



Introducing the National Transfer Accounts:
Estimating the Life-Cycle Deficit and
Measuring Economic Flows across Age Groups

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**Introducing the National Transfer Accounts (NTA):
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Abstract

Age is a meaningful dimension in the measurement of economic activity that has not been dealt with in a comprehensive manner at the aggregate level. This is especially important when one seeks to understand how the changing demographic structure has influenced some features of the macroeconomy. In particular, the interaction of population age structure and life cycle behavior, as influenced by culture (familial and public support systems) and individual choice, has implications on general savings and investment levels and the prospects for future growth.

In an initial step towards informing this discussion, we use the National Transfer Accounts (NTA) framework, an accounting system that intends to allocate labor earnings and consumption over the population age distribution in a manner consistent with the National Income Accounts (NIA), to estimate economic flows across age groups that arise primarily because children and the elderly consume more than they produce, relying on reallocations from those in the working ages. Intra- and inter-household transfers are given emphasis, and age profiles of public and private expenditures on health and education are tracked. In addition, various suggestions for further research and application are sketched.

1. Introduction

Previous research have argued that population demographics has a bearing on economic growth. Why this is so, and how demographics is changing economic activity.

The Philippines has a relatively young population.

The National Transfer Accounts (NTA) seeks to incorporate the age dimension in the measurement of economic activity. Simply put, it seeks to attribute income and expenditures to age groups using household surveys for profiling and aggregates from the National Income Accounts (NIA) as control totals.

This will discuss preliminary work on the NTA for the Philippines using 1999 data. This is part of Phase 1 of the Philippine Institute for Development Studies (PIDS)-Nihon University Population Research Institute (NUPRI) project, with support from the United Nations Population Fund (UNFPA).

Ronald Lee of University of California-Berkeley and Andrew Mason of the University of Hawaii at Manoa are the lead investigators of the umbrella project.

2. The NTA Framework

In this discussion, we borrow heavily from Mason (2005) and Mason, Lee, et al. (2005). To describe briefly, the NTA is a system for measuring economic flows across age groups. The flows arise because in any society members who produce more than they consume support dependent members. Societies take different approaches to reallocating resources from surplus to deficit ages. One method relies on capital markets. Individuals accumulate capital during working ages and when they are older and no longer productive support their consumption by relying on capital income (interests, dividends, interest income, profits etc.) and by liquidating assets. The other method relies on transfers from those at surplus ages to those at deficit ages. Some of these transfers are mediated by the public sector while many are private transfers of which familial transfers are most important.

The core of the NTA system consists of two accounts: the flow account (also called the lifecycle account) and the wealth account. The flow account measures flows that lead to a reallocation of resources from one age group to another. The wealth account measures the value of the stock associated with each flow. In both accounts, components are examined separately for private and public sectors.

In the flow account, life cycle deficits are determined by comparing consumption with labor income earned at each specific age. The deficit age groups are basically the young and the elderly, and the surplus group is basically the working age group. Then reallocation of resources across ages (from surplus to deficit ages) and the means for such reallocation are examined. Reallocation can be made through asset reallocation (i.e., capital, land or credit) and through pure transfers (i.e., internal household resource transfers between members and transfers from taxpayers to government service beneficiaries).

The governing equation for the flow account, which must be satisfied for any individual, household, age group, or (closed) economy, is:

$$\underbrace{C - y^l}_{\text{Lifecycle deficit}} = \underbrace{rA - S}_{\text{Asset reallocations}} + \underbrace{\tau_g^+ - \tau_g^-}_{\text{Net public transfers}} + \underbrace{\tau_f^+ - \tau_f^-}_{\text{Net private transfers}}.$$

Age reallocations

The difference between consumption and production, termed the *lifecycle deficit*, must be matched by *age reallocations* consisting of *asset reallocations* and *transfer*. 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*. In turn, *inter vivos transfers* happen between (*inter*)- and within (*intra*-) households.

The individual is the fundamental analytic unit in the NT accounts. All transactions are treated as flowing to and from individuals and are classified on the basis of the age of those individual. Public and private institutions mediate these transactions. Public reallocations are social mandates embodied in law and regulation and implemented by local, regional, and national governments. Private reallocations are

voluntary or contractual transactions between individuals, households, firms, and charitable organizations.

The household plays a prominent role in private age reallocations. In virtually every society reallocations to children are dominated by intra-household transfers, and in many countries the elderly live with and are supported by their adult children. Moreover, many assets are held by households rather than by individuals.

Several conventions have been adopted to attribute to individuals transactions that are between or within households. First, all intra-household transfers are assumed to be between the household head and household members. Second, private inter-household transfers are assumed to be between household heads. Third, all household assets are assumed to be held by the household head. Thus, all asset reallocations are attributed to the age group to which the household head belongs.

The complete NTA system also provides estimates of wealth associated with age reallocations. Wealth comes in several forms: capital (K), land and credit (M), and transfer wealth (T). The governing equation for the wealth account is:

$$W = K + M + T.$$

Total wealth (W) and its components can be defined for an individual, an age group, or a population. The first two forms of wealth are familiar concepts. Transfer wealth is conceptually equivalent in that its value derives from expectation of future transfer inflows and outflows. Transfer wealth is thus the present value of net transfers.

An important feature of the NTA system is its consistency with National Income and Product Accounts (NIPA). Variables in the NTA system are frequently defined in a manner identical to NIPA definitions. Differences in conventions are explicitly identified. Many NTA variables, e.g., income, consumption, saving, and investment, use NIPA values as control totals.

The complete NTA framework is presented in Table 1. It describes the economic flows of a particular year for a cross-section of age groups. The table presented is highly aggregated to facilitate presentation, but typically, the values are estimated by single-year of age with an upper age group of 90 or higher.

In the current status of the project, the focus is on estimating components of the flow account, in particular the life-cycle components and transfers.

Once complete, the NTA database is envisioned to be done for several years and which may be used to constitute a synthetic panel that can track cohort behavior.

3. Methodology

This will discuss preliminary work on the NTA for the Philippines using 1999 data.

The general steps for the estimation of individual NTA components are as follows:

1. calculate per capita values of component (e.g., private household education expenditure, private household health expenditure, etc.) by age group in single years;
2. multiply per capita values by population size at each age to obtain aggregate totals;
3. adjust total values obtained in (2) for consistency with aggregates in the National Income Accounts.

In some cases, especially for public consumption, the reverse process is done, wherein control totals are first obtained, which is then equally distributed to the identified consumer population projected from the survey, followed by the computation of per capita values (not per user or consumer) by dividing the aggregate totals by the population size.

Since most income and expenditure surveys would only contain household-level values, the components are distributed to household members using allocation rules specific to that component. We use the APIS because it contains individual-level information such as school attendance, hospital use, and employment status that will be useful in allocating expenditure components to household members.

Under labor income, there is no problem for earnings since wages/salary are individually-assigned. However, for self-employment income, we use the employment status and class of work to determine the recipients of surplus income, distributing it equally among household members engaged in own-account work. The control totals for labor earnings and self-employment income are compensation income and the share of net operating surplus attributable to labor (assumed to be two-thirds) from the NIA, respectively.

Under public consumption in education, we use the APIS to come up with enrolment rates in public schools by age, and then multiply this with the population distribution. The aggregate totals from the National Education Expenditure Accounts (NEXA) by school level are equally distributed to each student from the enrolled population.

Similarly, for public consumption in health care, we use the hospitalization rates by type of health facility from the APIS and distribute equally the control totals obtained by health facility type from the National Health Accounts (NHA).

For public other consumption, which include national defense, public works, sanitation and the like which cannot be directly attributed to any particular age group, we distribute this equally to all members of the population, so that per capita values are constant across all ages. The control total is government consumption expenditure (GCE) from the NIA minus the NHA and NEXA aggregate totals.

Under private consumption in education, we use the regression method wherein household educational expenditures are regressed on the number of enrolled household members of each single-year age group from 6-25 without an intercept, and then the

coefficients for each age are used as the weights in the distribution of household expenditure to enrolled members.

Under private consumption in health, the recommended method is also the regression method, with the regressors now defined as the number of household members in each single-year age. However, this resulted in negative coefficients for certain age groups, notably the young, so that this method was eschewed in favor of equal sharing among household members of the household's total medical expenditure

For private other consumption, which include food and clothing which may not be equally consumed by members of the household, it is allocated to individuals using an *ad hoc* allocation rule based on an extensive review of the literature and other estimation methods, e.g., Engel's method and the Rothbarth method. Consumption of individuals living within any household is assumed to be proportional to an equivalence scale that is equal to 1 for adults aged twenty or older, declines linearly from age 20 to 0.4 at age 4, and is constant at 0.4 for those age 4 or younger. These are used as weights in the distribution of household expenditure other than for education and health care to household members.

The personal consumption expenditure (PCE) is used as the aggregate control for private consumption, with the proportional share of total health and total education to total expenditures used as proxy for their respective control totals.

For direct and indirect taxes, the labor income profile and total consumption profile obtained from above were used to proportionally distribute the corresponding aggregates from the NIA.

Aggregate inter-household transfers were directly computed from survey tabulations of total support, assistance and relief received from domestic private sources and total expenditure on gifts and contributions to others. As discussed above, these transfers were all attributed to household heads.

On the other hand, aggregate intra-household transfers were derived using a stylized model of familial transfers sketched above. Here, 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. All those with "surpluses" contribute an outflow to the household head, which in turn distributes this and his own surplus as inflows to members with "deficits."

More detailed estimation methodology and references for the project can be obtained from the authors. General information can also be obtained from the umbrella project's website at www.ntaccounts.org.

4. Preliminary Results

We present here preliminary tabulations of the life-cycle deficit and its components using the 1999 Annual Poverty Indicators Survey (APIS). Work has also been done in the public and private transfers segments of the account, but private transfers are not yet

comparable with income and consumption figures because the estimates are still being fine-tuned and have not been scaled up with control totals from the NIA. Nevertheless, the estimated economic flows may already provide useful insights as to the general direction of familial transfers.

We start with the age profile of mean per capita labor income and current consumption shown in Figure 1a. Labor income has the expected hump shape, which peaks at age 42 and appears a little skewed to the right. Consumption is strongly influenced by the shape of the ad hoc equivalence scale used to distribute household other consumption to its members, but there are pronounced bulges around the ages 7 and 20, and around age 83 at the other end. We will find later that these were due to increases in education and health consumption, respectively. We see that life-cycle deficits are recorded for ages 0-25 and 59 and above.

The age profile of the country's population is presented in Figure 1b (not adjusted for possible age-heaping). It is striking that the number of persons at that time declined almost linearly in age, except possibly in the earlier ages. This results in a dependency ratio of around 0.70 and a median age of just 21. Note that in the textbook cases of countries experiencing the demographic dividend, the population age distribution is hump-shaped and skewed to the right, owing to declines in the fertility rate and increases in life expectancy.

We get the aggregate age profile for labor income and consumption in Figure 1c, and the aggregate life-cycle deficit in Figure 1d. These are also presented in tabular format in Tables 2a and 2b. The population age structure magnifies the life-cycle deficit attributable to the younger age groups, becoming more than 12 times bigger than the deficit attributable to the elderly. The life-cycle surplus recorded by ages 26-58 is small compared to the deficit, emphasizing the burden of raising and sustaining a very young population. The aggregate surplus amounts to just a third of the combined deficit.

When we look into the public and private components of current consumption, we find that private per capita consumption is higher than public per capita consumption across all ages (Figure 2a). Comparing Figures 2b and 2c, we see that per capita public consumption is targeted towards providing educational services in the primary- and secondary-school attending ages, while per capita private consumption is highest among the tertiary-school attending ages. Expenditures for child health care and elderly health care are prominent for per capita public consumption, but it's just the latter for private consumption. One may surmise that these patterns reveal household substitutions between public and private provision of health care and education.

Moving on to the transfers part, which is one means by which households and age groups finance their consumption, the aggregate inflow of public domestic transfers shows that a demonstrable chunk goes to support basic education provision (Figure 3). The aggregate outflow, which is composed of direct and indirect taxes, shows that financing is fairly spread out, owing to consumption taxes, but more concentrated in the working ages.

We now show rough estimates for aggregate private domestic transfers. For inter-household domestic transfers, the age profile of recipients is wider compared to the

contributors of the same, implying that households headed by the young and elderly, while hard-pressed to give contributions, do receive external support (Figure 4).

(Note that given a closed economy assumption, inflows should equal outflows. It is not atypical, however, for household surveys to yield aggregate inflows and outflows that do not match. It is interesting to note that in other countries, gifts given usually exceed gifts received, unlike the case we see here.)

Moving on to intra-household transfers in our synthetic model of familial transfers, we find that inflows occur to support education consumption, with pronounced peaks at ages 7 and 18, or when most young people enter elementary or tertiary school (Figure 5a). Significant amounts of corresponding outflows come from age groups 20-65, with discernible hints of similar two-peakedness that capture co-residence of parents with the identified school attendees.

We see in Figure 5b that intra-household inflows for health consumption go mostly to the young, most especially for newborns and toddlers, and that outflows are spread out but rise early on, again due to co-residence of parents to the very young. Note that inflows for those in the retirement ages also rise somewhat.

In Figure 5c, the age profile of intra-household inflows to finance consumption other than for health and education show much higher values for the young. Outflows are spread out and concentrated in the working ages.

In all the above, if you look into median ages for aggregate inflow and outflow, the picture that one will find is that the direction of intra-household transfers are all downward, or from higher age groups towards the young. This is in tune with the huge life-cycle deficit for the young that we saw earlier.

5. Conclusions

We've seen from the preliminary estimates of the age profiles of labor income and consumption for the Philippines that its very young population has created a scenario wherein the aggregate lifecycle deficit for the young is very large relative to surpluses that may be recorded in the prime working ages.

The demographic dividend that is expected to accrue to countries with young populations due to this has implications for savings and capital deepening from investments, as aggregate economic flows would tend to move downwards to finance current consumption by the young. Savings which may be used for widening the capital stock may thus be nil or absent, and active dis-saving may ensue.

Many avenues for further research are available. One may look into open economy versions of the basic NTA framework, suitably modified, to look into the effects of government external debt.

Another avenue is the treatment of remittances, which is very relevant to the Philippines' experience. As presently designed, the NTA framework would view remittances as inter-household transfer from the rest of the world (ROW), however, this

is most suited with remittances that come from immigrant families abroad. However, in the Philippine case, most overseas Filipino workers (OFWs) are non-immigrants and have fixed employment contracts which require them to return to the country once their contract is finished. The temporary working arrangement leads the overseas worker to consider him/herself still part of the local household, physically absent but maintaining strong emotional and economic ties with their family, with their salary regularly remitted almost in full. One can thus, in principle, treat non-immigrant remittances as part of labor income, and one can explore the possibility of obtaining an age profile of remittance senders and adding it on top of the existing labor income profile.

Another possible research strand is to look into the sensitivity of the estimates with respect to changes in headship definition, such as assigning headship to the most economically productive household member instead of reported headships that may arise due to seniority.

An important thing to consider is that most household surveys have been designed to be geographically-representative of the population, but unfortunately not age-representative. Possible ways of correcting for this problem may be proposed, if practicable.

Table 1. National Transfer Accounts
NTA FLOW ACCOUNT

	Total	Domestic by age					Foreign
		0-14	15-29	30-44	45-59	60+	
Lifecycle Deficit							
Consumption							
Public							
Education							
Health							
Other							
Private							
Education							
Health							
Other							
Less: Labor Income							
Earnings							
Benefits							
Self-employment							
Asset Reallocations							
Public							
Income on Assets							
Less: Public Saving							
Private							
Income on Assets							
Less: Private Saving							
Transfers							
Public							
Inflows							
Outflows							
Direct taxes							
Indirect taxes							
Private							
Inter vivos							
Inter-household							
Inflows							
Outflows							
Intra-household							
Inflows							
Education							
Health							
Other							
Outflows							
Education							
Health							
Other							
Bequests							
Inflows							
Outflows							

NTA WEALTH ACCOUNT

	Total	Domestic by age					Foreign
		0-14	15-29	30-44	45-59	60+	
Wealth							
Capital							
Property and Credit							
Transfer Wealth							
Public							
Private							

**Table 2a. Lifecycle deficit by 15-year age groups,
Philippines, 1999, aggregate, current prices (in PHP millions)**

	Total	Age group				
		0-14	15-29	30-44	45-59	60+
Lifecycle Deficit	747,375	670,281	318,870	(233,319)	(90,645)	82,189
Consumption	2,550,838	670,281	832,232	562,352	306,063	179,910
Public	389,238	185,874	97,956	55,711	30,602	19,096
Education	88,134	70,203	17,931	0	0	0
Health	29,621	14,411	4,671	4,286	3,107	3,146
Other	271,483	101,260	75,354	51,425	27,495	15,950
Private	2,161,600	484,407	734,276	506,641	275,462	160,814
Education	73,304	26,117	47,187	0	0	0
Health	65,038	17,828	17,859	10,984	8,114	10,254
Other	2,023,258	440,462	669,230	495,657	267,348	150,560
Total	2,550,838	670,281	832,232	562,352	306,063	179,910
Education	161,438	96,320	65,119	0	0	0
Health	94,659	32,239	22,529	15,270	11,221	13,400
Other	2,294,740	541,722	744,584	547,082	294,843	166,510
Labor Income	1,803,463	0	513,362	795,670	396,709	97,721
Earnings	1,030,430	0	315,422	454,075	223,673	37,260
Self-employment	773,033	0	197,941	341,595	173,036	60,461

**Table 2b. Lifecycle deficit, Philippines, 1999, aggregate,
current prices (in PHP millions)**

	Total	Age group		
		0-25	26-58	59+
Lifecycle Deficit	747,375	1,012,821	(348,210)	82,764
Consumption	2,550,838	1,315,151	1,041,814	193,873
Public	389,238	265,625	103,067	20,545
Education	88,134	88,134	0	0
Health	29,621	17,887	8,393	3,341
Other	271,483	159,604	94,674	17,205
Private	2,161,600	1,049,526	938,746	173,328
Education	73,304	73,304	0	0
Health	65,038	30,796	23,436	10,806
Other	2,023,258	945,426	915,311	162,521
Total	2,550,838	1,315,151	1,041,814	193,873
Education	161,438	161,438	0	0
Health	94,659	48,683	31,829	14,147
Other	2,294,740	1,105,030	1,009,984	179,726
Labor Income	1,803,463	302,330	1,390,023	111,109
Earnings	1,030,430	182,170	804,418	43,842
Self-employment	773,033	120,160	585,605	67,267

Figure 1a. Age profile of per capita labor income and consumption, Philippines, 1999, current prices (in PHP thousands)

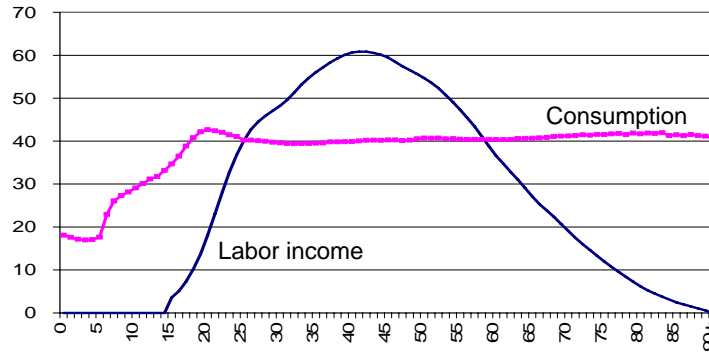


Figure 1b. Age profile of population, Philippines, 1999 (in Millions)

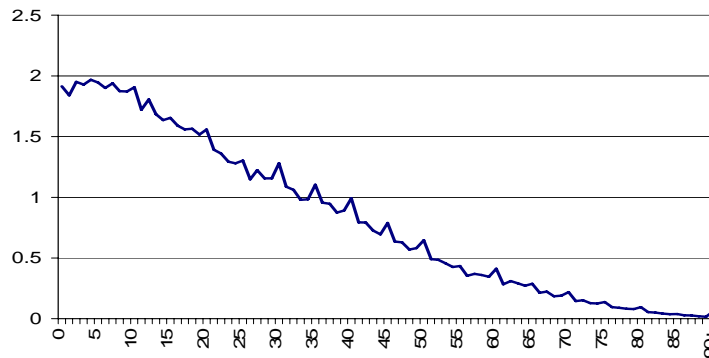


Figure 1c. Age profile of aggregate labor income and consumption, Philippines, 1999, current prices (in PHP billions)

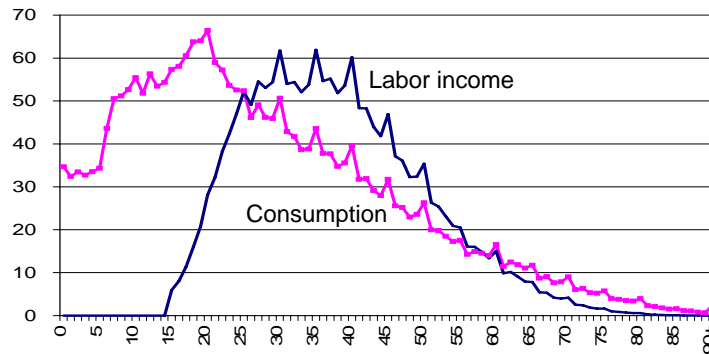


Figure 1d. Age profile of life-cycle deficit, Philippines, 1999 (in PHP billions)

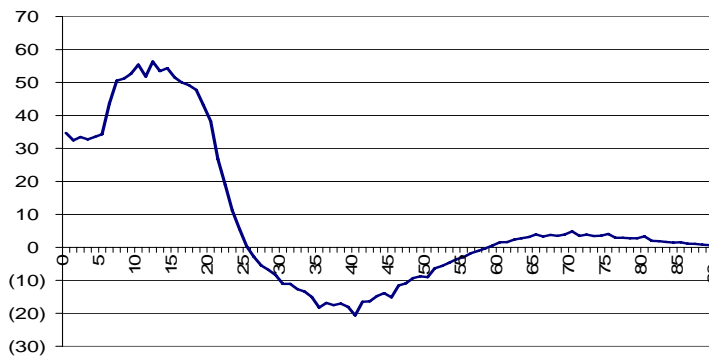


Figure 2a. Age profile of per capita public and private consumption, Philippines, 1999, current prices (in PHP thousands)

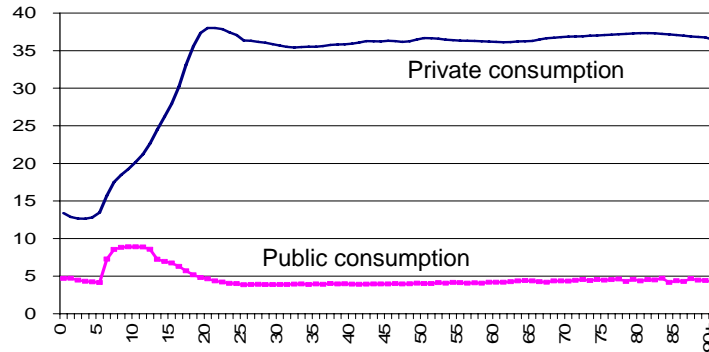


Figure 2b. Age profile of per capita public consumption, Philippines, 1999, current prices (in PHP thousands)

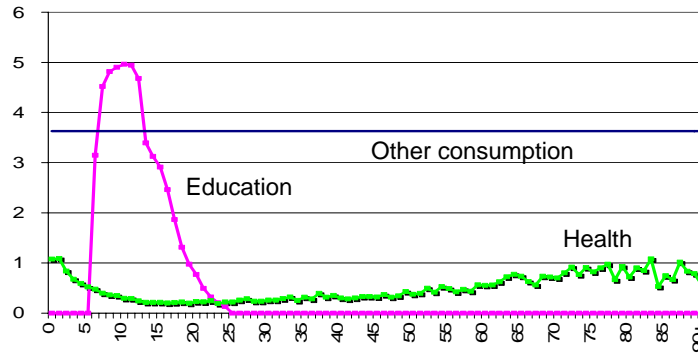


Figure 2c. Age profile of per capita private consumption, Philippines, 1999, current prices (in PHP thousands)

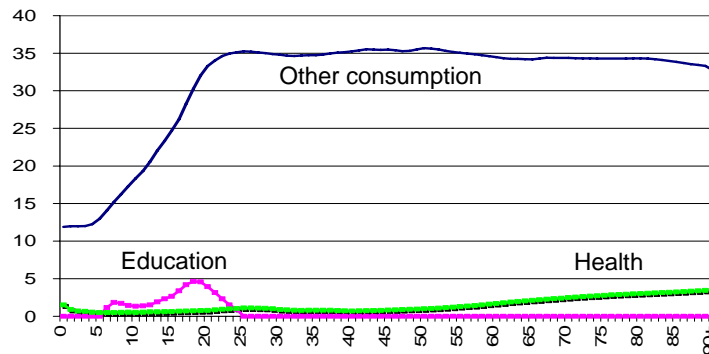


Figure 3. Age profile of aggregate public domestic transfers, Philippines, 1999, current prices (in PHP billions)

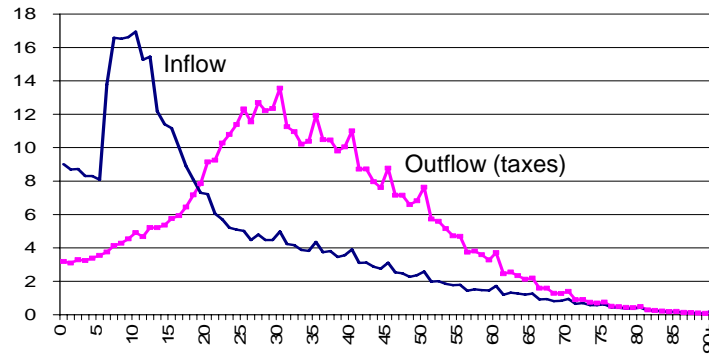


Figure 4. Age profile of aggregate (private) inter-household domestic transfers attributed to household head, Philippines, 1999, current prices (in PHP millions, unsmoothed, not yet scaled to NIA and equalized)

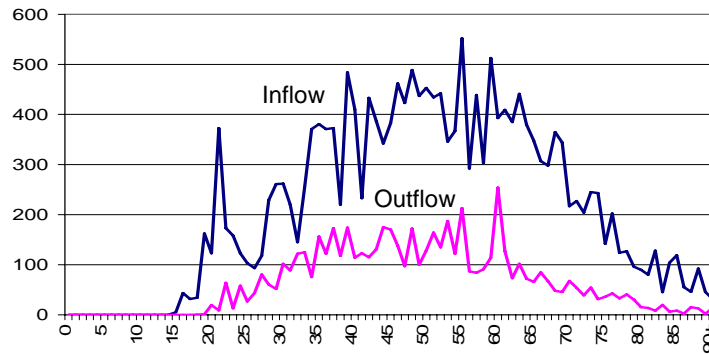


Figure 5a. Age profile of aggregate (private) intra-household transfers for education consumption, Philippines, 1999, current prices (in PHP millions, not yet scaled to NIA)

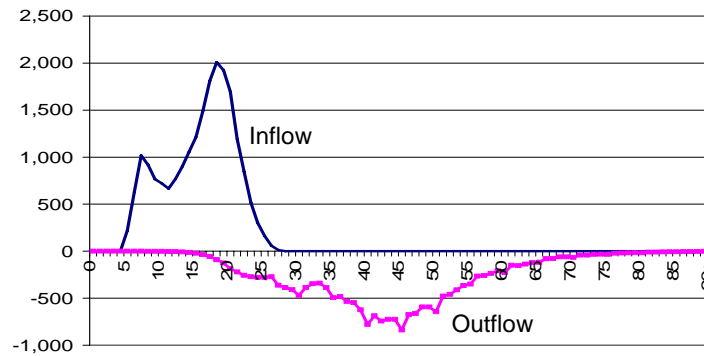


Figure 5b. Age profile of aggregate (private) intra-household transfers for health consumption, Philippines, 1999, current prices (in PHP millions, not yet scaled to NIA)

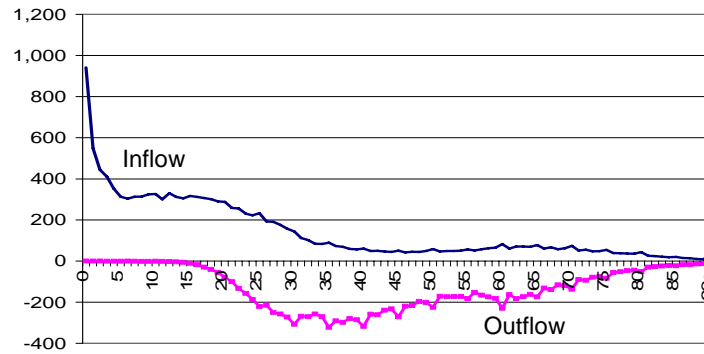
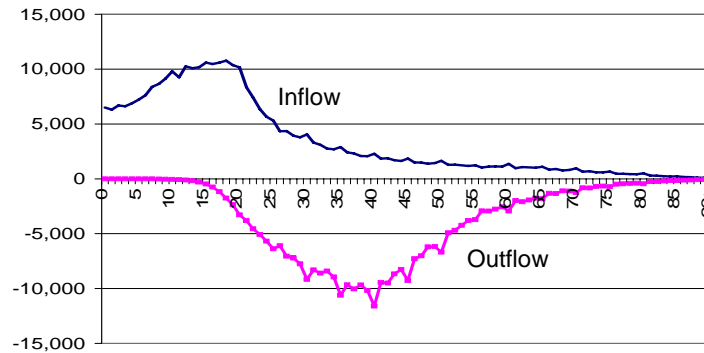


Figure 5c. Age profile of aggregate (private) intra-household transfers for other consumption, Philippines, 1999, current prices (in PHP millions, not yet scaled to NIA)



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