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## **Population Aging and Intergenerational Transfers: Introducing Age into National Accounts<sup>1</sup>**

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## Abstract

In all societies intergenerational transfers are large and have an enormous influence on inequality and growth. The development of each generation of youth depends on the resources that productive members of society devote to their health, education, and sustenance. The well-being of the elderly depends on familial support and a variety of social programs. The National Transfer Accounts (NTA) system provides a comprehensive approach to measuring all inter-age transfers at the aggregate level. It encompasses reallocations achieved through capital accumulation and transfers, distinguishing those mediated by public institutions from those relying on private institutions. This paper introduces the methodology and presents preliminary results emphasizing economic support systems in Taiwan and the United States. As the two economies differ in their demographic configuration, their level of development, and their old-age support systems, a comparison of the two will shed light on the economic implications of alternative institutional approaches to population aging.

## Introduction

In all societies intergenerational transfers are large and potentially have an enormous influence on inequality and growth. The development of each generation of youth depends on the resources that productive members of society devote to their health, education, and sustenance. The well-being of the elderly depends on social programs that provide health care and income support and also on familial systems that dominate in many developing countries.

The importance of intergenerational transfers has not gone unnoticed by the research community. During the last two decades there have been important advances in measuring, modeling, and assessing the implications of intergenerational transfers at both the micro and the macro level. A comprehensive macro-level intergenerational transfer framework and accounting system, however, has not been developed. In particular, efforts to model and measure familial transfers at the aggregate level have lagged.

One purpose of this paper is to outline key concepts and methods being used to construct National Transfer Accounts (NTA), an accounting system for measuring intergenerational transfers at the aggregate level in a manner consistent with National Income and Product Accounts. NTA provides estimates of economic flows across age groups that arise primarily because children and the elderly consume more than they produce relying on reallocations from the working ages, either longitudinally or cross-sectionally. When complete NTA accounts will distinguish three forms of these flows: as the accumulation of capital, as transfers, and as credit transactions. Here we consider only two: transfers and asset transactions, combining capital and credit transactions. The accounts distinguish the institutions that mediate the transactions: governments, markets, and families. When complete the NTA accounts will provide estimates with sufficient historical depth to study the evolution of intergenerational transfer systems; the consequences of alternative approaches to age reallocations embodied in public policy with respect to pensions, health care, education and social institutions, e.g., the extended family; and the social, political, and economic implications of population aging.

A second purpose of this paper is to compare the lifecycles and support systems of Taiwan and the United States. The differences between these two countries are particularly interesting because of the relative importance of the familial support systems – strong in Taiwan and weak in the United States. As a general proposition this is well known. Inter-household *inter vivos* intergenerational are modest in both country. Few US elderly live with their adult children. In Taiwan, in contrast, the elderly often live with their children. Although it is not immediately obvious how resources are flowing within households, our conclusion is that intra-household transfers from adult children to their parents are very large and comparable in magnitude to US public transfer programs.

There are other features of the reallocation systems in the US and Taiwan that are explored. We show that income from assets is a very important source of income for the elderly in both countries, but particularly in the US. Asset income also plays an important direct role in Taiwan, but also an indirect role by financing transfers from middle-aged adults to elderly parents.

The support systems for children are very similar in the US and Taiwan. Almost all of the financial resources available to those under the age of 20 consist of transfers. In both countries about two-thirds of all transfers are familial transfers. About one-third of transfers to children are public transfers of which support for public education is particularly important.

## **Background**

Research on intergenerational transfers has laid a solid foundation for constructing the NTA system with the historical depth and cross-national perspective envisioned here. Following on the pioneering work of Samuelson (1958) and Willis (1988), a theoretical transfer framework has been developed by Lee and his collaborators (Lee 1994a; Lee 1994b; Bommier and Lee 2003). The Lee transfer framework has been applied to many different settings but often under a restrictive set of assumptions (steady-state equilibrium and golden-rule growth). At the same time, “generational accounting”, has been used to describe forward-looking public longitudinal data in various countries (Auerbach, Gokhale et al. 1991; Auerbach, Kotlikoff et al. 1999).

Progress in modeling private and familial transfers at the aggregate level has been sporadic, but there have been important advances. The increased availability of surveys and micro-level studies has greatly improved our ability to measure familial transfers and to study why they occur (Lillard and Willis 1997; McGarry and Schoeni 1997; Altonji, Hayashi et al. 2000; Frankenberg, Lillard et al. 2002). Progress has been made in estimating and modeling bequests (Attanasio and Hoynes 2000; Poterba 2000; Poterba and Weisbenner 2001; Brown and Weisbenner 2002). There have been important advances in modeling the allocation of resources within households, a step critical to estimating intra-household inter-generational transfers (Lazear and Michael 1988; Bourguignon and Chiappori 1992; Deaton 1997; Bourguignon 1999). Innovative surveys provide new opportunities for analyzing intergenerational transfers (Chu 2000; Hermalin 2002). Building on the available theoretical framework and the extensive research on familial transfers, and utilizing the extensive household survey data that are available in many countries, makes estimating familial intergenerational transfers and a complete set of national transfer accounts a feasible option.

Constructing estimates of familial transfers is important because they play such a key role around the world. Familial transfers are almost universally the primary source of resources for children. Familial transfers to the elderly can have a profound effect on intergenerational equity (Mason and Miller 2000). Outside the industrialized countries of the West, most elderly co-reside with their adult children. In Japan and South Korea, the extent of co-residence has declined very rapidly in the last few decades, but roughly half of the elderly still currently live with children. In other Asian countries the great majority of elderly live with their children, and there is a surprising degree of stability in these arrangements. The situation in Latin America is less thoroughly documented but data for six Latin American countries show that living in multi-generation households has been the norm there as well (Kinsella 1990).

Extended living arrangements are less important in the West, but in some European countries the elderly are not living exclusively by themselves nor with their spouse. In Greece and Spain roughly 40% of those 65 and older were living in households with three or more persons. At the other extreme, only about 5% of the elderly of Sweden and Denmark lived in households with two or more persons. France is in an intermediate position, with 16% of the elderly living in households with two or more persons (Kinsella and Velkoff 2001). In the US, the great majority of elderly do not live with their children, but this has not always been the case. The percentage 65 and older living with children in the US declined from 64% in 1880 to 49% in 1940, 30% in 1960, and 18% in 1980 (Ruggles 1994).

A more comprehensive approach to intergenerational transfers is critical to resolving many important issues. The system of intergenerational transfers bears directly on current research on the demographic dividend. Increases in the share of the working-age population, particularly in East Asia, have contributed to rapid growth in per capita income (Kelley and Schmidt 1995; Bloom and Williamson 1998; Kelley and Schmidt 2001; Mason 2001; Bloom, Canning et al. 2002). The demographic dividend may dissipate, however, as the share of the elderly population rises and the share of the working-age population declines. If capital accumulation rather than familial or public transfer programs dominate the age reallocation systems for supporting the elderly, population aging may yield a second demographic dividend in the form of higher rates of saving and capital intensification of the economy (Mason and Lee 2004). If aging is accompanied by a shift away from transfer systems, either public or private, the effects on capital accumulation may be especially pronounced (Lee, Mason et al. 2003).

A second area of research concern an important factual issue – whether or not there are substantial generational inequities and whether or not they are changing over time (Preston 1984; Becker and Murphy 1988). One approach models intergenerational transfers as the outcome of political processes in which the magnitude and direction of transfers reflect the political power of the elderly relative to other demographic groups (Preston 1984; Razin, Sadka et al. 2002). An alternative approach argues that intergenerational transfers are the outcome of cooperative private and social implicit contracts that are guided by altruism and efficiency concerns (Barro 1974; Becker and Tomes 1976; Becker and Murphy 1988). A third area of research addresses the effects of intergenerational transfers on saving, economic growth, and equity (Feldstein 1974; Munnell 1974; Feldstein 1996; Gale 1998). These and similar studies inform efforts to evaluate existing transfer systems, to guide the development of new systems, and to

anticipate the implications of alternative reform proposals. Social security reform, in particular, has been the subject of an enormous amount of research (Feldstein 1998; Feldstein and Samwick 2001; Krueger and Kubler 2002).

Operating in the background and providing the impetus for research and reform efforts is population aging. Low levels of fertility and continued improvements in life expectancy in many countries are leading to rapid population aging. The advanced industrialized countries – Japan, European countries, and the US – are further along in the aging process. Many less developed countries, however, will soon have much older populations. Three aspects of population aging in the developing world are noteworthy. First, many countries are likely to experience population aging at a relatively low level of development. Not only will they have relatively low levels of income, but they may also have relatively under-developed political and financial institutions that have played a prominent role in aging industrial societies. Second, familial support systems are more important in many developing societies than in the West. Third, we have found that population aging causes a large increase in the demand for wealth relative to GDP. Population aging interacts with the transfer systems either to generate a major increase in the proportional implicit debt and transfer burden on the working population, or to generate a large deepening of the capital stock. Third World countries are at a crucial juncture, and depending on their policy choices, population aging will have one or the other effect. Hence, understanding how familial support systems operate, how they interact with alternative transfer systems, and how they are affected by population aging, is critical.

## **National Transfer Accounts: An Overview**

The purpose of National Transfer Accounts is to measure at the aggregate level the reallocations across age of economic resources. These reallocations occur because at some ages, individuals consume more than they produce. At other ages individuals produce more than they consume. The reallocation system documents the means by which the young and the old, those with lifecycle deficits, draw on the surplus resources generated during the prime working ages.

Reallocations are substantial relative to the economy. Consider the situation in Taiwan as represented in Figure 1a, which shows estimates of aggregate consumption and labor income by age in 1998. Total net reallocations from those in the prime working ages to those 24 and younger amounted to 36% of total labor income. Total net reallocations from the working ages in an upward direction, to those who were 56 or older, amounted to 11% of total labor income. Thus, nearly half of all labor income was reallocated from the working ages to the dependent ages.<sup>2</sup>

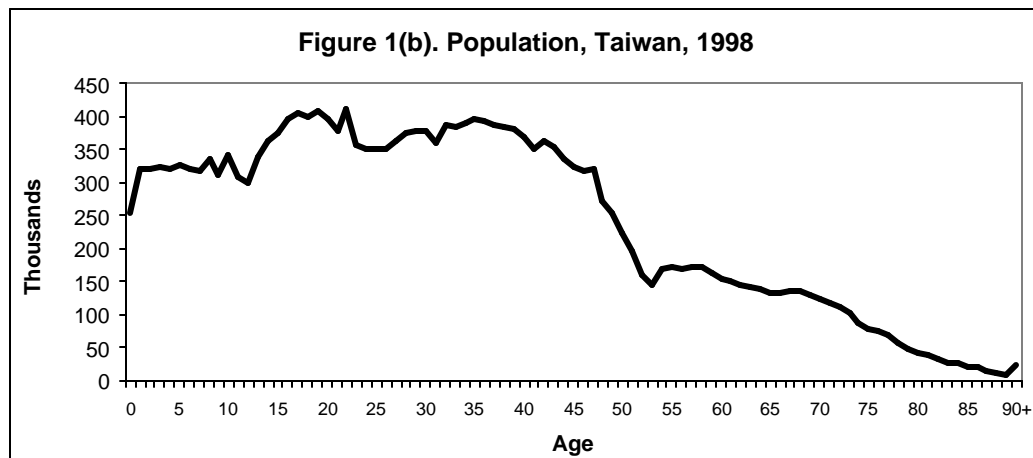
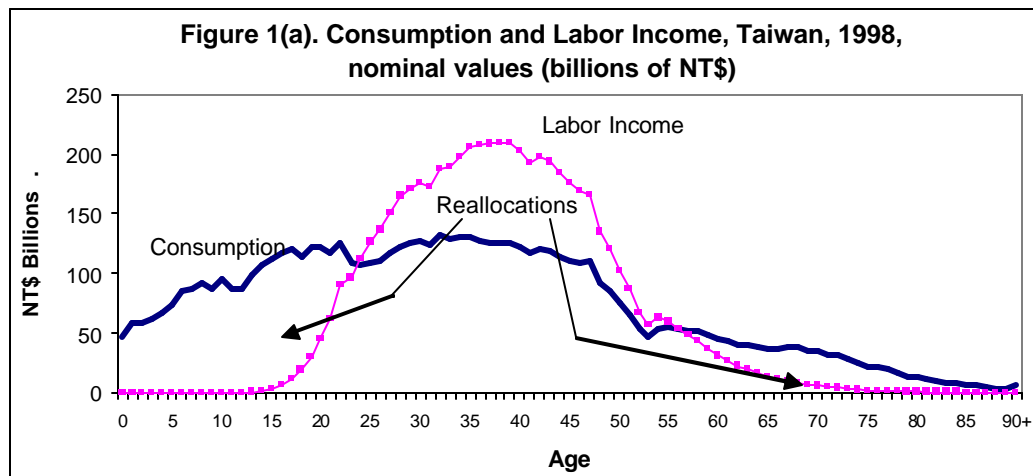
The age profiles of aggregate consumption and labor income reflect the age distribution of the population (Figure 1b) and per capita variation in labor income and consumption (Figure 1c). In 1998, Taiwan's population was younger than the US population. Thirty-one percent were under the age of 20 and eight percent were 65 or older. Hence, the reallocations reflect that age structure – with more going to children and less going to seniors than in the US. As will be seen below, Taiwan also has per capita profiles that are distinctive as compared with the US. The consumption profile is

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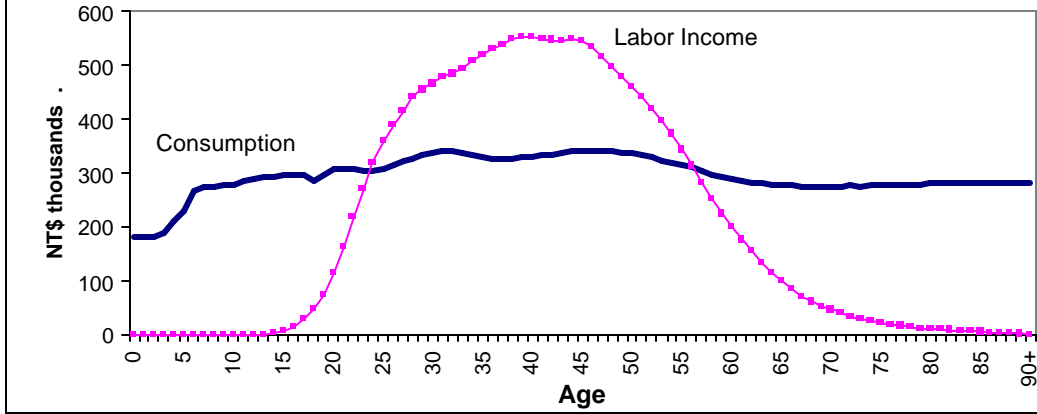
<sup>2</sup> Calculation details are discussed below.

very flat as compared with the US. Labor income reaches a peak at a relatively young age as compared with the US.

Reallocation systems, which bridge the gaps between consumption and labor income, vary along two important dimensions: the governing or mediating institution and the economic form of the reallocation (Lee 1994a; 1994b). The public sector reallocates resources relying on social mandates embodied in law and regulation and implemented by local, regional, and national governments. Education, public pensions, and health care programs are important examples of public reallocation programs. Private sector reallocations are governed by voluntary contracts, social conventions, etc. that are mediated by households, families, charitable organizations, and other private institutions. Important examples of private reallocations are private saving and credit transactions, and familial support to children and the elderly (Table 1).



**Figure 1(c). Per Capita Consumption and Labor Income, Taiwan, 1998**



In this paper we distinguish two economic forms that reallocations can take: asset reallocations and transfers.

**Asset Reallocations:** Assets include capital and property and credit. From the perspective of the individual (or household), these forms are close substitutes as reallocation mechanisms. They can be accumulated and dis-accumulated. They yield income. They are used primarily to reallocate resources from the present to the future. From the perspective of the macro-economy, there are important differences between capital, property, and credit.

**Capital Reallocations:** Transactions that increase future consumption by foregoing current consumption; lead to change in the stock of reproducible capital; include storage; allows only reallocation from younger ages to older ages. Individuals can accumulate capital when young and dispose of it when old.

<b>Table 1. A Classification of NTA Reallocations.</b>			
	<b>Asset Reallocations</b>		<b>Transfers</b>
	<b>Capital Reallocations</b>	<b>Property and Credit Reallocations</b>	
<b>Public</b>	Public infrastructure	Public debt Student loan programs Money	Public education Public health care Unfunded pension plans
<b>Private</b>	Housing Consumer durables Factories Farms Inventories	Consumer credit Insurance Rental of land	Familial support of children and parents Bequests Charitable contributions

Source: Adapted from Lee 1994.

**Property and Credit Reallocations:** Transactions that involve the trade of an economic resource in the current period in return for compensation in one or more future periods. Inter-temporal exchange leads to no net increase in aggregate wealth. An increase in the wealth of one group is always balanced by the decline in wealth of another age group. Two forms of inter-temporal exchange are distinguished. First, credit transactions allow one group of individuals to reduce current consumption and another group of individuals to increase current consumption. The use of credit cards to finance consumption by individuals and the use of public debt, including the printing of money, to finance government programs are examples. Credit transactions can be used to reallocate resources in either direction. Second, the exchange of land and other non-reproducible assets allows one group of individuals to increase or reduce consumption by acquiring or disposing of a non-reproducible asset. The exchange of land and other non-reproducible assets can only be used to reallocate resources from younger to older



ages – individuals can acquire non-reproducible assets when young and dispose of them when old.

**Transfers:** Reallocations from one group to another which involve no explicit *quid pro quo*.<sup>3</sup> Transfers can flow in either direction – from older to younger (parents and taxpayers to children) or from younger to older (adult children and taxpayers to the elderly).

The core of the NTA system consists of two accounts: the flow account and the wealth account. The flow account measures inflows and outflows between age groups that occur during the accounting period in question. The wealth account measures the value of the stock associated with each flow. This paper emphasizes the flow account and the wealth account will not be discussed further.

## The National Transfer Flow Account

The *National Transfer Flow Account* measures inter-age flows for a prescribed accounting period, typically a calendar or fiscal year. The NT Flow Account is governed by an accounting identity, which must be satisfied for any individual, household, age group, or economy, stating that for any period inflows are balanced by outflows<sup>4</sup>:

$$y^l + r(K + M) + \mathbf{t}_g^+ + \mathbf{t}_f^+ = C + I_K + I_M + \mathbf{t}_g^- + \mathbf{t}_f^- \quad (1)$$

Inflows consist of labor income ( $y^l$ ), the returns to capital ( $rK$ ) and land and credit ( $rM$ ) and transfer inflows from the public sector ( $\mathbf{t}_g^+$ ) and the private sector ( $\mathbf{t}_f^+$ ). Outflows consist of consumption ( $C$ ), investment in capital ( $I_K$ ) or credit and land ( $I_M$ ), and transfer outflows to the government ( $\mathbf{t}_g^-$ ) and the private sector ( $\mathbf{t}_f^-$ ). In this paper, we do not distinguish capital from land and credit. Designating assets by  $A = K + M$  and saving by  $S = I_K + I_M$ , substituting into equation (1), and rearranging terms provides the key elements of the NT Flow Account. The difference between consumption and production, termed the *lifecycle deficit*, must be matched by *age reallocations* consisting of *asset reallocations* and *transfers*:

$$\underbrace{C - y^l}_{\text{Lifecycle deficit}} = \underbrace{rA - S}_{\text{Asset reallocations}} + \underbrace{\mathbf{t}_g^+ - \mathbf{t}_g^-}_{\text{Netpublictransfers}} + \underbrace{\mathbf{t}_f^+ - \mathbf{t}_f^-}_{\text{Netprivatetransfers}} \quad (2)$$

$\underbrace{\hspace{15em}}_{\text{Agereallocations}}$

<sup>3</sup> Of course important models of familial transfers emphasize implicit contracts, e.g., risk sharing (Kotlikoff and Spivak 1981) or the exchange of money for time (Cox 1987).

<sup>4</sup> Equations (1) and (2) are written under the assumption that the rate of return to capital and credit and land are identical, but this assumption can be relaxed.

Asset reallocations can be further divided into *capital reallocation* and *credit and land reallocations*. Transfers are further sub-divided into *net public transfers* and *net private transfers*, consisting of bequests and *inter vivos* transfers.

The National Transfer Flow Account for Taiwan in 1998 is shown in summary form as Table 2 to provide a concrete point of reference of further discussion. The totals in the table are based on National Income and Product Account values and thereby insure consistency with NIPA. Briefly, consumption is equal to Total Final Consumption Expenditure.<sup>5</sup> Private and public consumption correspond to Private Final Consumption Expenditure and Government Final Consumption Expenditure. Labor income has no exact NIPA counterpart, because the income of unincorporated firms includes returns to labor and to capital. We allocate two-thirds of this income to labor and one-third to capital, to obtain estimates of labor income and income on assets. Saving is defined as national saving net of depreciation. In a closed economy, net transfers and each of its components would sum to zero. In an open economy, international financial flows lead to net transfer totals that differ from zero. In Taiwan, for example, private transfers to abroad exceeded those received from abroad by NT\$31 billion. More detailed information about adjustments are available from the authors.

**Table 2. National Transfer Flow Account, Taiwan, 1998, Aggregate Values, Nominal, (NT\$ billion)**

	Total	Domestic by age				
		0-19	20-29	30-49	50-64	65+
<b>Lifecycle Deficit</b>	<b>832</b>	<b>1,704</b>	<b>7</b>	<b>-1,329</b>	<b>25</b>	<b>424</b>
Consumption	6,570	1,775	1,163	2,376	757	499
Private	5,290	1,244	951	2,040	640	414
Public	1,280	531	212	335	117	85
Less: Labor income	5,738	70	1,156	3,704	732	75
<b>Lifecycle Reallocations</b>	<b>832</b>	<b>1,704</b>	<b>7</b>	<b>-1,329</b>	<b>25</b>	<b>424</b>
Asset Reallocations	861	-5	-26	500	180	212
Net Asset Income	2,456	2	176	1,566	535	176
Less: Net Saving	1,595	8	202	1,067	354	-36
Transfers	-29	1,710	33	-1,828	-155	212
Public	2	611	51	-673	-103	116
Private	-31	1,099	-18	-1,155	-52	95
<i>Inter Vivos</i> Transfers	-31	1,099	-93	-1,241	39	166
Bequests	0	0	75	86	-91	-70

<sup>5</sup> Private final consumption is adjusted to exclude indirect taxes that are assumed to be paid indirectly by consumers. The adjustment is small - 0.8% of the private consumption.

All aggregates are estimated by age using methods that are described briefly below. The values are cumulated into broad age groups to facilitate presentation and discussion, but the underlying values were estimated by single-year of age with an upper age group of 90+ as shown above in Figure 1.

The upper panel of the NT Flow Account reports, the *lifecycle deficit*, the total gap between labor production and consumption. The lower panel reports the total reallocation and its components. As shown in the budget identity, equation (2), the lifecycle deficit and reallocations must be equal, in total and for each age group.

### *Lifecycle Deficit*

The lifecycle deficit is large and positive for children and the elderly, small and positive for young adults and those aged 50-64, and large and negative only for adults aged 30-49. Taiwan's life-cycle deficit for children was NT\$1.7 trillion, 96% of their total consumption, and its lifecycle deficit for the elderly was NT\$0.4 trillion, 85% of their total consumption. Thirty to forty-nine-year-olds had a lifecycle surplus of \$NT1.3 trillion. Note that the surplus was less than the total lifecycle deficit of the dependent age groups leading to an overall deficit of NT\$832 billion or 13% of total consumption. If the economy were on a golden-rule steady-state growth path, the total lifecycle deficit would have been zero. A positive total lifecycle deficit occurs when consumption exceeds total labor income.

The lifecycle deficit is a residual – calculated as the difference between consumption and labor income. All consumption – both public and private – is included in the NT Flow Account and all is allocated to individuals. Private consumption includes the rental value of owner occupied housing. Public consumption includes goods and services that are consumed directly by individuals, e.g., health care and education. Public consumption also includes the value of all other government consumption such as spending on public safety, foreign diplomacy, public infrastructure, etc. All consumption is allocated to individuals based on their age using allocation rules that vary with the type of good being allocated and the availability of data. Consider, first, public consumption. The consumption of public education is allocated to students using age- and education-level-specific enrollment rates assuming that the cost per student varies across education level (primary, secondary, tertiary) but does not vary by age within the educational level. Age profiles of public health care by program (Medicare, Medicaid, and Other public programs) are based on age estimates of the U.S. National Health Accounts for 1999 (Keehan, Lazenby et al. 2004). Control totals for these programs are taken from U.S. NIPA tables for 2000.<sup>67</sup> Other public consumption is allocated on a per capita basis.

Private consumption is estimated using household surveys which report the number and age of household members and total household consumption, but not the household consumption of individual members. Allocation rules are used to distribute consumption to each household member. Per capita age profiles of consumption are then

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<sup>6</sup> <http://www.bea.doc.gov/bea/dn/nipaweb/index.asp>.

<sup>7</sup> In Taiwan, public consumption of health is very small. A National Health Insurance program has been instituted that provides partial reimbursement of the cost of services of private health providers. This is classified as private health expenditure.

computed by averaging across the consumption estimates for all individuals of a given age in the survey.<sup>8</sup>

Age profiles of labor income are based on individual-level data on compensation and entrepreneurial income. We assume that two-thirds of entrepreneurial income is a return to labor and one-third is a return to capital.

### *Lifecycle Reallocations: Assets*

Two broad economic forms by which resources are reallocated across age groups are presented in the lower panel of the NT Flow Account: asset reallocations and net transfers. Asset reallocation is the response to lifecycle problems captured in the classic lifecycle saving model. Suppose individuals relied exclusively on lifecycle saving to reallocate resources from the working years to old-age. Sometime during the working years, individuals would begin to save. This would generate a net outflow in the NT Flow Account. As the individual accumulate assets, he or she would begin to receive asset income, an inflow. The net inflow from asset reallocations is measured by asset income less saving ( $rA - S$ ). For a classic lifecycle saver, net asset reallocations would be negative during lifecycle surplus years. In his or her retirement years, the lifecycle saver generates inflows, positive net asset reallocations, sufficient to cover the lifecycle deficit. To do so the individual would rely on asset income ( $rA$ ) and dis-saving ( $S < 0$ ).<sup>9</sup>

The NTA framework does not assume that individuals behave as lifecycle consumers, and other forms of behavior are captured by asset reallocations. For example, if young individuals go into debt to finance their education, this would be reflected as a positive asset reallocation during school years – as individuals incurred debt beyond necessary debt repayment – and as a negative asset reallocation later in life as ex-students repaid their student loans. Alternatively, parents might accumulate assets in anticipation of the high costs of college. This would be reflected as a negative asset reallocation for parents with pre-college age children and positive asset reallocations for parents with college-age children. If asset accumulation is driven by a bequest motive, we would see negative asset reallocations during working years and positive reallocations at the time of death.

Although the role of assets as a reallocation tool is most easily explained by describing the behavior of an individual or a cohort over time, the NT Flow Account reports the flows for a particular year for a cross-section of age groups. Asset reallocations at all ages may respond to short-term economic fluctuations. The asset income and dis-accumulation of capital at older ages is not tied in any direct way to the accumulation at younger ages as observed in the cross-section.

Assets are not allocated among members of the household. Rather, we assume that all assets are held by a single individual – the household head. Thus, results presented here are consistent with other analyses that report assets or saving by the age of the head. The results also suffer from the same difficulties of interpretation, particularly

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<sup>8</sup> We have experimented with various methods for estimating the equivalence scales. We have found the Engels' and Rothbarth's methods to yield problematic results. At present, we first use regression methods to allocate expenditures on education and health care by age within households, and then allocate the remainder of household expenditures using equivalence scales. For the US children under the age of 15 have a scale of 0.5 while all others have a value of 1.0. In Taiwan, we use values based on Engel's estimates that result in slightly higher values for children and slightly lower values for the elderly.

<sup>9</sup> A pure lifecycle saver may not dis-save in the initial years of retirement.

in societies where multi-generation extended households are common. The influence on our results of gender bias in the choice of head will depend on the age difference between husbands and wives. The mean age of age-profiles tied to the age of the head will be greater if husbands are older than wives and more likely to be chosen as the head of the household.

In Taiwan, estimates of age profiles of net asset income are based on household-level data on entrepreneurial income, dividends, rent, and interest income and expense. For the US, estimates are based on age profiles of assets. In both countries, saving is estimated as a residual.

#### *Lifecycle Reallocations: Transfers*

The second form of reallocations is transfers. A transfer as measured by the NTA system is a transaction that transfers a good, service, or cash from an individual belonging to one age group to an individual belonging to another age group with no expectation of compensation or an explicit *quid pro quo* in any form. Transfers received are called inflows ( $\mathbf{t}^+(a)$ ), transfer payments are called outflows ( $\mathbf{t}^-(a)$ ), and net transfers are the difference between the two ( $\mathbf{t}(a) = \mathbf{t}^+(a) - \mathbf{t}^-(a)$ ). Public transfers ( $\mathbf{t}_g(a)$ ) are mediated by governments, which collect taxes from members of one set of age groups ( $\mathbf{t}_g^-(a)$ ) and make transfers to members of other age groups ( $\mathbf{t}_g^+(a)$ ) (these two sets of age groups may well overlap). Private transfers are mediated by the family and non-profit institutions serving households (NPISHs). Net private transfers are given by

$$\mathbf{t}_f(a) = \mathbf{t}_f^+(a) - \mathbf{t}_f^-(a).$$

Public transfer inflows can be in the form of cash or in-kind. Cash public transfer inflows are typically targeted and the associated inflows often vary substantially with age. Welfare programs provide cash benefits to children and/or mothers. Unemployment benefits target those in the working ages. Pension benefits target the elderly.

The age pattern of the outflows depends on the mechanisms by which the programs are financed – the age variation of the economic resource being taxed and the age variation in the rate of taxation. The economic resource being taxed depends on the incidence of the tax. Our approach is to follow the methods employed in generational accounting (GA). With a few exceptions, GA assumes that the incidence of the tax falls on the entity that pays the tax: payroll taxes are paid by workers, sales tax by consumers, property tax by owners of property, and so forth (Auerbach and Kotlikoff 1999).

Private transfers largely consist of familial transfers. In virtually all societies familial transfers are the dominant reallocation system through which children are supported. As noted above, neither capital nor land reallocations can be used to transfer resources in a downward direction, i.e., from the working ages to the childhood ages. Credit plays a limited role for legal and institutional reasons. A few instances can be identified where supporting children is a community or a public responsibility rather than a familial responsibility. Examples include some African societies, the *kibbutz* in Israel, and limited experiments with the collectivization of child care in some Communist economies. But even where familial systems are primarily responsible for support children, public transfers can be substantial. In many countries, the public sector plays an important role in education. Also, many low fertility countries have adopted or are

considering policies that increase the importance of the public reallocation system vis-à-vis the familial system. These include family allowances, subsidization of child care, tax benefits, etc. Children are also the beneficiaries of a broad set of public goods and services that accrue to members of society at large.

Two forms of private transfers are distinguished in Table 2 above and the results discussed below. *Inter vivos* transfers consist of inter-household transfer (transfers between two existing households) and intra-household transfers (transfers between individuals who belong to the same household). The second form, *Capital transfers*, come in several varieties: bequests and capital transfers associated with household transitions (fusion, fission, generational transitions in leadership). The final category is labeled *bequests* in Table 2 and will frequently be referred to as bequests in the text.

#### *Inter-household Familial Transfers*

Measuring inter-household transfers is a relatively straight-forward empirical task that relies directly on survey data from income and expenditure surveys or more specialized surveys of transfer behavior. Income and expenditure surveys typically report both gifts received and made so that outflows and inflows can be calculated directly from the survey.

The most serious technical difficulty that arises is that transfers received may be seriously under-reported in household surveys. Often reported transfers made exceed reported transfers received. Part of the difference can be explained by remittances to and from abroad, but it is generally believed that differences due to reporting error can be substantial. According to one recent estimate, US households reported giving \$64 billion in 1997. They reported receiving \$47 billion annually, on average, between 1993 and mid-1998 (Brown and Weisbenner 2002). In Taiwan the differences are smaller. In 1998 transfers received were NT\$1.9 billion while transfers given were NT\$ 2.1 billion.

In a closed economy, aggregate outflows and inflows will be equal and should be adjusted to insure aggregate consistency. In an open economy, outflows and inflows will no longer be equal. A further technical difficulty arises if inflows include capital transfers that arise from bequests. Transfers made by households that no longer exist at the time of survey are not captured as outflows but will be captured as inflows. NT Flow Accounts are estimated based on the assumption that all inter-household transfers are between heads of households. With few exceptions, income and expenditure surveys do not provide information about transfers to and from individuals within households. One exception is the Taiwan FIES that reports inter-household transfer inflows to individuals and to the collective household. In 1998, for example, 65.6% of the inflows were reported as to the household, 20.5% to the head, 1.0% to the spouse of the head, and only 1.9% to other household members.

#### *Intra-household Familial Transfers*

As discussed above, all assets are held by the household head. Likewise, all saving and dis-saving is carried out by the household head. Household members who are not the household head allocate their income, net of taxes and public transfers, to two ends: consumption and intra-household transfer. Thus, net intra-household transfers for non-heads are given by:

$$\mathbf{t}_{-h}^{fr}(i, j) = c_{-h}(i, j) - [y_{-h}^l(i, j) + \mathbf{t}_{-h}^g(i, j)] \quad (3)$$

where  $\mathbf{t}_{\sim h}^{fr}(i, j)$  is the net private (superscript  $f$ ) intra-household (superscript  $r$ ) transfer received by non-head household member  $i$  in household  $j$ ,  $c_{\sim h}(i, j)$  is the consumption of that household member, and  $y_{\sim h}^l(i, j) + \mathbf{t}_{\sim h}^g(i, j)$  is net disposable income of the household members, i.e., labor income plus net public transfers. Again note that by assumption non-head household members receive neither non-labor income nor inter-household transfers. Their only sources of income are labor income and public transfers.

Intra-household transfers must sum to zero for each household  $j$ . Using the index  $i=1$  to designate the household head, net transfers to the household head must equal:

$$\begin{aligned} \mathbf{t}_h^{fr}(1, j) &= -\sum_{i=2}^{N_j} \mathbf{t}_{\sim h}^{fr}(i, j) \\ &= \sum_{i=2}^{N_j} \{[y_{\sim h}^l(i, j) + \mathbf{t}_{\sim h}^g(i, j)] - c_{\sim h}(i, j)\} \end{aligned} \quad (4)$$

where  $N_j$  is the number of household members in household  $j$ .

Estimates of inflows and outflows can be constructed by aggregating positive values (inflows) and negative values (outflows) from household survey data, i.e.,

$$\begin{aligned} \mathbf{t}^{fr+}(i, j) &= \mathbf{t}^{fr}(i, j)(\mathbf{t}^{fr}(i, j) \geq 0) \\ \mathbf{t}^{fr-}(i, j) &= -\mathbf{t}^{fr}(i, j)(\mathbf{t}^{fr}(i, j) < 0) \end{aligned} \quad (5)$$

where  $(\mathbf{t}^{fr}(i, j) \geq 0)$  and  $(\mathbf{t}^{fr}(i, j) < 0)$  take values of 1 when true and zero otherwise.

This is a narrow definition of inflows and outflows as compared with the measures constructed for public transfer accounts and for inter-household transfers. In these cases, direct measures of outflows and inflows are both available. For intra-household transfers, only net transfers are available for each individual. The calculations of gross inflows and outflows would be equivalent under either method only if no household member both receives and makes transfers during the same period. This assumption would be entirely unrealistic for public transfers, but is less implausible for a small self-contained unit such as a household.

### *Bequests*

*Bequests* capture all capital transfers that occur because of headship transitions. If a household head dies, if two independent households merge, or if the headship designation within an existing household shifts from one member to another, a capital transfer is generated. The estimates of bequests presented in Table 2 are very preliminary and intended only to suggest magnitudes.

The estimates were obtained in the following way. First, the rate of return to assets was assumed to be independent of age. Thus, wealth by age has the same age distribution as asset income by age. Second, the survival rate of heads is assumed to be independent of age. If wealthy heads have a higher survival rate, a likely possibility, the mean age of bequests would be greater than those reported in Table 2. Preliminary analysis suggests that the covariance between wealth and survival in Taiwan is relatively

small, however. Third, we assumed that all capital transfers were to direct descendants, assumed to be 30 years younger than the household head. Thirty years is the mean generation length in Taiwan. If there is a parity bias in bequests, i.e., if older children receive a larger share of bequests, the inflow would be to older individuals on average than assumed here. Given the low fertility and decline in parity bias in Taiwan this is not likely to have a substantial effect. The use of a single age 30, rather than a distribution, also has an effect on the distribution of bequest inflows. Subsequent versions of this paper will deal with these details and not serious technical difficulties are anticipated.

## **Estimation and Data Sources**

NT Flow Accounts are estimated relying on a variety of sources of information. National Income and Product Accounts are used to construct aggregate controls on public and private consumption, labor income (compensation of employees plus a portion of household entrepreneurial income), saving, asset income, public and private transfers, and its components.

Aggregates are allocated across age groups relying on a variety of data sources with extensive use made of administrative records and nationally representative income and expenditure surveys. For Taiwan, we make extensive use of the 1998 Family Income and Expenditure Survey of Taiwan (DGBAS various). For the US, we make extensive use of the Current Population Survey (1998,1999, and 2000), the Consumer Expenditure Survey (1998,1999,2000), the Survey of Consumer Finances (1998 and 2001), and the US National Health Accounts (1999).

## **Preliminary Results**

The results presented in the remainder of the paper are snapshots – National Transfer Accounts for a single year in Taiwan (1998) and the United States (2000). The full value of the accounts will be realized only when we have constructed estimates for many years. That work is underway, but the estimates will not be available for some time. In the absence of these more extensive data, we cannot track cohorts over time for example. The inability to do so limits the extent to which we can explain the cross-sectional patterns that we observe. In particular, we often can only speculate about the extent to which the results reflect distinctive features of the years for which the accounts were constructed, possibly substantial cohort effects, or the effects of age. Before discussing the results, it is worthwhile to point out some of the key features of Taiwan and the US that may bear on the results.

First, the fiscal crisis struck East Asia beginning in 1997 and Taiwan's economic growth was atypically slow in 1998. The crisis in Taiwan was much less severe than in many other East Asian countries, however. The Year 2000 was an interesting year in the US. The stock market peaked in 2000 and the economy began to slow after an extended period of strong economic growth.

Second, the current demographic situation in Taiwan and the US are similar important respects. The total fertility rate is much lower in Taiwan than in the US. Life expectancy is about 1.5-2 years higher in the US than Taiwan. Taiwan's population is younger with 8.6 percent of its population aged 65 or older in 2000. A potentially important difference between Taiwan and the US is that Taiwan's demography has changed so substantially during the post-World War II era. The TFR was much higher



and life expectancy at birth was much lower in Taiwan than in the US in the 1950s. These differences may bear in important ways on the behavior of those who are now in their 60s and 70s. Migration patterns are also different between the two countries. The US, of course, has had relatively high rates of net immigration during recent decades. Taiwan has not. On the other hand, Taiwan experienced a large influx of young adults – heavily male – from the Chinese mainland in 1949/50.

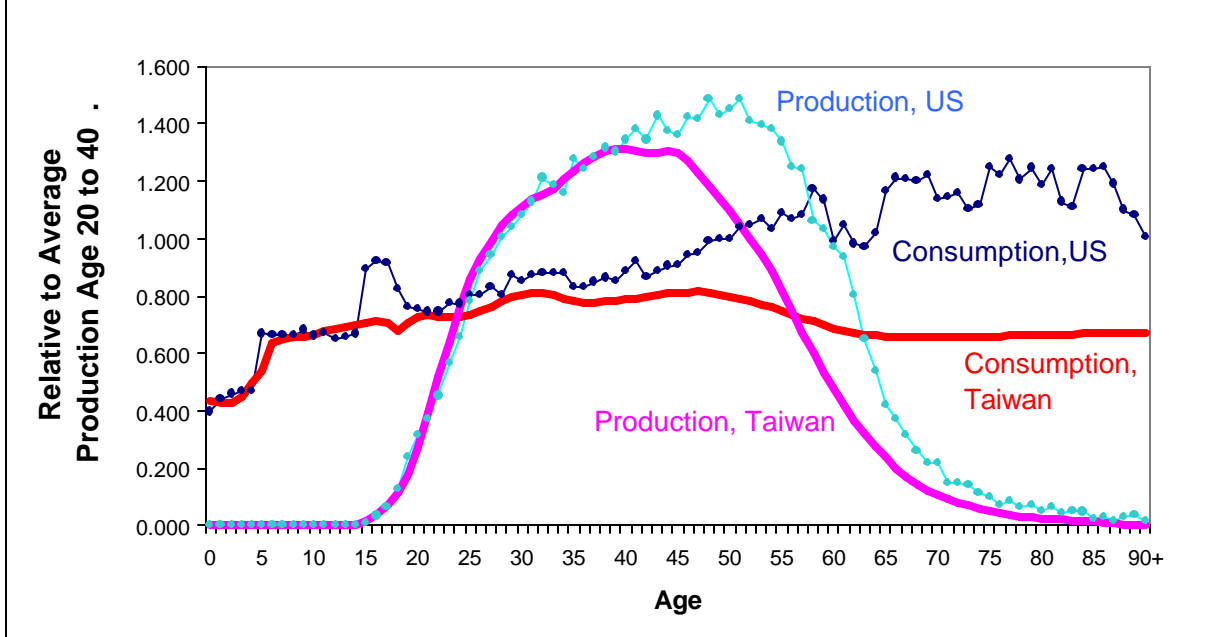
Third, the economies of Taiwan and the US are very different. Taiwan is a middle income country with a per capita GDP of a little less than \$12,600 in 2001. In the US, per capita GDP was \$35,700 in 2001. But in 1960, real GNP per capita was only \$1000 in Taiwan (in 2001 prices) as compared with over \$14,000 in the US. Between 1960 and 2001, Taiwan's real rate of growth of per capita GNP has exceeded 6 percent per annum! This implies extraordinary differences between the lifetime earnings of successive generations. Given a mean generation length of 30 years and an annual growth rate of 6 percent, per capita income increases by six-fold each generation.

### *The Lifecycle Deficit*

The individual lifecycles in Taiwan and the United States are broadly similar, but with some important differences (Figure 2). In both settings, children and the elderly consume substantially more than they produce. In Taiwan, young adults begin to produce as much as they consume at age 22; in the US at age 24. In Taiwan, adults no longer produce as much as they consume at age 56; in the US at age 57. The span of years during which there is a lifecycle surplus is surprisingly short in both countries – 34 years in Taiwan and 33 years in the US.

The shape of the production (labor income) age profiles for Taiwan and the US are strikingly similar until adults reach their early 40s. To facilitate comparison of the US and Taiwan the profiles in Figure 2 have been scaled by dividing by the simple average of per capita production from ages 20-40. Both the level and slope of the age-profiles are sensitive to the particular scaling factor chosen. However, the percentage change in labor income associated with an additional year of age is unaffected by scaling. In the late teens and early 20s, labor income grows somewhat faster in Taiwan, while between the early 20s and early 40s, labor income growth somewhat faster in the US. Between the mid-40s and late 50s, however, the income profiles diverge by as much as 5 percent per single year of age. The gap between the US and Taiwan persists into the older ages. The differences in per capita labor income reflect differences in labor force participation – a particularly rapid drop in participation rates with age in Taiwan – due entirely to differences in female participation rates.

**Figure 2. Lifecycle of Production and Consumption, Per Capita, US 2000 and Taiwan 1998**



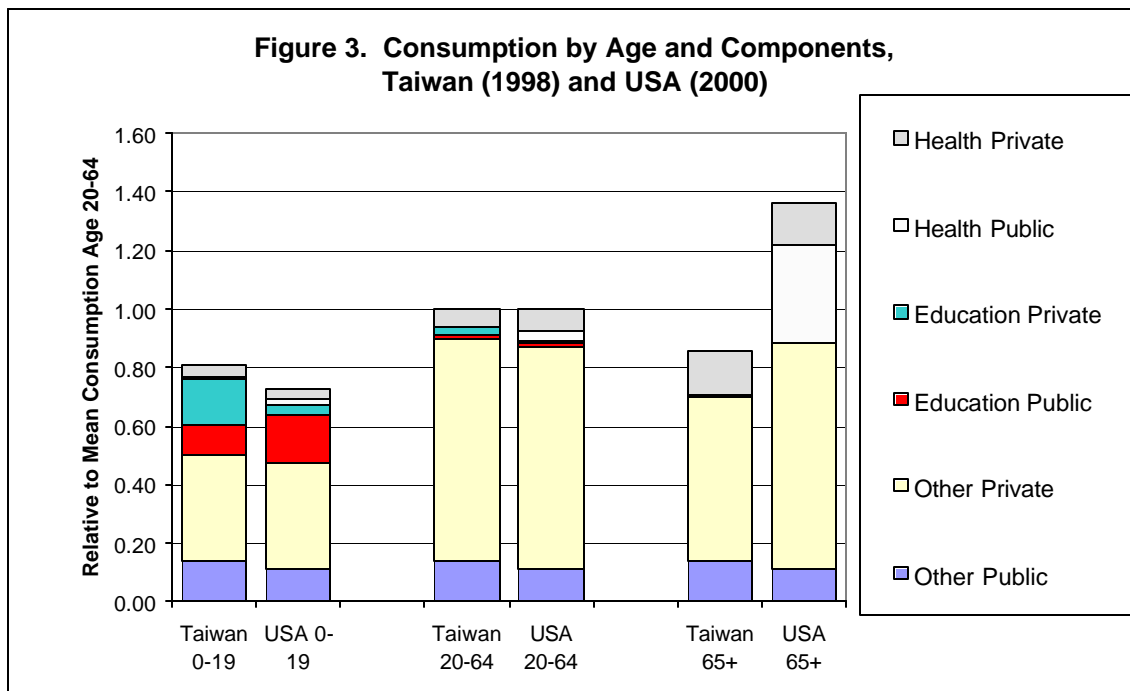
There are important similarities in the consumption patterns at young ages in Taiwan and the US. Consumption by children *relative to consumption by adults in their twenties and thirties* is similar in Taiwan and the US. In both countries consumption by young children is substantially less than consumption by older children and prime age adults. In both settings, consumption by children increases in a large and discrete fashion as children enter school. In the US, another jump in consumption is evident for children in their late teens. This occurs, in part, because for the consumer equivalence scale used to allocate consumption in the US is assumed to be 0.5 for children aged 0-14 and 1.0 for those who are older than 15. The jump at age 15 reflects the shift in the equivalence scale from 0.5 to 1.0. The subsequent decline is associated with the decline in public spending on education as children depart high school. In Taiwan, the equivalence scale is based on Engel's method and does not have a sharp discontinuity at age 15.

The most striking difference between consumption in the US and in Taiwan is the much steeper consumption profile in the US that becomes particularly apparent starting in the early 40s. In contrast, the Taiwan consumption profile is relatively flat. Per capita consumption by those 65 and older was 136 percent in the US and 86 percent in Taiwan of per capita consumption of those 20-64. A substantial part of the difference can be attributed to the consumption of health (Figure 3). If we consider just non-health consumption, the elderly and non-elderly adults in the US had virtually identical consumption while Taiwan elderly had non-health consumption equal to about 75% of the non-health consumption of adults between the ages of 20 and 64. Thus, even controlling for health consumption, US elderly were consuming at a much high rate relative to non-elderly adults than were elderly in Taiwan.

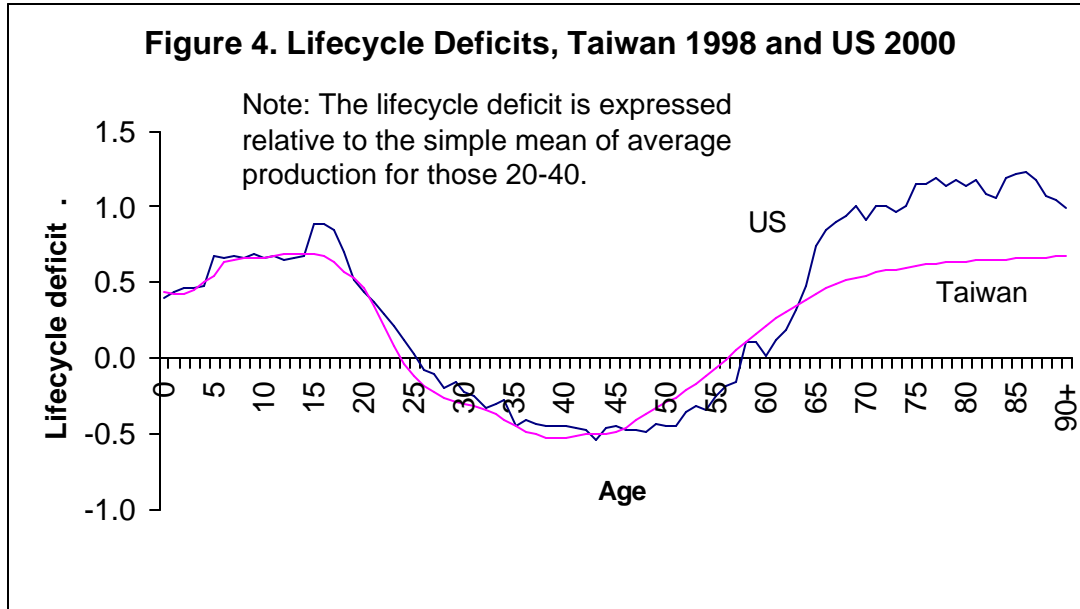
The differences in consumption are most pronounced for the elderly, but they are not confined to the elderly. In Taiwan, the average consumption by those 50-64 was 91%

of the average consumption of those 20-49 while in the US the figure was 122%. This difference had nothing/little to do with health consumption.

Why health consumption increased so much more steeply with age in the US than in Taiwan and why non-health consumption increased so steeply with age in the US but declined in Taiwan are interesting questions about which we can only speculate at this point. One possibility is that the lower consumption among older ages in Taiwan is a response to their lower relative current labor income. Another possibility is that the lower consumption of the elderly is a response to their relatively low lifetime labor income. Perhaps institution differences are playing a role with US consumption patterns reflected by the greater reliance on public transfer programs and Taiwan's greater reliance on familial transfer programs.



Earlier in this section we noted the similarities in the lifecycle deficits in Taiwan. Indeed, the lifecycle deficits (Figure 4) are closer than their constituent elements – consumption and labor income. Taiwan's surplus is greater for young working age adults, those under the age of 40; the US surplus is greater for older working age adults, those in their late 40s and early to mid-50s. The most striking different between the two series is the substantially large lifecycle deficit for US elderly. Given the age distribution of the population, the lifecycle reallocation system of the US shifts a larger share of resources to older than does the Taiwan reallocation system. That the US population is older than is Taiwan population only serves to reinforce this feature of the US reallocation system.



### *The Reallocation System*

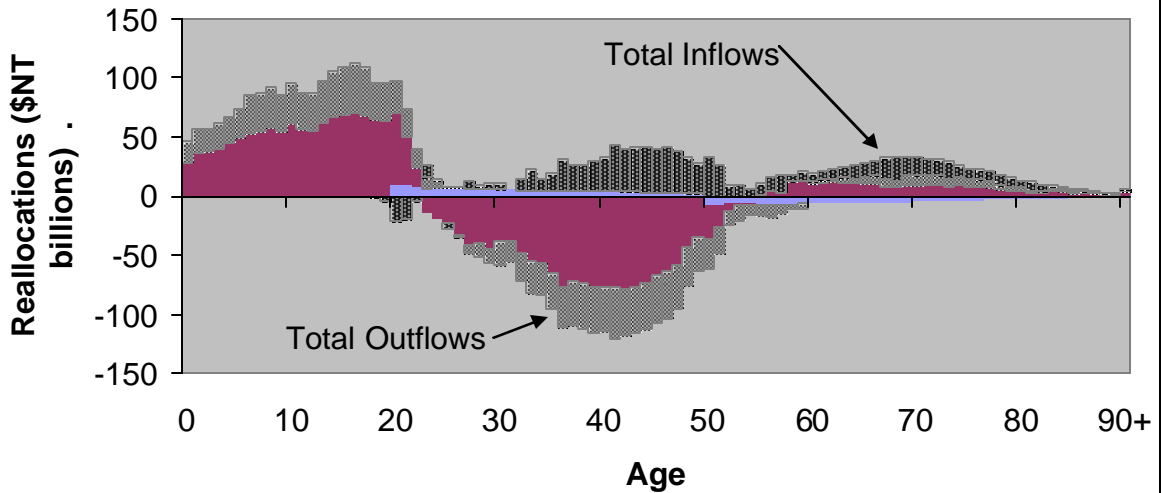
The broad features of the reallocation system are presented in Figure 5 for Taiwan in 1998 and in Figure 6 for the US in 2000. Panel A reports the aggregate flows to and from each age group. Panel B reports the per capita flows. Four economic forms used to reallocate resources are distinguished: asset reallocations, public transfers, private transfers, and bequests. Negative values represent outflows and positive values represent inflows. The values are “stacked” in the figures. For example, teenagers in Taiwan received net transfers of about \$NT 100 billion of which about one-third was public and two-thirds was private. At many ages there are simultaneously inflows from one system and outflows from another system. In both the US and Taiwan, asset reallocations are producing inflows to most working ages while public and private transfers are producing outflows at the same ages. The outflows less the inflows equal the lifecycle deficits for Taiwan and the US.

The reallocation systems that support children are quite similar in Taiwan and the US. In both Taiwan and the US, transfers dominate the reallocation system for children, with total transfers slightly exceeding total reallocations. Familial transfers are particularly important. Private, intra-household transfers accounted for 64 percent of all transfers in Taiwan and 62 percent in the US.<sup>10</sup> The importance of familial transfers should not come as any great surprise. We know that asset reallocations are used infrequently to support the consumption of children. Of asset reallocations, only credit can be used to support consumption by children. Creditors have limited recourse if children default on their debt, limiting the extent to which children can borrow. Thus, transfers dominate the child reallocation system in both Taiwan and the US – and no doubt elsewhere.

<sup>10</sup> Dependent children do not receive inter-household transfers in the accounting system by assumption.

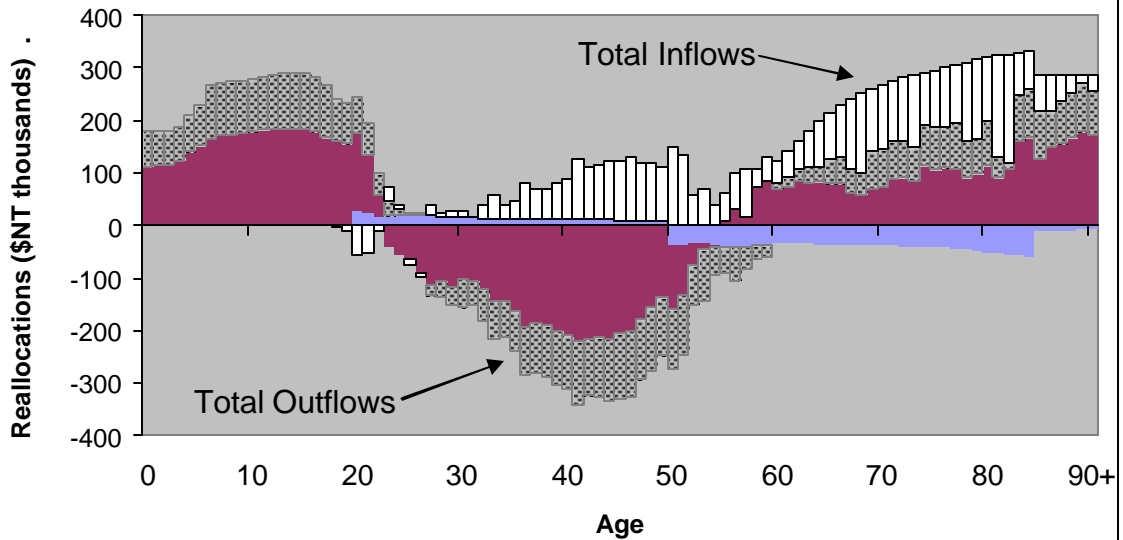
**Figure 5a. Components of Age Reallocations, Aggregate Values, Taiwan, 1998**

■ Bequests ■ Inter Vivos Transfers ■ Public Transfers ■ Asset Reallocation

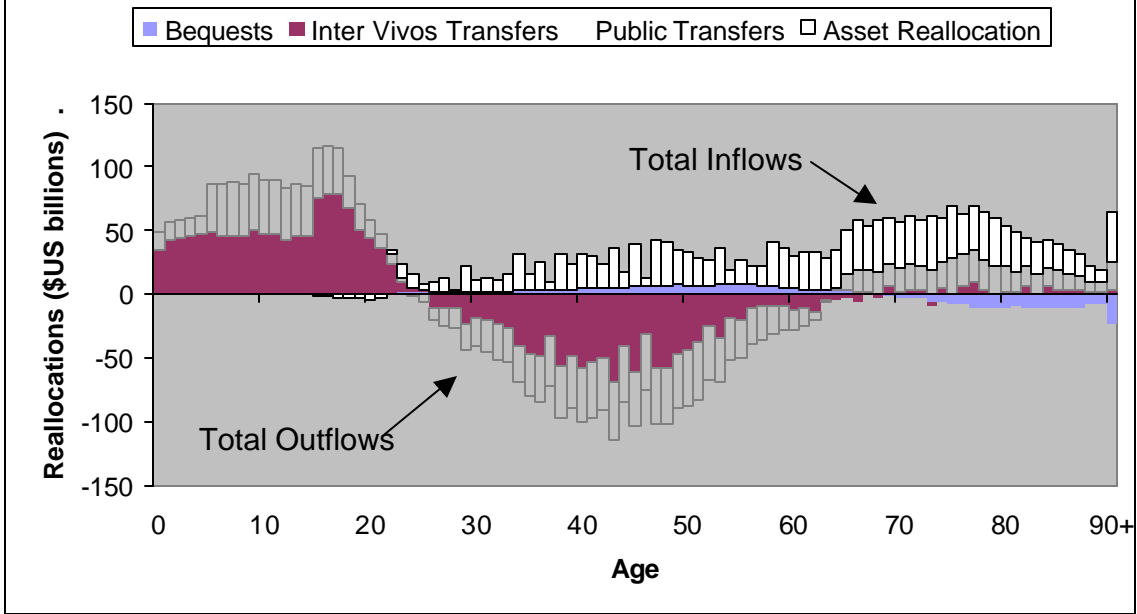


**Figure 5b. Components of Reallocations, Means Values, Taiwan, 1998**

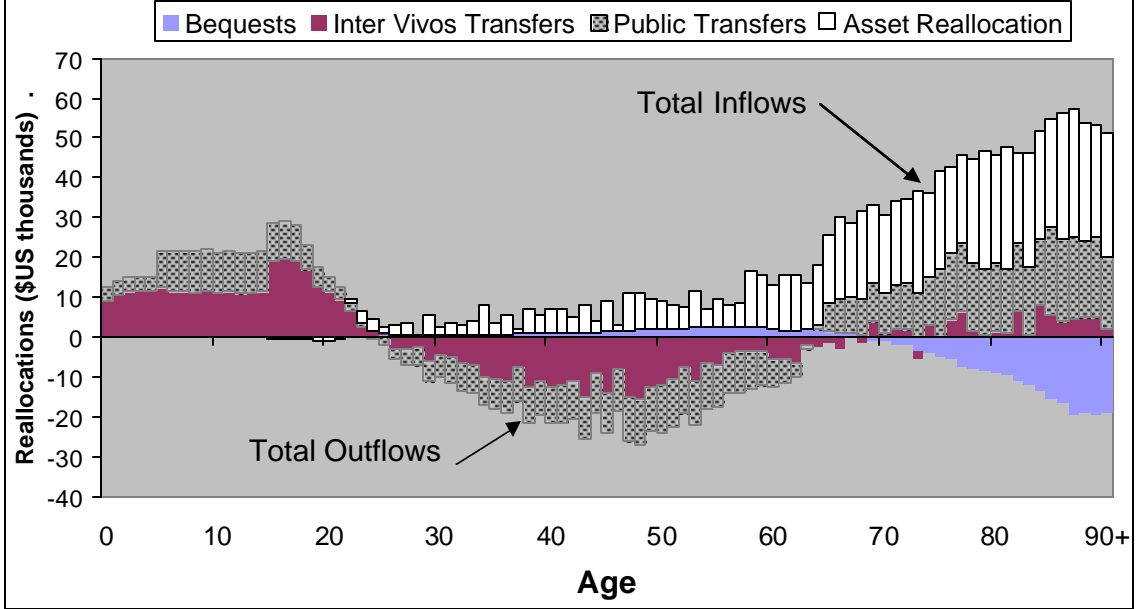
■ Bequests ■ Inter Vivos Transfers ■ Public Transfers □ Asset Reallocation



**Figure 6a. Components of Age Reallocations, Aggregate Values, US, 2000**



**Figure 6b. Components of Age Reallocations, Means Values, US, 2000**



Public transfers to children are also quite substantial. In Taiwan, 36 percent of all transfers were public transfers as compared with 38 percent in the US. As can be seen in Figure 3 above a significant portion of these transfers is public education spending. Of roughly equal importance is children's *pro rata* share of pure public goods and other goods that cannot be allocated to specific individuals.

In Taiwan and the US, the old age reallocation systems are very different than the child reallocation systems. The elderly rely both on asset reallocations and transfers to generate inflows. The elderly can in principle generate asset reallocation inflows in two ways: first, by earning asset income on their accumulated wealth and, second, by dis-saving or liquidating their assets. There are many ways in which this can be accomplished. The elderly can sell off financial assets or a family business or farm, take out a reverse mortgage on a home, or sell their home and rent or buy a less expensive residence.

For US elderly asset reallocations are very important constituting 71 percent of lifecycle reallocations. Of this total, 53.7% of total reallocations was net asset income and 17.4% was dis-saving. At first glance this seems to provide strong support for the lifecycle saving hypothesis and runs contrary to previous empirical research that US elderly do not dis-save. The dis-saving figures include the declines in assets that occur due to bequests. In the US, this amounted to 16.8% of the 17.4% asset reallocations due to dis-saving. Dis-saving by surviving elderly was only 0.6% of total reallocations. Thus, our estimates imply that the elderly did not support themselves by dis-saving. They did, however, rely heavily on the income generated by assets accumulated during their working years.

In Taiwan, asset reallocations were also important but less so than in the US. Asset reallocations were 50.1% of total reallocations; asset income amounted to 50.5% and dis-saving amounted to -0.4%, i.e., assets held by the elderly increased by a small amount in 1998. Because the assets of the elderly were reduced by bequests, the assets of those who survived to the end of the year increased substantially. We estimate bequests for Taiwan to be 16.6 percent of total reallocations – a figure very similar to the US figure. Thus, considering only surviving elderly asset reallocations were close to one-third rather than one-half of total lifecycle reallocations.

Transfers were important components of the reallocations systems for the elderly in both countries but, again, a clear picture requires careful attention to the role of bequests. In the US, public transfers are particularly important. If we ignore bequests, public transfers constituted 40.6% and private transfers 5.0% of total reallocations to the elderly. Transfers are almost as important as asset reallocations and public transfers dominate. Private transfers to the elderly are small in the US. Note, however, that private transfers are greater than one would think based solely on inter-household transfers even in the US. Once bequests are taken into account, however, we see that the direction of the private transfer is from the old to the young rather than the reverse. Bequests were more than 3 times private transfers to the elderly in 2000.

In Taiwan, public transfers were less important than in the US but private transfers far more than compensated for the lower level of public transfers. Public transfers were 27.4% of total lifecycle reallocations for the elderly; private transfers – again excluding bequests – were 39.1% of lifecycle reallocations. Combined transfers were about two-thirds of lifecycle reallocations with private transfers playing a

particularly important role. Of private transfers, intra-household familial transfers were far the more important; intra-household familial transfers were relatively modest. Unlike the US, private transfers are still in an upward direction – from adult children to elderly parents – even after taking bequests into consideration.

In important respects the reallocations for those with lifecycle surpluses are just the counterpart for the reallocations for children and elderly as just described. This is true by definition for transfers because inflows and outflows must match, ignoring the relatively modest amounts of international flows. The large public transfer inflows to US elderly must be matched by large public transfer outflows from those in the working ages. Likewise, the large private transfer inflows to Taiwan elderly must be matched by large private transfer outflows from those in the working ages. Exactly which working ages experience the public sector outflows depends on the tax systems, their incidence, and the age distribution of the economic resources being taxed. Exactly which working ages experience the private sector outflows depends to a great extent on the co-residence patterns that in turn govern intra-household transfers.

Unlike transfers, asset reallocations need not balance.<sup>11</sup> In both Taiwan and the US, total asset income substantially exceeded total saving. As can be seen in Figures 5 and 6 asset reallocations are positive at most adult ages, not just at old age. In Taiwan, we see some negative asset reallocations at young adult ages, but these are small. We see even less negative asset reallocations for the US.

This is a puzzling pattern and not what we would expect to see if workers are accumulating pension assets. Suppose workers contributed a fixed percentage of their income to a pension fund during their working years and any interest generated by the fund was allowed to accumulate within the fund – a normal practice. Saving by the workers would exceed interest income by the portion of labor income that was contributed to the fund each year. Asset reallocations would be negative during the working years and would turn positive only after retirement. Even under very general conditions, as cohorts begin to accumulate wealth saving must exceed asset income. Judging from the substantial asset income of older cohorts, it is clear that they have accumulated a substantial amount of wealth during their lifetimes. The key question is “Why is saving so low among working adults?”

First, these are cross-sectional data and not longitudinal data. There may be particular features of the years in question – 1998 in Taiwan and 2000 in the US – that led to high consumption and low saving during the working ages. The financial crisis hit East Asia beginning in 1997. Taiwan was influenced less than many other East Asian countries, but economic growth did slow in 1998. The US experienced an enormous run-up in the stock market that peaked in 2000. Housing prices also increased very substantially in the US. Perhaps working-age Americans responded to the significant increases in their real wealth by increasing their consumption and reducing their saving.<sup>12</sup>

Second, the cross-sectional patterns may reflect longer run trends. In Taiwan, saving rates declined substantially between the late 1980s and the late 1990s. The US has experienced a long-run secular decline in saving rates over the last three to four decades. It may be that in both countries asset reallocations are becoming less important than they

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<sup>11</sup> In golden-rule steady-state growth all asset income is saved and total net asset reallocations are equal to zero.

<sup>12</sup> Net saving rates increased during the 1990s in the US, but whether this is true at all ages is unknown.



were in the past. Hence, we observe relatively little saving at young, but relatively large asset reallocation inflows at older ages.

A third and final point to consider is that the asset reallocations are serving a purpose other than the accumulation of pension wealth as envisioned in the lifecycle saving model. We think it is plausibly the case in Taiwan where asset reallocation inflows are substantial for people in their 40s and early 50s. At these ages people in Taiwan are doubly burdened by dependent children and dependent elderly. This is reflected in the very substantial *inter vivos* transfers at these ages. In a sense, lifecycle saving is indirectly financing the consumption of the elderly by financing transfers from middle-aged adults to their elderly parents.

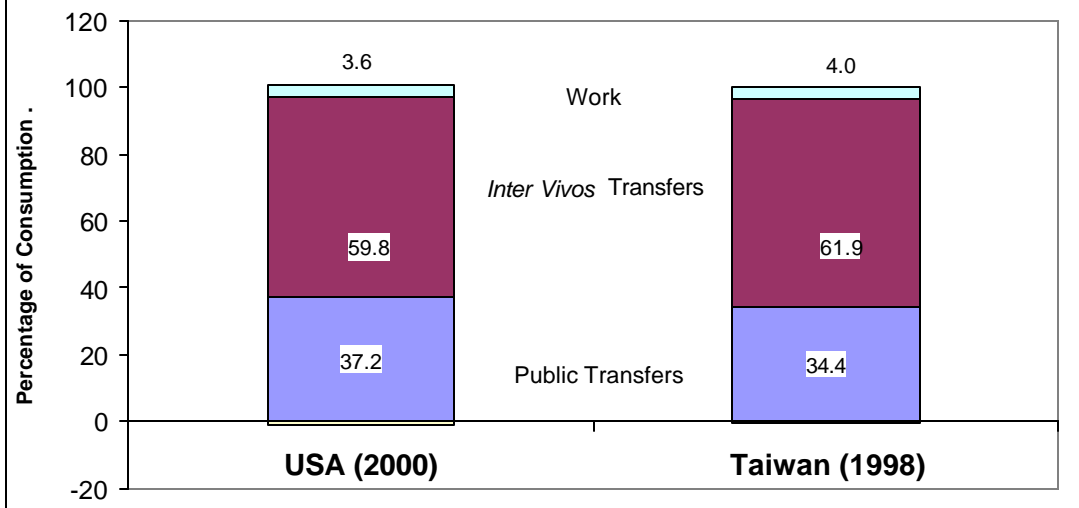
### *Sources of Support*

Sources of income are a standard and useful descriptive measure in reports on the economics of aging. The NTA system yields a more complete measure of the sources of support for the dependent populations that includes familial, intra-household transfers and dis-saving. In Figures 7 and 8 we compare the sources of support, i.e., the methods by which consumption were financed, in Taiwan and the US.

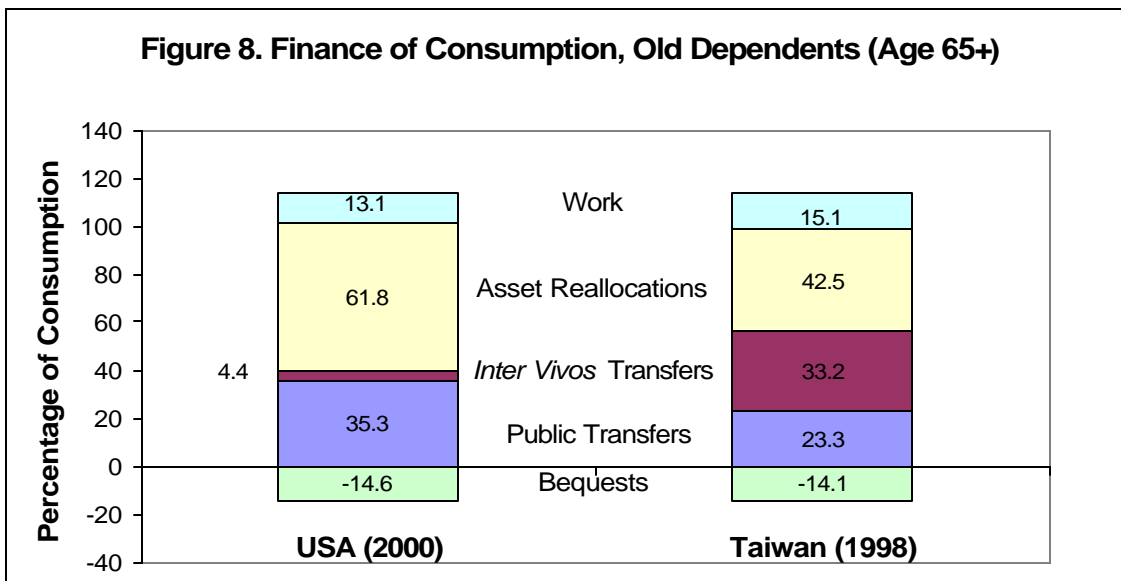
The methods by which the consumption of dependent children, defined as those under the age of 20, are financed are very similar in Taiwan and the US. In both countries about 3-4% is from the earnings of children. The remainder consists of transfers – close to 60% consists of private, familial transfers. The remainder – about one-third – consist of public transfers.

The finance of consumption by the elderly is very different in Taiwan and the US. Work plays a similar role in both countries – contributing about 15% of consumption. Asset reallocations and public transfers are more important in the US. Private, familial transfers are more important in Taiwan. The greater importance of public transfers in the US and private transfers in Taiwan are consistent with what relatively casual observers might expect. The greater importance of asset reallocations in the US would come as a surprise perhaps to many.

**Figure 7. Finance of Consumption, Young Dependents (Age 0-19)**



**Figure 8. Finance of Consumption, Old Dependents (Age 65+)**



## Conclusions

The reallocation of resources across age groups is an important feature of any economy yet it goes largely unmeasured at the aggregate level. The objective of the research described here is to rectify that situation. By doing so we should increase our understanding of generational differences in the command over resources, the institutional mechanisms by which resources are redistributed across generations, and how population aging is likely to influence economic performance.

The research reported here is in an early stage, however. The estimates are preliminary and many of the methodologies are still being refined. Moreover, there are a number of difficult issues that cannot be addressed in an entirely satisfactory way given the data and analytic techniques that are currently available. None the less, we believe that the development of the National Transfer Account system will prove useful in the same way that National Income and Product Accounts are useful despite the flaws. The value will be enhanced in particular as estimates for additional years allow us to follow cohorts over their lifecycles.

The results reported here provide information about support systems that has not been previously available. We provide detailed information about the asset accumulation process and how it relates to variation in lifecycle needs. In both countries asset income is important to those who are currently retired, but dis-saving is not. In Taiwan asset income indirectly supports the elderly by financing transfers from middle-aged adults to elderly parents. Somewhat surprisingly the accumulation of assets by working age adults is modest in both countries. Why this is so and whether it is a persistent or transitory feature is a question that cannot be answered with a single year of data.

One of the most important objectives of this research is to quantify both public and private transfers in a way that allows comparison and analysis. We find that private, familial transfers from adult children to their elderly parents are very important in Taiwan – similar in magnitude to public support to the elderly in the US. Familial transfers are almost entirely intra-household transfers.

Public transfers are also important in Taiwan and, although not documented here, known to be growing. Further analysis will hopefully shed light on whether or not the growth of public transfers has served to crowd out private transfers or whether the elderly have gained in terms of consumption by being able to rely on a mix of assets, public programs, and familial transfers.

One of the most striking differences between Taiwan and the US is the age pattern of consumption. In Taiwan, consumption appears to vary little by age. In the US, however, consumption by the elderly is very high. A large portion of the extra consumption – but by no means all – is due to high consumption of health care goods and services. This will clearly have important implications for how population aging will influence the economies of Taiwan and the United States.

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