (2000) has expanded these observations to postulate a system that homeostatically maintains subjective quality of life within a narrow range. As the result of this system's ability to adapt to changing circumstances, objective and subjective indicators of well-being are poorly correlated. But he also postulates that very poor objective circumstances can defeat this homeostatic system and when this occurs, the objective and subjective measure will display higher correlations. He finds support for these hypotheses through meta-analyses of correlations within and between objective and subjective indicators taken from Western populations not experiencing "marked privation", contrasted with similar correlations from groups experiencing "threatening life circumstances".

Another attempt to probe the connection between objective to subjective indicators is to test whether these relationships are stronger when more refined measures of each type of indicator are employed. To this end, Douthitt and colleagues (1992) looked at the effect of a simple measure of income versus more refined economic measures (logged income plus a relative consumption variable) on both an overall subjective measure of well-being and a measure of economic satisfaction. They found that the refined model added moderately to the explanatory power of the objective measures, but still did not account for more than 10 percent of the variance in the subjective indicators.

Our analysis contributes to these key points in several ways. We focus on the relationship of subjective to objective indicators among the elderly in non-Western settings, groups relatively understudied in these respects. By utilizing panel data we examine the degree of change in both types of indicators as well as changes in the nature of their relationship. In addition, we model the level of change in subjective well-being as a function not only of objective changes in economic well-being but in terms of other important life events as well.

THE SOCIOECONOMIC AND DEMOGRAPHIC CONTEXT

Singapore and Taiwan are interesting venues for studying the relationship between subjective and objective measures of economic adequacy. Both countries have undergone rapid economic expansion in a relatively short period of time, as well as dramatic demographic changes. Several key indicators shown in Table I provide some of the measures for this generally well-known transformation.

The "economic miracle" associated with these countries is shown by their very high annual growth rates in GNP over a long period, 5.7 and 8.4 percent for Singapore and Taiwan, respectively. This has led to a GNP per capita (in 1995 U.S. dollars) of almost $23 000 for Singapore and over $12 000 for Taiwan, which compares to the U.S. figure of about $28 000 in 1995. Associated with their economic transformation, approximately one half of women are in the labor force in each country by 1995, and there have been rapid gains in educational attainment. In Singapore almost eight out of ten secondary age students are enrolled, and in Taiwan, the proportion exceeds nine out of ten, as of 1995.

Equally dramatic have been the demographic changes. Both countries have sharply reduced their fertility levels, and by 1995, women were having fewer than two births (based on the age specific birth rates of that year). The reductions in fertility and continued improvements in mortality have led to a rapid aging of the population. While each country had approximately 10 percent of its population 60 or older in 1995, these percentages will approach or exceed 30 percent by 2030, about the same percentage projected for Europe in that year.

TABLE I

Selected socioeconomic and demographic indicators for Singapore and Taiwan, 1970–1995

	Singapore	Taiwan
Socioeconomic measures		
Annual percent growth		
in GNP, 1970–95	5.7%	8.4%
GNP per capita, 1995		
(U.S.$)	$22 770	$12 396
% of Females (15 and over) in labor		
Force		
1970	26	36
1995	50	45
Gross enrollment ratio secondary school		
(as% of eligible age group)		
1970	46	54
1995	76[a]	96
Demographic measures		
% of Population 60 or older		
1970	5.7	4.9
1995	9.3	10.9
2030	30.4	27.6[b]
Total fertility rate		
1970	3.0	4.0
1995	1.8	1.8
Life expectancy at birth		
1970	68.7	68.6
1995	76.9	74.7
Female mean age at marriage		
1970	24.2	22.8
1990	27.0	26.5

[a]Figure is for 1997.
[b]Figure is for 2031.
Data source: Knodel, J., M. B. Ofstedal and C. Roan: forthcoming, 'The Demographic, Socioeconomic and Cultural Context', in A. I. Hermalin (ed.), The Well-Being of the Elderly in Asia: A Four-Country Comparative Study, Tables IV and V (University of Michigan Press Ann Arbor, Michigan).

These transformations have several implications for the actual and perceived economic well-being of today's elderly. Many of them will have missed out on the educational and economic opportunities arising over the last 30 years and will have constrained actual incomes based on their ability to continue work in less remunerative jobs, limited savings, and to some degree, limited retirement plans (For a discussion of sources of income and labor force behavior of the elderly in these countries see Hermalin and Chan, 2000; Hermalin et al., 1999). Many however will also have economic support from their children, as discussed in more detail below, and often this is their major source of income. This multiplicity of sources, and their nature, enhances the likelihood of actual changes in income, as when small savings are depleted, limited payouts from a retirement plan are exhausted, or one or more children change the amount or frequency of support. Perceived adequacy is also prone to fluctuate in this environment. Older people who grew up in less affluent times may be relatively satisfied with their current conditions, but as their children and the society at large rapidly advance economically, it is also possible for them to feel relatively deprived in terms of their economic well-being. These conflicting subjective forces coupled with fluctuations in their actual incomes may lead to considerable variation in how respondents assess their economic well-being and the stability of these assessments.

DATA AND BASIC CHARACTERISTICS OF RESPONDENTS

We provide additional context for the study and introduce the characteristics of the elderly by drawing on the two longitudinal surveys conducted in Singapore and Taiwan. The Singapore data were collected as part of the project, *Transitions in Health, Wealth, and Welfare of Elderly Singaporeans: 1995–1999*, conducted by the National University of Singapore and the Ministry of Community Development and Sports. The purpose was to re-interview respondents to the 1995 *National Survey of Senior Citizens* (Ministry of Community Development, 1996). The original sample was nationally representative and consisted of 4750 individuals age 55 years and above, representing a response rate of 60 percent. The re-interview was conducted four years later in 1999. Approximately

11.8 percent of the sample died between 1995 and 1999 ($n = 557$). Out of the eligible households remaining, 16.4 percent had moved away. A total of 1981 respondents were re-interviewed, representing a response rate of 47 percent at follow-up of surviving respondents, and 57 percent of the non-moving survivors [A comparison of Wave 2 respondents and non-respondents on a number of socio-demographic, economic and health characteristics indicate that respondents were slightly younger, more likely to be female, working, and in good health than non-respondents; however, differences on these characteristics are quite small. This suggests that the reinterviewed respondents are representative of the full baseline sample, at least with respect to the characteristics of key interest in the present analysis. Results of this comparison can be provided by the authors upon request]. An additional 249 cases (13 percent) were dropped due to item-missing data on one or more of the variables of interest, yielding a final analysis sample of 1788. An important point to note is that the *Transitions* data was collected during the recent Asian economic crisis that began in late 1998. In October 1998, the stock market crash in Thailand sparked off a regional economic crisis that only began to ebb at the end of 1999.

The Taiwan data come from two waves of a multi-wave, nationally representative panel survey of older persons, the Study of Health and Living Status of the Elderly (Taiwan Provincial Institute of Family Planning, 1989). The original sample was comprised of 4049 persons age 60 years or over at the start of the survey in 1989; this represented a baseline response rate of 93 percent. To date, six waves of interviews have been conducted, including in-person interviews in 1989, 1993, 1996 and 1999, and abbreviated telephone interviews in 1991 and 1995. The data used in this analysis come from the 1989 and 1993 rounds. As of 1993, 590 respondents had died and 3154 were reinterviewed, for a follow-up response rate of 91 percent. Of the reinterviewed respondents, 289 cases (9.2 percent) were dropped due to missing data on one or more of the variables of interest, leaving us with an analysis sample of 2865.

Table II describes the characteristics of the sample at baseline and Table III shows the degree to which key statuses changed over the four-year period under study. Both sets of characteristics constitute

TABLE II

Frequency distributions for baseline characteristics: Singapore, 1995 and Taiwan, 1989

Characteristic	Singapore		Taiwan	
	Percent (weighted)	N cases (unweighted)	Percent (weighted)	N cases (unweighted)
Age: 55–59	30.4	315	–	–
60–64	27.0	363	39.7	1140
65–69	16.7	265	30.8	881
70–74	13.0	208	17.4	498
75+	12.9	581	12.1	346
Sex: Male	47.1	987	57.3	1642
Female	52.9	745	42.7	1223
Ethnicity (Singapore)				
Chinese	83.0	1483	inap.	inap.
Malay	10.6	186		
Indian	5.5	50		
Others	0.9	13		
Ethnicity (Taiwan)	inap.	inap.		
Taiwanese			77.7	2226
Mainlander			22.3	639
Education				
No formal education	60.0	1153	39.8	1141
Primary level	26.7	402	32.7	936
Secondary level or above	13.3	177	27.5	788
Total	100.0	1788	100.0	2865

the independent variables for studying the factors associated with change in perceived adequacy of income. With regard to the Singapore sample, 57 percent is below the age of 65. The majority of elderly are female, given the advantage in life expectancy that Singaporean females have over Singaporean males. The elderly sample reflects the ethnic breakdown of the larger population; 83 percent are Chinese, 11 percent are Indian, 5.5 percent are Malay and 0.9 percent are categorized as "Other". As a result of the limited educational opportunities when they were young, three-fifths of the older

TABLE III

Frequency distributions for time-varying covariates: Singapore, 1995–1999 and Taiwan, 1989–1993

Characteristic	Singapore		Taiwan	
	Percent (weighted)	N cases (unweighted)	Percent (weighted)	N cases (unweighted)
Marital status				
Unmarried at both waves	44.7	799	30.4	872
Married to unmarried	6.3	112	6.9	198
Married at both waves[a]	49.0	877	61.7	1769
Health status				
Health remained good	32.4	579	67.1	1923
Health improved	8.6	154	9.7	277
Health declined	52.6	941	12.9	370
Health remained poor	6.4	114	9.8	282
Work status				
Working at both waves[b]	12.6	225	15.4	441
Working to not working	9.5	169	16.7	478
Not working at both waves	77.9	1394	62.2	1783
Main source of income				
Own source at both waves	21.3	380	35.0	1003
Children to own source	15.2	271	11.3	323
Children at both waves	53.8	964	39.4	1130
Own source to children	9.7	173	14.3	409
Living arrangement				
With child at both waves	74.1	1325	59.8	1713
With child to without child	11.5	205	11.4	326
Without child to with child	2.2	40	5.5	158
Without child at both waves	12.2	218	23.2	665
Home ownership				
Owner at both waves	61.5	1099	39.8	1140
Non-owner to owner	0.4	8	6.0	173
Owner to non-owner	33.7	603	15.7	451
Non-owner at both waves	4.4	78	38.4	1101
Total	100.0	1788	100.0	2865

[a]Also includes a small number of cases who were unmarried at Wave 1 and were married at followup.
[b]Includes a small number of cases who were not working at Wave 1 and were working at Wave 2.

respondents have no formal education, and only 13 percent of this generation of elderly have a high school education or higher.

The Taiwanese sample consists of elderly persons aged 60 and above. Seventy percent of the sample is below the age of 70. The majority of the sample is male, which is an outcome of the special migration from the mainland in 1949–1950 following the Chinese Civil War, which was heavily male. This group is referred to as "Mainlanders" and makes up about 22 percent of the sample, with the remainder comprised of Taiwanese nationals. Educational levels are slightly higher than for Singapore. Forty percent of Taiwanese elderly have no education whereas 28 percent have at least a high school education or higher.

Table III shows the status of several key covariates at the beginning and end of the four-year period, since we hypothesize that transitions in these statuses as well as actual income can affect the respondents' sense of income adequacy. Six to seven percent of the sample moved from being married to unmarried, nearly all of them on account of the death of a spouse. Half the elderly in Singapore and over three-fifths in Taiwan remained married at both time points. The distributions and changes in self-assessed health were quite different in Singapore and Taiwan. Only a third of Singaporean elderly compared to two-thirds of those in Taiwan assessed their health as good at both time points, with over half of the Singaporeans indicating that their health declined contrasted with 13 percent in Taiwan. Most of these older respondents were not working when first interviewed and the proportions retiring over the four-year period were modest in both countries.

As noted at the outset, in both countries support from children is a major source of income for many older parents and this is reflected in Table III. At the first interview, two-thirds of the Singaporean respondents and half the Taiwanese reported that children were their major source of income, and although there were transitions to and away from children vs. self-support, these were largely offsetting, so that the proportions were little changed at the end of the period.

The close involvement of older parents and children is also seen in the living arrangements and their transitions. In Singapore, 86 percent of respondents were living with one or more children at the first wave, and over 75 percent at the second wave, the decrease

mainly arising when young adults leave the household. In Taiwan, the proportions are somewhat lower but still substantial. Over 70 percent of respondents lived with children at the first wave and this decreased only slightly to 65 percent at the second wave.

As noted at the outset, in many developing countries governments would like to maintain traditional family support for older parents to the extent possible and, to this end, a number have instituted various policies. In Singapore, as widely reported, the government has imposed a legal obligation upon adult children to take care of their aging parents economically. In 1996, the Parental Maintenance Act was instituted which allows older parents to sue their adult children for economic neglect. Although the actual number of cases per year that are brought to the Tribunal has never exceeded 150, the presence of this legality is a firm reminder that filial piety is a virtue in Singaporean society. Less well known are the incentive programs the government has adopted to promote intergenerational living arrangements. As example, adult children who live with, or near, a parent are given tax exemptions and priority in housing choice. Taiwan, among other steps, has an in-home service program to provide older people who have limitations with a variety of services, as well as an extensive system of day care centers to provide cultural and recreational activities to those who are ambulatory. These services and facilities not only provide direct assistance to the older population, but they facilitate continued residence patterns, including coresidence with children.

But these high levels of assistance from children and co-residence do not necessarily translate into adequate levels of income for the elderly. Older parents may also be providing direct support to children as well as a wide range of services, including taking care of grandchildren, preparing meals and assisting with housework. Table III, for example, indicates that the proportion of respondents coresiding exceeds those receiving major support from children, suggesting that the flow of assistance may be from parents to children in a substantial number of cases. And a number of analyses have documented that older parents are rendering many services to their children and grandchildren (Chan, 1997; Hermalin et al., 1998; Yong, 2000).

Indeed the final characteristic shown in Table III, home ownership, suggests a fair degree of financial independence for the older respondents. In Singapore, over 62 percent were owners or joint owners of their residences (often apartments in government estate housing) at baseline. In Taiwan, the figure was 56 percent, but many of the elderly there reported assisting their children with the purchase of their home or transferred ownership to them (see Hermalin et al., 1999).

These considerations and findings point to the need for more direct assessment of the incomes received by the elderly and their views on the adequacy of these incomes to cover their expenditures. The next section introduces these measures and discusses their levels and change over time.

MEASURES OF ACTUAL AND PERCEIVED INCOME AND THEIR INTERRELATIONSHIP

For this part of the analysis, the measures of primary interest are indicators of objective and subjective economic well-being and changes therein. The objective indicator that we use is a categorical measure of the respondent's monthly income; this variable is measured and categorized identically across survey waves within each country. In the Taiwan survey, respondents were instructed to include their spouse's income if married; in the 1995 baseline Singapore survey no such instruction was given and it is unclear whether, for married Singaporeans, income includes or excludes the spouse's income. During the reinterview in 1999, respondents were specifically instructed to include their spouse's income if married. As our measure of change in income, we subtract the wave 1 value from the wave 2 value. Respondents who drop one or more categories between waves are defined as having experienced a decline in income, those who increase by one or more categories are defined as having experienced an increase in income, and those who remain in the same category are defined as having the same income in both waves.

The subjective indicator of economic well-being that we use is a measure of perceived adequacy of income. To assess perceived adequacy of income, respondents were asked whether their current

level of income was sufficient to cover their expenses, allowing them to indicate whether it was just sufficient, more than sufficient or that they experienced some or much difficulty. To construct the measure of change in perceived adequacy of income, we compared the level of adequacy reported at each wave. The change variable thus indicates whether perceived income adequacy was the same in the two waves, or whether it increased or decreased by one or more categories between the two waves.

The subjective measure used in this study is somewhat different than that used in most previous research, which tends to rely on measures of satisfaction with economic status. It may be argued that perceived income adequacy is more objective than a rating of satisfaction with economic status in that respondents are explicitly asked to compare their income against their expenses and determine the extent of a shortfall. Although the Singapore survey does not have an economic satisfaction measure, the Taiwan survey does include such a measure and we find a fairly high correlation between the income adequacy and economic satisfaction measures at baseline ($r = 0.66$, $p < 0.000$).

In this section we investigate the first two objectives of this paper, to describe the degree of change on objective and subjective measures of economic well-being and to examine the association between the two types of measures. Tables VI and V address the first goal and Tables VI and VII the second.

Before examining the patterns in Tables IV and V in detail, it is useful to make a couple of general observations. First, slightly more than half of the Singaporean respondents had monthly incomes of less than S$500, equivalent to $287 U.S. (based on exchange rates in early 2001), while the median monthly income of Taiwanese respondents was about NT$10 000, equivalent to $309 U.S. (see 1995 column for Singapore in Table IVa and 1989 column for Taiwan in Table IVb). It is interesting to note that despite the higher GNP per capita in Singapore, the Taiwanese elderly have slightly higher actual incomes than their Singaporean counterparts. In fact adjusting by purchasing power parity index shows the actual average dollar income of the elderly is almost twice as high in Taiwan compared to Singapore (Hermalin, forthcoming). This differential in cash incomes does not imply that the Taiwanese respondents

TABLE IVa

Level and change in income: Singapore, 1995–1999

Monthly individual income in 1995[a]	Change in income				Income level[b]	
	Decrease	Same	Increase	Total	1995	1999
< $500	–	62.8	37.1	100.0	52.0	46.9
$500–999	37.3	35.6	27.2	100.0	30.5	27.6
$1000–1499	48.0	21.4	30.6	100.0	11.0	13.2
$1500–1999	57.5	21.3	21.3	100.0	2.6	5.4
$2000+	50.7	49.3	–	100.0	4.0	6.9
Total	20.1	48.4	31.5	100.0	100.0	100.0

Chi-square = 539.04 (df = 8), $p < 0.001$
[a]Figures are given in Singapore dollars. S$100 = NT$1857 = US$57
[b]Figures present the cross-sectional distribution of income for the indicated year.

TABLE IVb

Level and change in income: Taiwan, 1989–1993

Monthly income of R and spouse in 1989[a]	Change in income				Income level[b]	
	Decrease	Same	Increase	Total	1989	1993
< $3000	–	49.9	50.1	100.0	16.4	21.3
$3000–4999	29.1	24.9	46.0	100.0	12.2	14.0
$5000–9999	34.6	30.8	34.6	100.0	22.3	21.7
$10 000–14 999	46.1	20.3	33.6	100.0	18.4	13.6
$15 000–19 999	51.2	15.6	33.1	100.0	11.4	10.0
$20 000–49 999	47.1	46.7	6.3	100.0	16.8	16.8
$50 000+	62.5	37.5	–	100.0	2.5	2.7
Total	35.0	32.4	32.6	100.0	100.0	100.0

Chi-square = 571.05 (df = 12), $p < 0.001$.
[a]Figures are given in Taiwanese new dollars (NT$). NT$100 = S$5.39 = US$3.09.
[b]Figures present the cross-sectional distribution of income for the indicated year.

are better off, however, since more Singaporean elderly live with children and may benefit from substantial non-cash support in the form of food, clothing, utilities and coverage of other needs. This highlights the point made earlier about the need for a multiplicity of measures of economic well-being (see Hermalin et al., 1999 for a detailed analysis along these lines). Indeed the subjective measures of perceived adequacy (shown in Tables Va and Vb) reveal that, at baseline, 90 percent of Singaporean elderly report having enough or more than enough income to meet expenses, contrasted with 78 percent of Taiwanese respondents who give these positive responses, indicating that other factors enter into an appraisal of adequacy.[2]

In Tables IVa and IVb we show the association between an individual's monthly income at baseline and whether the person experienced a change in income between interviews, for Singapore and Taiwan respectively. Overall, the data suggest considerable movement in income levels over time.[3]

For Singapore, elderly with the lowest income levels at baseline are most likely to remain at that income level. Specifically, of those reporting monthly incomes of less than S$500 in 1995, 63 percent reported the same income level in 1999 and 37 percent reported an increase in income level. Of those elderly who reported monthly incomes above $2000, 51 percent reported a decrease in income level by 1999. Individuals earning between S$1000–1499 experienced a great deal of change over time. Between 1995 and 1999, 48 percent experienced a decrease in income levels, 21 percent reported the same income level, and 31 percent experienced an increase in income level. Focusing on the last two columns in Table IVa, we see the net result of these changes in terms of aggregate income distributions which point to a modest upward shift in incomes. The two distributions however are rather similar, as reflected in an Index of Dissimilarity of only 8.0.[4]

For Taiwan in Table IVb, the proportions experiencing a decline, increase and no change in income were about equally split. The larger number of income categories in Taiwan display a strong association between level of income at baseline and direction of change. The lower the income reported in 1989, the more likely that respondents would report a gain in one or more categories in 1993, and conversely, the higher the category in 1989, the more likely that

TABLE Va

Perceived income adequacy and change in perceived adequacy: Singapore, 1995–1999

Level in 1995	Change in adequacy				Perceived adequacy[a]	
	Better	Same	Worse	Total	1995	1999
Enough with money left over	–	28.2	71.7	100.0	10.5	21.0
Just enough, no difficulty	21.0	63.5	15.5	100.0	79.9	61.8
Some difficulty	68.4	26.6	5.0	100.0	7.8	14.7
Much difficulty	87.9	12.1	–	100.0	1.9	2.5
Total	23.8	56.0	20.2	100.0	100.0	100.0

Chi-square = 574.08 (df = 6), $p < 0.001$.
[a]Figures present the cross-sectional distribution of perceived income adequacy for the indicated year.

TABLE Vb

Perceived income adequacy and change in perceived adequacy: Taiwan, 1989–1993

Level in 1989	Change in adequacy				Perceived adequacy[a]	
	Better	Same	Worse	Total	1989	1993
Enough with money left over	–	63.7	36.3	100.0	13.6	34.1
Just enough, no difficulty	34.8	56.6	8.5	100.0	64.3	53.1
Some difficulty	74.2	19.3	6.5	100.0	17.2	9.6
Much difficulty	80.6	19.4	–	100.0	4.9	3.1
Total	39.1	49.3	11.6	100.0	100.0	100.0

Chi-square = 778.31 (df = 6), $p < 0.001$.
[a]Figures present the cross-sectional distribution of perceived income adequacy for the indicated year.

there would be a decrease in 1993. Overall, the number declining was somewhat larger than those increasing, so that the aggregate distributions shown in the last two columns show somewhat greater concentration in the lower income categories in 1993, but the Index of Dissimilarity between the distributions is only 6.9.

Tables Va and Vb show the association between perceived income adequacy at baseline and change in perceived adequacy over time for Singapore and Taiwan, respectively. As with changes in

actual income, changes in perceived income adequacy over time appear to be non-trivial. Of Singaporean elderly who reported enough income with money left over at baseline, 28 percent reported the same status in 1999 whereas 72 percent reported worse status in 1999 (Table Va). At the other end of the spectrum, among those elderly who reported much difficulty meeting expenses at baseline, 88 percent reported an improvement in ability to meet expenses in 1999 and only 12 percent reported continuing to have much difficulty. Changes were not strictly limited to those elderly at the extremes of the spectrum, however. Among those with just enough income at baseline, 21 percent reported an improvement in adequacy, 16 percent a decline in adequacy, and 64 percent reported the same status in 1999. Among those elderly with some difficulty meeting expenses in 1999, 68 percent reported an improvement by 1999 whereas 5 percent reported a worsening of status, and 27 percent reported the same status. The net result for Singapore is that over one-half of the elderly reported the same level of perceived income adequacy at both time points, and similar proportions reported improvement and decline in income adequacy (24 percent and 20 percent, respectively). The Index of Dissimilarity between the two aggregate distributions is 18.1, somewhat larger than that for the actual income distributions.

The Taiwan pattern is again somewhat different, and quite surprising in light of the slight net decrease that was observed with respect to actual income (see Table IVb). For Taiwan, older persons reported substantial improvements in perceived income adequacy. Over one-third of those who were just making ends meet in 1989 reported improvement in income adequacy over the period, and three-quarters or more of those who had some or much difficulty meeting expenses in 1989 reported improvement in income adequacy. The net result is that two-fifths of all elderly reported higher income adequacy in 1993, and just over one-tenth reported lower income adequacy. This leads to substantial improvement in the aggregate distribution in perceived adequacy as of 1993, and the Index of Dissimilarity at 20.6 reflects the difference in distributions.

Before turning to the relationship between actual and perceived income, we note that the substantial degree of actual income change that is observed among older persons in Singapore and Taiwan does

not appear unusual, judging by reports from the United States and the Netherlands. Burkhauser et al. (1999) cite panel data between 1991 and 1993 for these two countries which display considerable income mobility among older persons. For the United States, 28 percent of men age 50–60 reported household size-adjusted income decreases of 20 percent or more in the two-year period, 33 percent had increases of 20 percent or more, and the remainder had incomes in 1993 that decreased or increased less than 20 percent. For the Netherlands, income mobility was less among men of this same age range, with 8 percent reporting decreases of 20 percent or more, 19 percent increases of 20 percent or more, and the remaining 73 percent within plus or minus 20 percent of baseline. Thus, the perception that one sometimes encounters that income tends to be fairly stable in later life appears unfounded.

Tables VIa and VIb examine the relationship between monthly income and perceived adequacy of income at baseline. As might be expected, the percentage of respondents who report just enough or more than enough income for expenses increases quite regularly as actual income increases, and those reporting some level of difficulty declines. The Chi-square statistics associated with these tabulations indicate that these relationships between objective and subjective measures of economic well-being are statistically significant for both countries. However, the level of associations are not very high, with the Pearson correlations between the objective and subjective measures only 0.13 for Singapore and 0.35 for Taiwan. The lack of high correlation between the two measures is consistent with previous studies on this topic, as noted in the introduction.

In Tables VIIa and VIIb we take this comparison one step further by examining the association between change in actual income and change in perceived adequacy of income over time. Again, the literature suggests that the association between these two measures will be moderate to low at best. While the association between the variables is statistically significant and generally in the expected direction for both countries, the correlations between the measures are quite low (0.15 for Singapore and 0.19 for Taiwan). The weakness of this association is clear from the details in Tables VIIa and VIIb. Among Singaporean elderly who experienced an actual increase in income level over time, only 31 percent reported

TABLE VIa

Percentage distribution of perceived adequacy of income by actual income level: Singapore, 1995

Monthly income of R and spouse in 1995[b]	Adequacy level				Total
	Much difficulty	Some difficulty	Just enough	More than enough	
< $500	2.2	9.3	81.0	7.6	100.0
$500–999	1.5	6.8	80.0	11.7	100.0
$1000–1499	2.6	5.1	81.6	10.7	100.0
$1500–1999	0	10.6	78.7	10.6	100.0
$2000+	0	1.4	66.2	32.4	100.0
Total	1.9	7.8	79.9	10.5	100.0

Chi-square = 55.97 (df = 12), $p < 0.001$.

TABLE VIb

Percentage distribution of perceived adequacy of income by actual income level: Taiwan, 1989

Monthly income of R and spouse in 1989[b]	Adequacy level				Total
	Much difficulty	Some difficulty	Just enough	More than enough	
< $3000	15.7	22.3	56.9	5.1	100.0
$3000–4999	4.0	22.3	66.0	7.7	100.0
$5000–9999	5.5	23.5	64.3	6.7	100.0
$10 000–14 999	2.5	16.9	67.9	12.7	100.0
$15 000–19 999	0.6	14.7	70.2	14.4	100.0
$20 000–49 999	0.2	4.2	67.5	28.1	100.0
$50 000+	0.0	2.8	30.6	66.7	100.0
Total	4.9	17.2	64.3	13.6	100.0

Chi-square = 542.75 (df = 18), $p < 0.0000$.

TABLE VIIa

Percentage distribution of change in perceived adequacy of income by change in actual income: Singapore, 1995–1999

Change in income between 1995 and 1999	Change in perceived adequacy			Total
	Better	Same	Worse	
Increase	31.4	53.1	15.2	100.0
Same	21.7	58.7	19.5	100.0
Decrease	16.7	54.2	29.2	100.0
Total	23.8	56.0	20.2	100.0

Chi-square = 46.1 (df = 4), $p < 0.0001$.

TABLE VIIb

Percentage distribution of change in perceived adequacy of income by change in actual income: Taiwan, 1989–1993

Change in income between 1989 and 1993	Change in perceived adequacy			Total
	Better	Same	Worse	
Increase	49.9	43.4	6.6	100.0
Same	37.9	51.3	10.8	100.0
Decrease	30.0	53.2	16.8	100.0
Total	39.1	49.3	11.6	100.0

Chi-square = 72.3 (df = 4), $p < 0.0000$.

an improvement in perceived income adequacy. The majority (53 percent) reported no change in income adequacy and 16 percent reported a worsening of income adequacy. For the group of Singaporean elderly who did not experience any change in income level over time, 59 percent reported no change in perceived adequacy, 22 percent reported an increase in income adequacy, and 20 percent reported a decrease in income adequacy. Even among those elderly for whom actual income declined over time, 17 percent reported an increase in income adequacy and 54 percent reported no change in perceived adequacy.

Similar patterns are found for Taiwan. For those who experienced an increase in actual income, there is slightly higher agreement than was the case for Singapore; one-half of these elderly reported an improvement in income adequacy. Still the remaining half reported either the same level of adequacy (43 percent) or a deterioration in income adequacy (7 percent). A more intriguing pattern is found for those whose incomes remained the same or decreased over the period. Over one-third of elderly in each of these groups reported an improvement in perceived income adequacy, whereas much smaller proportions reported a worsening of income adequacy.

There are several plausible explanations for the low correlations between these measures. A primary explanation is that actual income represents only one aspect of income adequacy – we do not know anything about what happened to either actual or, perhaps more importantly, desired expenditures for respondents over the period. If expenditures fell faster than income, then a decline in income will not necessarily lead to a decline in adequacy. A second explanation is that our measure of change in income may not be very sensitive. There may be important changes occurring within categories that are not detected, whereas for people who are near the border of categories, a change that puts them into an adjacent category may be minor. Another possible reason for the low correlation between changes in actual and perceived income adequacy is the hypothesized "hedonic treadmill" discussed above. If respondents tend to adjust their expectations as income increases or to adapt to declines, we would expect only low levels of associations between changes in actual level and the more subjective expressions of income adequacy. At the same time, we might then expect greater stability in the subjective measures than we have observed in these samples.

One way to summarize the data in this section is to look at several key summary measures. Table VIII presents the correlations for each well-being measure over time and the correlations for their interrelationships. These correlations and the previous analysis highlight several findings relevant to our first two objectives. Perhaps most importantly from the standpoint of understanding the economic well-being of the elderly, both the objective and subjective measures employed are not stable over time when the same individual is

TABLE VIII

Correlations among key measures of economic well-being

	Singapore	Taiwan
Actual income, Time 1 and Time 2	0.47	0.56
Perceived adequacy of income, Time 1 and Time 2	0.13	0.39
Actual income and perceived adequacy, Time 1	0.13	0.35
Actual income and perceived adequacy, Time 2	0.24	0.37
Change of actual income and change in perceived adequacy	0.15	0.19

Note: The correlations shown are Pearson correlation coefficients.

observed four years later. The proportion of respondents who changed categories on each of the measures in the two countries ranged from about half to two-thirds (Tables IV and V).

At the same time the net distributions for each measure over time were quite stable, highlighting the importance of distinguishing gross from net changes in research, interpretation, and policy formation. It may be for example that testing of the hedonic treadmill hypothesis has relied unduly on the stability of net distributions rather than observations of individual change over time.

Lastly, there is only a modest association between the measures of actual income and perceived adequacy. The correlations are somewhat higher for Taiwan than Singapore, but overall they vary only between 0.13 and 0.37 over the two countries and the two time points. The level of association of the change in actual income with the change in perceived adequacy is low in both countries, as often is the case with change measures.

MULTIVARIATE ANALYSIS OF CHANGE IN PERCEIVED INCOME ADEQUACY

To this point the analysis has focused primarily on the association between the objective and subjective measures of economic well-being, and we have seen evidence of a statistically significant, yet fairly weak bivariate association between these two types of

measures. In addition to income, there are a number of other factors that may reflect either additional economic resources or potential expenses during later life. These include basic socio-demographic characteristics (e.g., gender, age, ethnicity, education), as well as statuses and major life transitions that may require larger outflows of income (e.g., independent living, deterioration in health) or lead to a change in economic resources (e.g., widowhood, retirement, change in home ownership). In this final stage of the analysis, our primary objective is to examine whether these characteristics and life transitions influence change in perceived income adequacy net of the effects of actual income.

To address this question we use ordinal logistic regression models to simultaneously estimate the effects of a number of characteristics and changes therein on stability and change in perceptions of income adequacy. An ordinal logistic regression model is a proportional model that can be used for dependent variables with more than two categories which contain an inherent ordering. The model is similar to a bivariate logistic model in that it estimates the log-odds of obtaining one response versus another when collapsing the dependent variable into any two categories (Agresti, 1996).

The ordinal logistic procedure estimates that the probability of

$$Y \geq j = \frac{1}{1 + e^{-\alpha_j - X_i \beta}}$$

where the dependent variable ranges from 0, 1, ..., k, and j = 1, 2, ..., k. The regression produces a series of intercepts and a single regression coefficient for each independent variable. α_j is the intercept corresponding with the j'th category on the dependent variable, X_i is the vector of observations of the independent variable for the i'th observation, and β is the vector of regression parameters.

The dependent variable used in the current analyses is the three-category measure of change in perceived income adequacy shown in Tables Va–b and again in VIIa–b. This variable is coded as follows: 1 = decrease in perceived income adequacy, 2 = no change in perceived income adequacy, and 3 = increase in perceived income adequacy. Given the coding on the dependent variable (i.e., that an increase in value implies a relatively favorable change in perceived adequacy), a positive coefficient associated with a dicho-

tomous independent variable indicates that the group in question (i.e., coded 1 on the dummy variable) experienced a more favorable change in perceived income adequacy on average than their respective counterparts, all other things being equal, and a negative coefficient indicates that the group experienced a less favorable change. Likewise, for continuous independent variables, a positive regression coefficient indicates that an increase in the independent variable is associated with a favorable change in perceived income adequacy and a negative coefficient implies a less favorable change in perceived income adequacy.

In all of the models we control for perceived income adequacy at baseline (i.e., the initial survey period), because the starting point strongly conditions the direction and magnitude of change due to floor and ceiling constraints on these variables. Persons who fall in the lowest category on perceived income adequacy at baseline (code = 4) are not able to decline, and the reverse is true for those in the highest category (code = 1). Hence, as coded, baseline status is positively correlated with change for a given outcome. Although we are not interested in the effects of baseline adequacy from a substantive standpoint, we include this variable in the models as a control. We tested two different forms of baseline adequacy in the models: 1) a set of dummy variables representing the four categories of perceived adequacy, and 2) a continuous variable for perceived adequacy coded from 1 to 4. Because the results under the two coding schemes were consistent, for ease of presentation we opted to treat baseline adequacy as a continuous variable.

The analysis proceeds in two parts. We first estimate a model that includes as predictors only the baseline income and change in income variables (Baseline income is treated as a continuous variable, ranging from 1 = lowest income to 5 = highest income for Singapore, and 1 = lowest income to 7 = highest income for Taiwan). We then estimate a second model that adds age, sex, ethnicity and education, along with sets of dummy variables representing transitions in marital status, health, employment, major source of income, home ownership, and living arrangements. This will allow us to determine whether the sociodemographic and life transition variables exhibit significant effects on change in perceived income adequacy net of the effects of income, and whether as a group

they contribute significantly to the variance explained by the model. Results from these models are presented in Table IX in the form of regression coefficients.

Focusing first on Model 1, we see that both baseline income and change in income are strongly related to change in perceived income adequacy in Singapore and in Taiwan. Those with higher baseline income are more likely to report a favorable change in income adequacy over the subsequent 3–4 year period. Specifically, in the Singapore sample a one-category increase in baseline income is associated with a 0.38 increase in the log-odds of moving up one category on the dependent variable (from decreased adequacy to no change in adequacy, or from no change to increased adequacy). The comparable figure for Taiwan is 0.30. Likewise, those whose income either increased or did not change were more likely than those whose income decreased to report a favorable change in income adequacy. Change in perceived adequacy is also strongly conditioned by baseline adequacy rating, reflecting the floor and ceiling effects described above. Those reporting inadequate income at baseline (high scores on the baseline adequacy measure) are more likely to report a favorable change in adequacy and vice versa. Taken together, these variables explain 27 percent of the variance in perceived income adequacy in Singapore and 17 percent in Taiwan.

As noted above, our primary interest in this analysis is to examine whether other sociodemographic and life transition variables influence change in perceptions regarding adequacy of income. The results for Model 2 suggest that this is indeed the case for many of the factors considered. Focusing first on Singapore, the results indicate that all of the sociodemographic and transitions factors are associated with change in perceived income adequacy, with the exception of transitions in living arrangements and home ownership. Firstly, there is a general pattern with age, whereby persons age 65 or older report more favorable changes in perceived adequacy than those in the youngest age group (note that the coefficient for the 70–74 age group is not statistically significant, however). This finding is somewhat surprising given that the vast majority of persons age 65 or older are no longer working and are therefore not likely to be accumulating a great deal of economic resources. However, the 65+ year olds may also have fewer economic obligations to chil-

TABLE IX

Ordered logistic regression coefficients for socio-demographic characteristics and life transitions predicting change in perceived income adequacy[a]

Covariates	Singapore ($N = 1788$)		Taiwan ($N = 2865$)	
	Model 1	Model 2	Model 1	Model 2
Baseline adequacy	2.44***	2.66***	1.95***	2.14***
Baseline income	0.38***	0.55***	0.30***	0.32***
Change in actual income				
No change (vs. decrease)	0.69***	0.60***	0.61***	0.62***
Increase (vs. decrease)	1.22***	1.36***	1.33***	1.33***
Age 60–64 (vs. 55–59 for Sing.)		0.06		–
Age 65–69 (vs. 55–59 for Sing.)		0.38*		0.09
Age 70–74 (vs. 55–59 for Sing.)		0.28		0.28*
Age 75+ (vs. 55–59 for Sing.)		0.39**		0.15
Male		–0.25**		–0.36***
Malay (vs. Chinese)		–0.21		inap.
Indian (vs. Chinese)		–0.58*		inap.
Mainlander (vs. Taiwanese)		inap.		–0.06
Education				
No formal education		–		–
Primary level		0.05		0.29**
Secondary level or above		0.35*		0.35**
Marital status				
Unmarried at both waves		0.43***		0.24*
Married to unmarried		0.67**		0.40*
Married at both waves[a]		–		–
Health status				
Health remained good		0.52***		0.81***
Health improved		0.94***		0.58***
Health declined or remained poor		–		–
Work status				
Working at both waves[b]		–0.31		–0.05
Working to not working		–0.87***		–0.002
Not working both waves		–		–

TABLE IX

Continued

Covariates	Singapore (N = 1788)		Taiwan (N = 2865)	
	Model 1	Model 2	Model 1	Model 2
Main source of income				
Own source at both waves		0.17		0.12
Children to own source		–0.08		0.26
Children at both waves		–		–
Own source to children		0.48**		–0.10
Living arrangement				
With child at both waves		–		–
With child to without child		0.09		–0.17
Without child to with child		0.02		0.05
Without child at both waves		–0.18		–0.29**
Home ownership				
Owner at both waves		–0.03		0.05
Non-owner to owner		–0.11		0.24
Owner to non-owner		–0.11		–0.06
Non-owner at both waves		–		–
Intercept1	–7.69***	–9.01***		4.40***
Intercept2	–4.57***	–5.72***		7.63***
Pseudo R^2	0.27	0.31	0.17	0.19
Model Chi-square (df)	15.94 (4)	59.43 (28)	940.51 (4)	1055.56 (26)

[a]Dependent variable is coded as follows: 1 = decline; 2 = no change; 3 = improvement.

[b]Includes a small number of cases who were not working at Wave 1 and were working at Wave 2.

dren and they may have adapted their lifestyles to accommodate a lower level of income, and as a result their expenses may be lower than those of their younger counterparts. On the other hand, men report less favorable change in perceived adequacy than women. Again this finding is somewhat surprising given that men tend to have more economic resources than women. However, men are often the primary economic decision makers and, as a result, they may be more knowledgeable about household expenditures and feel more responsible for ensuring that income is sufficient to cover expenditures. Older Indians and to some extent Malays report less

favorable change in income adequacy than their Chinese counterparts, perhaps reflecting the tendency for the minority ethnic groups to be economically disadvantaged relative to the Chinese. Finally, those with secondary or higher education report more favorable change in income adequacy compared to uneducated elderly.

The results pertaining to health and work transitions are as expected. Those whose health either improved or remained good report more favorable changes in perceived income adequacy compared to those whose health deteriorated or remained poor. This likely reflects the greater potential of persons in good health to accumulate or preserve economic resources, or conversely the higher health-related expenses borne by those in poor health. With regard to work transitions, persons who retired during the interval reported less favorable change in income adequacy compared to those who were not working in both waves. This may reflect a decline in income that is not captured fully in our change in income measure, and perhaps also the economic uncertainty that often accompanies the transition into retirement.

More surprising are the results relating to transitions in marital status and main source of income. With regard to marital status, those who were unmarried in both waves and those who were widowed during the interval experienced more favorable change in income adequacy than those who were married in both waves. Married persons may have more expenses compared to unmarried individuals, particularly if married persons have dependent children. Older Singaporeans who shifted from relying on their own sources of income to being primarily supported by children also reported a more favorable change in income adequacy than those who relied on children in both waves. Presumably those who made this shift in major source of income did so because they lacked adequate resources of their own to meet their expenses and felt they were better off once their children stepped in to meet the shortfall.

The effects of baseline adequacy and income coefficients do not change significantly once other factors are entered into Model 2. We see the same positive relationship between baseline adequacy and favourable change in income adequacy overtime. Individuals whose income remained the same or increased were also more likely to report an increase in perceived income adequacy over time.

Turning to the results for Taiwan, we see many of the same patterns. First, as is the case for Singapore, Taiwanese men report less favorable change in income adequacy than women. In addition, persons with higher levels of education (including both primary and secondary), those who were unmarried in either or both waves, and those whose health either remained good or improved all report more favorable change in income adequacy. Finally, the effects of baseline income and change in income are remarkably stable across the models. All of these findings are consistent with the results for Singapore.

There are several differences in the findings for Singapore and Taiwan that are worth noting. First, we find no difference between native Taiwanese and Mainlanders in change in perceived income adequacy net of other factors. This may be because the key differences between the two groups relate to demographic and socioeconomic characteristics (Mainlanders tend to be younger, predominantly male, more educated, in better health, better off financially, and less likely to rely on support from children), all of which are accounted for in the model.

In addition, retirement does not appear to have a negative effect in perceived income adequacy in Taiwan as is the case in Singapore. This suggests that older Taiwanese either had alternate sources of income to fall back on (e.g., from pensions, savings, children) or that they adjusted their expenditures and/or expectations regarding income adequacy to account for the loss of income from work. Also, main source of income is unrelated to change in perceived income adequacy in Taiwan.

A final difference of interest relates to living arrangements. In Singapore, living arrangement is unrelated to change in perceived income adequacy. In Taiwan, in contrast, those who were living alone at both waves reported less favorable change in income adequacy than those coresiding with a child at both waves. This may reflect the higher expenses associated with maintaining an independent residence. Persons who shifted from living with a child to living without a child also experienced less favorable change in income adequacy, but this effect is not statistically significant.

Although many of the sociodemographic and life transition factors are significantly associated with change in perceived income

adequacy, they provide little additional explanatory power to the model over the baseline adequacy and objective income measures (4% for Singapore and 2% for Taiwan). This increase in explained variance is statistically significant for both countries, however, as indicated by the difference in Chi-square statistics between Models 1 and 2.

DISCUSSION

This paper examines changes in the economic status of the elderly in Singapore and Taiwan, over time, and the determinants of these changes. In doing so, we examined (1) the levels and changes in objective and subjective measures of economic well-being, (2) the association between these two types of measures, and (3) whether specific life transitions, such as becoming widowed, a decline in health status, retirement, etc., were correlated with increases or decreases in perceived income adequacy in Singapore and Taiwan.

In general, it appears that older persons in Singapore and Taiwan are doing quite well with respect to economic well-being. Despite what seem to be quite low levels of monthly income (equivalent to $287 U.S. per month in Singapore and $309 U.S. per month in Taiwan), the overwhelming majority of elderly in both countries report that their incomes are adequate to meet their expenses. In 1995, over 90 percent of older Singaporeans reported having no difficulty meeting expenses, with 80 percent reporting that their income is just enough, and 10 percent reporting that they have money left over. There was a considerable amount of shifting in income adequacy at the individual level between 1995 and 1999, with the net result being a slight drop in the percent reporting adequate income in 1999 (to 83 percent). This may be at least in part a result of the economic crisis that hit Singapore in late 1998. Among older Taiwanese, perceived adequacy was also quite high: 78 percent reported having no difficulty meeting expenses in 1989, and this situation appears to have improved between 1989 and 1993 despite a small net decline in actual income over the same period. The different perceptions of the well-being of the older popula-

tion that emerge from the more objective and subjective measures highlights the need for measuring multiple economic dimensions.

In addition, however, the findings suggest that the period of old age, with the various transitions that often accompany it, is not one of economic stability. In fact, both subjective and objective measures of income fluctuate depending on a number of characteristics, such as gender, education level, and ethnicity, and the types of transitions that the elderly face. This has important policy implications, as will be discussed below.

With regard to the relationship between the actual income and perceived adequacy of income, we examined both contemporaneous associations and associations between changes in each measure over time. Our findings on this point show that, although the associations between the objective and subjective measures are statistically significant (as indicated by the p-values associated with the Chi-square statistics and Pearson correlation coefficients), they are actually quite weak. This provides some evidence from a non-Western setting for the "hedonistic treadmill" argument that individuals adjust their expectations as their material conditions change. At the same time, the weak stability of the subjective measures over time points to more fluctuation than the treadmill hypothesis suggests. The weak correlation between the objective and subjective measures also reinforces our earlier point about the multi-dimensionality of economic well-being and the need to collect an appropriate array of information.

With regard to the correlates of change in perceived income adequacy, we find that changes in key demographic characteristics, such as marital status, health, work status, and living arrangements, are significant predictors. The results suggest that being male and having a lower education level are significantly associated with a decrease in perceived income adequacy over time, in both Singapore and Taiwan. In future, these gender differences may become less prominent if gender differentials in employment histories and expectations of living standards during retirement decrease. Women who have ever worked may have higher expectations of living standards in old age therefore reducing the gender differentials that we see in these data. In addition, improvements in education

levels among future cohorts of elderly may result in a decrease of education differentials.

We find that remaining in good health or experiencing an improvement in health status, and being unmarried or recently widowed, are associated with an improvement in perceived income adequacy over time. Increases in health expenses may account for decreases in perceived income adequacy among elderly whose health declined. The finding in relation to widowhood is contrary to the expectation that widowhood is associated with economic hardship, particularly for women. Rather, we find that both recent and longer-term widows were more likely than those who remained married to report improvements in income adequacy. Furthermore, results from gender stratified models (not shown here) indicate that this effect was consistent for both men and women. It may be the case that widowhood is associated with a decrease in expenditures that outweighs whatever reduction in income may be experienced. This issue cannot be addressed in the current study, but is an interesting topic for future research.

We included homeownership in our model to explore the effects of owning assets on changes in perceived income adequacy. We find no effect of this variable on perceived income adequacy in either Singapore or Taiwan. In Singapore, we were particularly interested in whether selling one's home and downgrading to a smaller home might increase perceptions of income adequacy. However, the findings suggest little evidence for this hypotheses.

For both countries, higher baseline income and higher baseline adequacy are associated with increases in perceived income adequacy. The association between increase in actual income and increase in perceived income adequacy is strong and positively significant.

We also find a number of country-specific effects. For example, retirement is significantly associated with a decrease in perceived adequacy among Singaporean elderly, but this effect is not found in Taiwan. Also in Singapore, increases in perceived income adequacy are reported by respondents whose main source of support shifts from own source to children. Among Taiwanese elderly, maintaining an independent residence at both survey waves is associated with a decrease in perceived income adequacy. However transitions

in living arrangements is not associated with perceived income adequacy in either Taiwan or Singapore. It seems likely that the combining and separating of households may have a fairly profound impact on household finances, so the lack of association in this regard is quite striking.

These findings point to several important policy implications. First, the results suggest that major life course transitions in later life, such as the transitions into retirement and poor health, need to be carefully taken into account when trying to understand the economic status of the elderly. In Singapore, the significant association between retirement and a decrease in perceived economic adequacy suggests that retirement income derived from the formal social security system (the Central Provident Fund) may be insufficient to maintain standards of living for the elderly. An evaluation of income needs of the elderly after retirement and enhanced employment opportunities for older persons would help address this issue.

Maintaining family support for the elderly has been a key Singaporean government policy and our results suggest that familial sources of support continue to play a significant role in increasing perceived economic adequacy. Support from family members may be particularly important for this group of Singaporean elderly given their lower education levels and lower coverage under the Central Provident Fund scheme. It remains to be seen whether, in the future, familial support will play such a large role in perceptions of income adequacy among Singaporean elderly.

Our finding that the economic status of the elderly is not static, but fluctuates over time, highlights the need for policies that address the changing needs of the elderly during the period of old age. Policies that cater to an individual's needs at one point in time may not be relevant several years in the future. Policy makers need to be sensitive to the effects of significant life course events on perceived and actual income adequacy. This would allow for specific subgroups of elderly to be targeted, such as the less educated elderly and those in poor health.

NOTES

1. Information on this research project can be obtained at http://www.psc.isr. umich.edu/.
2. We do not take into account the number of persons dependent on the elderly person's income since these data are not available from either survey. Our focus here is on income of the elderly "unit" whether it be an elderly individual or an elderly married couple. We make some attempt to account for potential demands on the respondent's income by controlling for marital status, change in marital status and living arrangements. We do know from the survey data that elderly who provide monetary or material support to others are in the minority in both countries. For example, in the 1989 Taiwan survey, 11% of the elderly respondents (age 60+) reported that they provide money to any other person and 7% reported providing material assistance (clothing, food, etc.). In the 1996 Singapore survey, 28% reported that they provide money to any of their children.
3. The measures of income reflect current money value at each wave in both countries. Ideally we would like to convert the follow up wave income into base-year-value income, but the data do not permit us to do this. As a result, we assume that the cost of living did not change dramatically between the two survey periods in Singapore and Taiwan. However, it is likely that the Asian Economic crisis which began in October 1997 had some effect on the cost of living in both countries, perhaps in a downward direction, and thus on the 1999 income values for Singapore.
4. Index of Dissimilarity (D) is derived as:

$$\frac{\sum_{i=1}^{n} \left| P_{it} - P_{i(t+1)} \right|}{2}$$

where: p_{it} is the percent in the ith category at time t,
$p_{i(t+1)}$ is the percent in the ith category at time t+1, and
n is the total number of categories.

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