

# Economics of Ageing Feature

## Ageing and the economic life cycle: The National Transfer Accounts approach

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**Objective:** *To illustrate the use of National Transfer Accounts (NTA) for understanding ageing and the economic life cycle in Australia.*

**Methods:** *The NTA methodology is applied utilising a range of unit record, demographic and administrative data sets from 1981 to 2010.*

**Results:** *During early and later life, total consumption (public and private) is greater than labour income. On a time series and cohort basis, we show that each successive generation has improved their level of well-being (as measured by consumption) relative to the previous years or previous cohorts from 1981 to 1982 onwards. We also show a substantial increase in labour income earned by mature age workers over this period. International comparisons show Australia to have consumption and labour income age profiles very similar to those of Canada but dissimilar to many other countries, driven by differences in demographic and policy settings.*

**Conclusion:** *The NTA approach provides a powerful framework to track differences in the economic life cycle across age groups, across time, across cohorts and across countries.*

**Policy Impact:** The National Transfer Accounts framework outlined herein offers a comprehensive approach to inform policy debates on how changes in population age structure affect economic growth, the well-being of all age groups, and the sustainability of public and private systems that transfer resources, across time, across generations and across countries.

**Key words:** *ageing, economic models, population dynamics.*

### Introduction

The economic role of mature age Australians as producers of goods and services and consumers of public resources in particular has become a key issue in policy discussions. The regular Intergenerational Reports are the government's

primary tool to track the demographic and economic issues associated with the continued ageing of Australia's population [1–4]. Despite their contribution to public debate, these studies are oftentimes subject to criticism due to scope, changing assumptions and, recently, politicisation of the document [5–7].

More generally, studies on the economics of ageing are criticised for their failure to examine the full transfer system that governments, families and individuals engage in to fund consumption across the life cycle. With increased longevity and limited upward movement in the age at retirement, most high-income countries have developed an extended period at the end of the life cycle with reduced labour market attachment. In addition, extensions of time in education have tended to delay full-time labour market participation at younger ages. Despite these trends, many studies gloss over the transfer systems that serve to fund consumption in the earlier and later stages of the life course. A further limitation of many economic studies on population ageing is their failure to generalise the findings about the impact of ageing on the economy beyond the specific confines of their study – comparing countries at different times in demographic and economic development, with differing cultural, political and social systems.

The National Transfer Accounts (NTA) project seeks to bridge this gap through the development of a unified (cross-country and across time) theoretical and methodological framework for the analysis of intergenerational economic issues. The NTA is colloquially referred to as 'adding age to the national accounts', as central to the approach is the disaggregation of national-level aggregate statistics on economic phenomena by age. By doing so, the NTA seeks to improve our understanding of what we term the generational economy: 'the social institutions and economic mechanisms used by generations or age groups to produce, consume, share and save resources' [8; p.1]. This type of analysis contributes to an understanding of how changes in population age structure are affecting economic growth, the well-being of all age groups and the sustainability of public and private systems that transfer resources between generations.

In this study, we outline the NTA approach to examine the intersection of ageing and economic roles throughout the life course, through an analysis of one account component: the economic life cycle of production and

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consumption. Following a discussion of the NTA conceptual framework and methodology, we present results showing the utility of the NTA approach in examining the economic life cycle: (i) at a point in time; (ii) across age groups and cohorts over time; and (iii) across countries. We conclude with an examination of limitations and extensions to the NTA project currently underway to further improve its scope.

## Methods

One purpose of the Australian NTA project is to document the economic life cycle through the NTA system: That is, the age-related patterns of consumption and labour income that are associated with the life cycle of education, work and retirement. Specifically, the NTA is:

*a system of macroeconomic accounts that measures current economic flows by age in a manner consistent with the United Nations System of National Accounts. NTA measures age-specific labour income, asset income, consumption, transfers and saving, accounting for flows within households, between households, through the public sector and with the rest of the world.* [9; p.199]

The Australian NTA project forms part of a large international project with research teams producing accounts for over 80 countries in the Asia-Pacific, Americas, Europe and Africa, covering a population of over six billion people. The NTA project began in 2004 led from the East-West Center (University of Hawaii) and the Center for the Economics and Demography of Aging, University of California at Berkeley. A detailed overview of the theoretical and mathematical basis of the NTA system, as well as the detailed descriptions of methodology, country case studies and cross-country comparisons, is available elsewhere [9–12].

Fundamental to the NTA approach is the detailed construction of accounts that map the economic life cycle – The patterns of production and consumption that vary by age, generating periods in life in which one exceeds the other. Where these shortfalls exist, mostly in childhood and later life, public and private transfers or reallocations are required to meet the gaps. These transfers can be from the public sector (e.g. the Age Pension, subsidised pharmaceuticals), inter- or intrahousehold transfers (e.g. parents paying for children's education) or drawing upon income from previously accumulated assets or upon savings (e.g. drawing upon superannuation or dissaving).

The NTA includes a number of subaccounts, and in this study, we focus on the headline results from the economic life cycle account, which details labour income and consumption (Table 1). For example, the economic life cycle

account includes measures of the private and public consumption of education, health and housing by different age groups. These account items are consistent across all countries in the international NTA project. Other accounts include the public age reallocation account and private age reallocation account, which measure how consumption is funded when consumption exceeds labour income (Table 1). New accounts for assets and liabilities have also been produced for Australia [13]. As will be discussed later in this study, new accounts for time transfers in the household sector are now part of the NTA methodology.

The NTA methodology has been developed to maximise comparability between different countries, and across time. This has led to a flexible modelling approach where numerous data sources and methods are employed to estimate the underlying account items. The procedures are extremely detailed, and the interested reader is directed to the United Nations manual [9]. However, the general approach is to firstly calculate the aggregate benchmarks for the total economy (of consumption, labour income, public age reallocations and private age reallocations) derived from National Accounts or equivalent data sources. Secondly, using a combination of sample survey and administrative data, an age profile is fitted to the benchmark. When individual-level data are not available (i.e. data are only available at the household level), allocations must be made from the household to individual members to generate the age profile. The NTA methodology uses a number of strategies including regression, iterative fitting, equivalence scales and an equal benefit approach, depending on the item under analysis [9].

In addition to Australian Bureau of Statistics (ABS) demographic data, this project draws heavily upon ABS sample surveys including the Household Expenditure Survey, Survey of Income and Housing, and Survey of Disability, Ageing and Carers, as well as the Australian System of National Accounts and administrative data on programmatic expenditure. The sample survey data were predominantly used to fit age profiles to each of the account items in Table 1, whereas the data from National Accounts and administrative data are used to estimate aggregate benchmarks.

## Results

### Cross-sectional results

Figure 1 displays the key concepts from the economic life cycle account, including consumption, labour income and the life cycle deficit for the financial year 2009–2010. Consumption refers to the total goods and services that satisfy the needs and wants of residents and comprises both public and private consumption on items such as housing, education and health (Table 1). In the NTA framework, labour

**Table 1: National Transfer Accounts economic life cycle account, public age reallocation account and private age reallocation account**

Economic life cycle account
Consumption
Public consumption
Public consumption, education
Public consumption, health
Public consumption, housing
Public consumption, child care
Public consumption, residential aged care, high care
Public consumption, residential aged care, low care
Public consumption, other†
Private consumption
Private consumption, education
Private consumption, health
Private consumption, housing
Private consumption, child care
Private consumption, residential aged care, high care
Private consumption, residential aged care, low care
Private consumption, other†
Labour income
Labour earnings, including fringe benefits
Self-employment labour income
Public age reallocation accounts
Public transfers
Public transfers, inflow
Public transfers, education, inflow
Public transfers, health, inflow
Public transfers, housing, inflow
Public transfers, child care, inflow
Public transfers, residential aged care, high care, inflow
Public transfers, residential aged care, low care, inflow
Public transfers, social protection targeted at the older people, inflow
Public transfers, social protection targeted at the prime-aged, inflow
Public transfers, social protection targeted at the young, inflow
Public transfers, social protection, other, inflow
Public transfers, other in-kind, inflow
Public transfers, other cash, inflow
Public transfers, outflow
Income taxes levied on individuals
Income taxes levied on enterprises
Employers' payroll taxes
Taxes on property, corporations
Taxes on property, households
Taxes on property, unincorporated businesses
Goods and services tax
Other taxes on the provision of goods and services
Taxes on the use of goods and performance of activities
Other transfers from private to public
Public transfers, deficit, outflow
Public asset-based reallocations
Public asset income
Public property income
Public property income, inflow
Public property income, outflow
Public capital income
Public saving
Private age reallocation accounts
Private transfers
Private interhousehold transfers
Private interhousehold transfers, inflow
Private interhousehold transfers, outflow
Private intrahousehold transfers
Private intrahousehold transfers, inflow
Private intrahousehold transfers, outflow
Private asset-based reallocations
Private asset income

**Table 1: Continued**

Private age reallocation accounts
Private property income
Private property income, inflow
Private property income, corporations, inflow
Private property income, households, imputed interest, inflow
Private property income, households, other, inflow
Private property income, outflow
Private property income, corporations, outflow
Private property income, households, consumer credit, outflow
Private property income, households, other, outflow
Private capital income
Private capital income, corporations
Private capital income, owner-occupied housing
Private capital income, share of mixed income
Private saving

†All other forms of consumption. Source: Australian National Transfer Accounts [12].

income is comprised of labour earnings inclusive of fringe benefits, and self-employed labour income. The difference between total consumption and labour income is termed the life cycle deficit.

National Transfer Accounts data can be presented on both a per-capita and aggregate basis. Per capita profiles show the average levels of production and consumption per age category, whereas the aggregate profiles express the total economy-wide values produced, consumed or transferred for each age category. In 2009–2010, younger Australians consumed while earning negligible amounts of labour income (Figure 1). A similar situation is found among older Australians who have significant levels of consumption while earning lower amounts of labour income. In contrast, Australians of prime working age earned more in labour income than they consumed. This relationship is summarised in the average per capita age profile for the life cycle deficit, which is simply the difference between consumption and labour income. This general relationship is observed across all countries in the NTA network although, as will be shown, the national age profiles differ considerably.

### Time series results

An important limitation of the results presented above is they show age profiles at only one point in time. How have these age patterns of labour income and consumption differed over time in Australia, particularly in the last 30 years, a period of considerable demographic and economic change [14]? Results in Figure 2 show the per capita levels of labour income and consumption from 1981–1982 to 2009–2010, standardised to 2009–2010 Australian dollars (AUD). Over time, consumption rises across all age groups. That is, for each particular age group, later generations appear to have higher living standards than earlier generations, on average. While the benefits of economic growth may not have been spread equally within age groups, when looking across age groups it is evident that total consumption (an important measure of well-being) has increased considerably for all age groups.

Figure 1: Economic life cycle variables, per capita (a) and aggregate (b), 2009–2010.

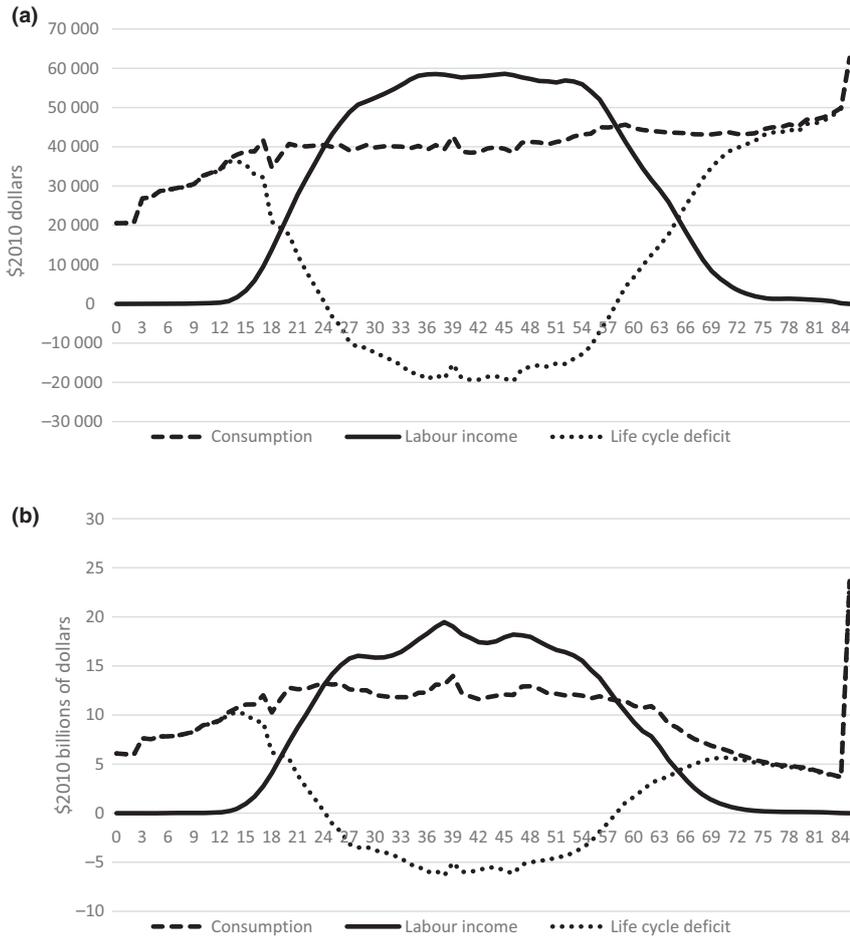
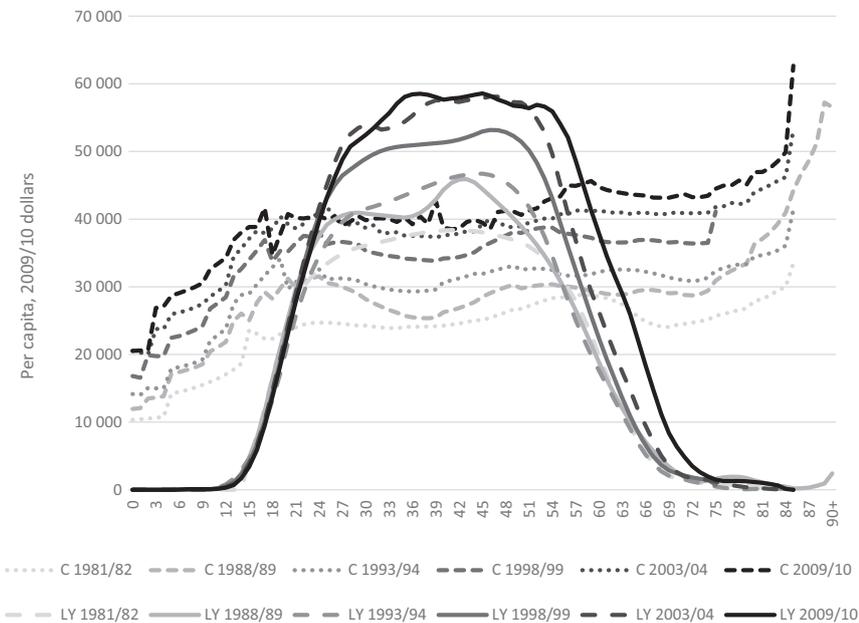


Figure 2: Per capita total consumption (C) and labour income (LY), 1981–1982 to 2009–2010 (2010 Australian dollars).



These data also show significant shifts across time in the economic production of older Australians as measured by their labour income. This is shown by the outward shift of the labour curve over time, which was particularly pronounced during the 2003–2004 to 2009–2010 period. This later period coincides with a significant increase in mature age labour force participation [15]. Moreover, across time, there has been a significant increase in average labour income earned by persons in the primary working ages, much of which has been driven by the increasing labour force participation of women [14]. However, for young Australians (under age 25), the shifts in average earnings over time have been small primarily because of increasing participation in education, although their consumption has increased through increases in public and private transfers to them.

### Cohort results

Using the multiple cross sections of NTA data, it is possible to construct cohort trends across each variable. That is, it is possible to view trajectories of people born in the same years across time as they age. Figure 3 compares the 2009–2010 cross-sectional profile of per capita labour income with the birth cohort profiles. Each solid line represents the labour income of a cohort as the cohort has aged from 27 to 55, 37 to 65 and so on.

An important finding from this graph is that peak income has been achieved at a later age for cohorts than is the case for the cross sections. This is because incomes have risen cross-sectionally at all ages across time. However, for the

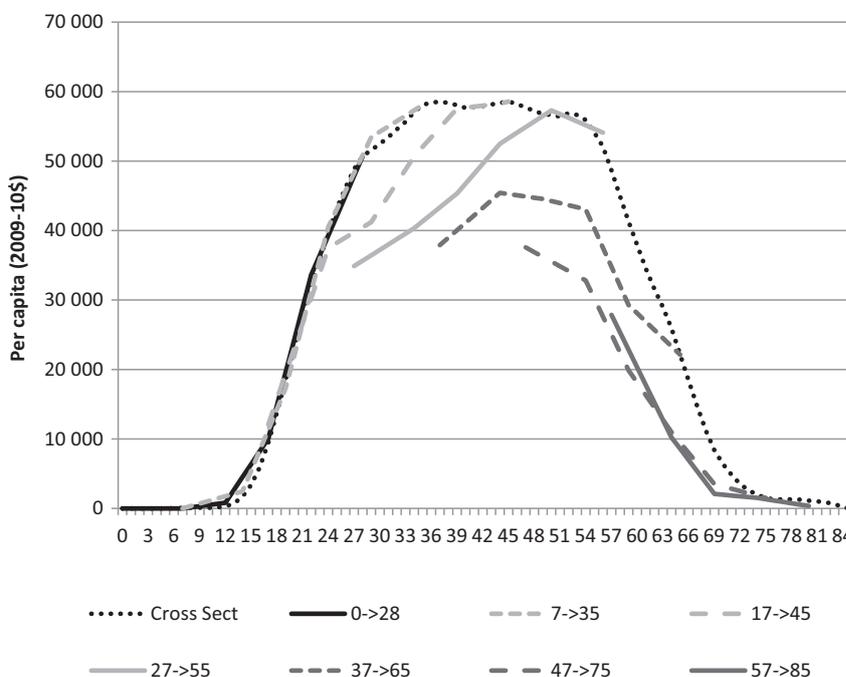
later birth cohorts (0–28 and 7–35), the age at peak income seems to be matching the early cross-sectional peak income. In contrast, average incomes at older ages have continued to rise strongly across cohorts. It is clear from these cohort comparisons that more recent cohorts of older Australians have fared better in the labour market when compared to their predecessors. These results also underscore the fact that different cohorts experience the economic life cycle in different ways, indicative of different levels of education, macro-economic and social conditions as they enter, progress through and leave the labour market.

### International comparisons

One key benefit of the NTA approach is the utilisation of a standardised methodology to compare populations at differing points of the demographic transition, with different levels of population ageing under different cultural, political and policy settings. Herein, we present comparisons of Australia's labour income and consumption with China, Japan, the United States, Canada and Sweden. The first three countries are Australia's top three trading partners [16]. Canada is included as it has a very similar public transfer system and a similar economy to Australia. Sweden is included as an outlier, with very generous public transfers and high taxes relative to other countries. The figures below are normalised across countries relative to the average values for persons aged 30–49 (shown as a ratio of 1).

Viewing Figure 4, there are a number of similarities and differences in the consumption and labour income age

**Figure 3: Cross-sectional and cohort measures of labour income (2010 Australian dollars).**



Notes: Cross Sect, cross-sectional estimates for 2009–2010.

profiles across countries. Given similar economies, welfare systems and migration policies, it is not surprising that the age profiles of consumption are very similar between Canada and Australia. Indicative of low- and middle-income countries in the NTA network, consumption is higher in the early life course but lower in the later life course in China. As expected, given generous welfare and care provisions in Sweden, consumption is high in both early and later life. Japan has a similar later life consumption profile as the United States, but consumption is relatively high among younger ages in Japan also. Recalling that the comparison age group is 30–49, it is not surprising that the United States has relatively high consumption in later life. Low levels of public transfers are available to those of working age in the United States, which constrains consumption during these ages. Consumption in later life in the United States is also higher due to the significantly higher levels of labour income in the later life course when compared to other countries [11]. This is evident by the labour income curve for the United States,

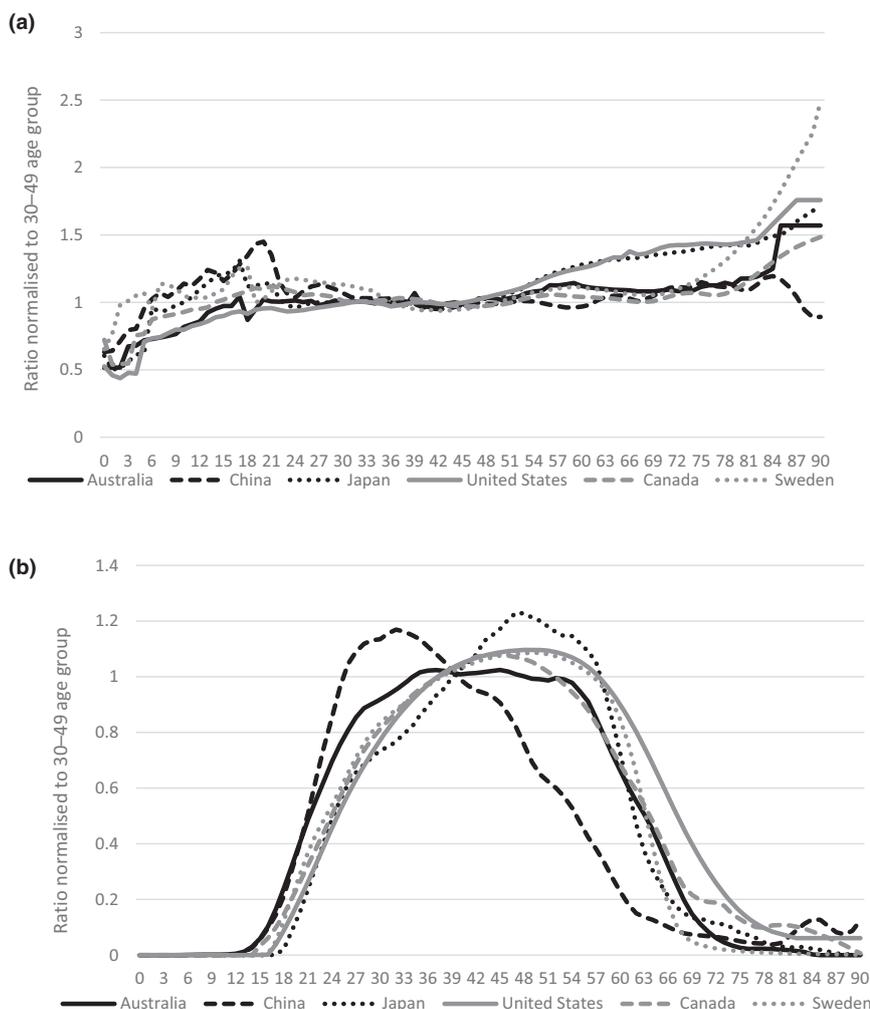
which is skewed to the right relative to the other countries (Figure 4).

Again, Canada has the labour income profile most similar to Australia. However, like China (but to a much lesser extent), labour income tends to rise more quickly in Australia at younger ages. A stark comparison is Japan, where the labour income profile does not peak until the early 50s at a value 20% higher than the average for those aged 30–49, is dropping very quickly from the mid- to late 50s. This is indicative of the seniority system and retirement age in Japan acting in tandem, in which salaries rise with age, but the onset of retirement is very rapid and society-wide. A strong drop in labour income is also evident in Sweden, although more gradual than the severe case in Japan.

### Discussion

Focusing on the economic life cycle account of the NTA, this study has sought to show the multiple dimensions in

**Figure 4: Per capita consumption (a) and labour income (b), selected countries, normalised age profiles.**



Notes: To normalise the profiles across countries, the age group 30–49 is set to 1. Values above 1 indicate higher consumption or labour income. Values below 1 indicate proportionately lower consumption or labour income. Australia, 2009–2010; China, 2007; Japan, 2004; United States, 2011; Sweden, 2003.

which ageing, production and consumption can be considered: cross-sectionally, as a time series, as a cohort and in a cross-country setting. This enables the economic life cycle of ageing to be considered from multiple perspectives, each providing complementary but alternative views. The results presented in this study underscore the fact that different cohorts experience ageing and the economic life cycle in different ways, indicative of different levels of education, macro-economic and social conditions as they enter, progress through and leave the labour market.

Notwithstanding, consumption is greater than labour income in the later life course irrespective of whether ageing and the economic life cycle is considered cross-sectionally, on a time series and a cohort basis, or across countries. This expected finding is not necessarily a problem for the macro-economy. What is important is the age reallocations that exist to fund the life cycle deficit and the sustainability of these transfer systems over time. Indeed, results presented here show a significant increase in average labour income earned by mature age Australians over the last 30 years, but particularly in more recent times. In subsequent papers, we are examining the funding mechanisms whereby transfers fund the gap between consumption and labour income for older Australians. This is particularly important as much of the concern commonly expressed about population ageing relates to age-specific public sectors programs (e.g. Age Pension, Pharmaceutical Benefits Scheme). However, this needs to be placed in the context of a range of government programs funded by the government, the role of private consumption in substituting for public programs and the extent to which reallocation, whether between households or from asset-based sources, fund continued consumption.

As noted by Kendig and Woods [6], it is important to disaggregate the costs attributable to population ageing from other factors such as technological or sectorial changes. This is underscored by the results of the international comparisons, which show the importance of policy settings and cultural and demographic factors in the shape and height of consumption and labour income curves in the later life course. This is even more pronounced in international comparisons of intergenerational transfer systems and projected life cycle deficits, as the world population continues to age [11]. The ability to disaggregate the potential impacts of population ageing on economies and families across countries is a key advantage of the NTA approach.

Despite these strengths, there are two key limitations to the NTA approach, which recent methodological advances are helping to overcome. The first limitation is that the Australian NTA is constructed to be broadly consistent with and complementary to the Australian System of National Accounts and, as such, shares in its limitations.

One limitation is that services provided by the household sector for the household sector are excluded. The exclusion of these services is an issue for the Australian NTA, in particular, because who produces and who consumes these services can be expected to vary greatly by age and by sex, particularly for unpaid caring work. Indeed, research consistently shows that older Australians engage in non-market activities that shadow market-provided services such as unpaid care and volunteering [17,18]. A new advance made to the NTA methodology is the inclusion of non-market activities into the NTA. Results have recently been published for a number of European countries [19,20]. These NTA studies underscore an asymmetry in private intergenerational transfers, whereby 'men are net donors of money to other age groups during their working life, women are net donors of time to other household members' [20; p.689]. Unfortunately, these advances in methodology come at a time when funding for the ABS Time Use Survey has been cut in Australia. Previously, Time Use Surveys have been conducted by the ABS in 1992, 1997 and 2006. However, the ABS abandoned plans for a 2013 survey due to funding cuts. We are currently investigating pathways for incorporating this important area of research.

This point highlights the second limitation of the standard NTA approach, which is that it does not consider inequalities or differences within specific age groups. The methodology, as it stands, disaggregates flows by age. However, there are significant differences in the ways in which production, consumption and intergenerational transfers differ *within* rather than *between* age groups. Again, methodological advances have started in this area with countries constructing NTA data from the perspective of gender and socio-economic status [21,22]. Nonetheless, there remains a need for further research on within-age group inequalities in the later life course.

A further extension to the NTA framework is the use of simulations and projections to understand the policy implications of population ageing. For example, the UN has recently released projections of detailed dependency and support ratios across the world using the NTA framework [23]. Others have examined the projections of individual account items (such as health care) or built overlapping generation models using NTA data [24,25]. A research priority of the Australian NTA team is to build a simulation model from NTA data to examine the interaction between Australia's shifting demography and the efficacy of extant formal and informal intergenerational transfer systems.

## Conclusion

Noting these limitations and extensions, the NTA provides a comprehensive framework to examine the production, consumption and transfer behaviours that reflect the

generational economy. Taken together with recent methodological advances in the NTA project, this will enable a more comprehensive view of the economic role of older persons that has heretofore been omitted from much economic analysis of population ageing.

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