COUNTING WOMEN'S WORK

Counting Women's Work in Mauritius:

Household Production across the Lifecycle in 2003

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Morné Oosthuizen and Kezia Lilenstein[†]

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Abstract

Gender-disaggregated National Transfer Accounts (NTA) reveal significant differences in labour income across the lifecycle between men and women, the result of its link to the System of National Accounts (SNA) and its designation of non-market services as outside the production boundary. Since females specialise relative to males in non-market production, this creates problems when analysing the generational economy from a gender perspective. The National Time Transfer Accounts (NTTA) methodology aims to address this blindspot, by constructing estimates of time spent in household production activities across the lifecycle, valuing this time using a specialist replacement wage and integrating these estimates into standard NTA estimates of production and consumption. This paper applies the NTA and NTTA methodologies to data for Mauritius from 2003, and finds stark differences in labour income for males and females across the lifecycle. It is estimated that aggregate household production is equivalent to 29.0 percent of GDP, with almost three-quarters of this produced by females. The effect of including consumption of household production is to almost triple per capita consumption for infants and almost double consumption for five-year-olds. While narrowing the gender gap in labour income can have a strongly positive effect on the country's demographic dividend, policies that aim for this outcome should account for the time reallocations needed to ensure an equitable distribution of work across gender and age.

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1 Introduction

Countries around the world are experiencing rapidly changing population age structures. In some countries, including a number of rich countries, populations are ageing as large age cohorts approach and pass retirement age. In these countries, the median age is relatively high and rising. In other countries, the largest age cohorts are entering the prime working ages so that, even though the median age is relatively low, it is rising. In still other countries, though, the largest cohorts remain child cohorts.

These changes in the age structure of the population are recognised to have implications for national economies, some of whom need to adjust to shrinking workforces and others needing to plan for rapid growth in the number of jobseekers entering the labour market. National Transfer Accounts (NTA) provide a unique view of national economies, by describing economic flows across the lifecycle. These estimates, which link strongly to national accounts, then represent a rich source of information with which to analyse the effects of population change on the economy.

However, through their link to national accounts, conventional NTAs are unable to account for all production and consumption that occurs within a given society. Specifically, the System of National Accounts (SNA) excludes non-market services, such as cooking, cleaning and care, from macroeconomic estimates of production. Thus, an activity that would contribute to GDP if it is performed by an employed individual disappears from view if it is performed within the household as an unpaid service.

Gender-disaggregated NTAs expose this gap by revealing substantial differences in the labour income profiles of males and females. These differences are closely linked to the traditional division of labour observed in societies around the world, with men working in the market and women working within the home. Naturally, the extent of this gender specialisation varies significantly across societies, being a function of labour market conditions, norms, and institutions, amongst other factors.

This paper addresses this blindspot by applying the National Time Transfer Accounts (NTTA) methodology (see Donehower, 2018) to data for Mauritius. The aim of this research is to construct estimates across the lifecycle of household production performed by males and females in Mauritius, using time-use data for 2003. By valuing this time using appropriate wage rates, it is possible to integrate market and non-market production: NTTA estimates are incorporated into gender-disaggregated National Transfer Accounts for Mauritius in order to derive a more comprehensive view of production and consumption and, by extension, dependency. This paper presents the first set of NTA estimates constructed for Mauritius and, as far as we have been able to ascertain, represents one of the few detailed analyses of the Mauritius time-use data.

2 Methodology and Data

2.1 Methodology

2.1.1 National Transfer Accounts and National Time Transfer Accounts

National Transfer Accounts (NTA) are a detailed set of accounts that describe the generational economy, defined as "the social institutions and economic mechanisms used by each generation or age group to produce, consume, share, and save resources" (Mason and Lee, 2011b, p.7). The NTA methodology has been developed over the past 15 years within a global network of country teams, having originated in earlier work by Lee (1994a; 1994b). This global network currently includes more than 53 countries from around the world; African member countries are Benin, Egypt, Ghana, Kenya, Mozambique, Nigeria, Senegal, and South Africa.

NTAs are comprised of various age profiles, each describing a particular economic flow by providing the mean value of that flow for each age cohort from age 0 to the very oldest cohort (usually a combined cohort aged 90 years and above). Together, these flows describe the "economic lifecycle" (Mason and Lee, 2011a, p.55). Although the economic lifecycle is a feature of all societies, its exact nature in a given country will depend on numerous country-specific patterns of behaviours, institutions and norms, amongst other factors.

NTAs begin from the recognition that for every individual resource inflows must equal resource outflows. Thus, the following identity must hold at the individual level:

$$Y^l + Y^A + \tau^+ = C + \tau^- + S \tag{1}$$

Thus, an individual may receive resources (i.e. inflows) in three forms, namely labour income (Y^l), asset income (Y^A) and transfer inflows (τ^+). These resources can be used (i.e. outflows) in the form of consumption (C), transfers to others (i.e. transfer outflows, τ^-) and savings (S). Rearranging the terms reveals the so-called NTA identity, which is:

$$\underbrace{C(x) - Y^l(x)}_{\text{Lifecycle Deficit}} = \underbrace{\underbrace{\tau^+(x) - \tau^-(x)}_{\text{Net Transfers}} + \underbrace{Y^A(x) - S(x)}_{\text{Asset-Based Reallocations}}}_{\text{Age Reallocations}} \tag{2}$$

where x represents a given cohort's age. Consumption, transfers and asset-based reallocation are all further disaggregated into public and private flows, while private transfers are disaggregated into interhousehold and intrahousehold flows. Transfers are flows characterised by a lack of an "explicit quid pro quo", while asset-based reallocations "realize inter-age flows through inter-temporal exchange" (United Nations, 2013).

The full methodology for constructing a complete set of NTAs is provided in the NTA Manual (United Nations, 2013), and we therefore provide a broad outline of the methodology here. The first step in constructing a given NTA profile is to derive the *shape* that describes how the mean flow varies by age. This shape is typically derived from household survey or administrative data. Importantly, the mean value for the flow is calculated across all

individuals within each age cohort; those individuals who do not experience a particular flow are included as zeros within the calculations. For example, for self-employment earnings, the profile is constructed across all members of each age cohort and includes the employed who have no self-employment income, the unemployed, and the economically inactive as zeros in the calculation. To ensure consistency with macro-level totals as may be found in national accounts or government budgets, for example, profiles are adjusted multiplicatively using a scalar value. The result is that, when the per capita labour income profile is multiplied by the number of individuals in each age cohort and summed across age, the total value will be equal to the aggregate control total.

The key challenge when analysing the generational economy from the perspective of gender, however, is that standard NTAs systematically underestimate the contribution of women since they specialise in household production[1] when compared with men (Waring, 1999). Because the System of National Accounts (SNA) does not include household production within national accounts aggregates, it is not reflected in standard NTA flows. A further complication is the existence of important age-related variations in the extent to which both males and females engage in different types of household production and unpaid care work (Gershuny, 2003; Hammer et al., 2013).

The National Time Transfer Accounts (NTTA) methodology builds on the NTA methodology as well as research that aims to quantify household production. This latter work has seen increasing harmonisation of time-use surveys and, in some countries, has informed the construction of satellite accounts in the National Income and Production Accounts (NIPA) for non-market household production (for example, Ironmonger, 1996; Landefeld and Mc-Culla, 2000; Abraham and Mackie, 2005; Budlender, 2008; Tabatabaei et al., 2013, amongst others). The contribution of work on NTTAs is the estimation of time spent in household production for individual age cohorts, and the incorporation of the value of this time into gender-disaggregated NTAs. This latter step is critical to more fully understand dependency.

2.1.2 Constructing Household Production-Related Age Profiles

NTTAs aim to describe average patterns of time allocations to productive activities across the lifecycle and by gender. These allocations of time are viewed as 'production', and they are allocated in particular ways to derive patterns of 'consumption'. It is then possible to derive age profiles of transfers of household production across age cohorts and between genders. In other words, it is possible to derive flows related to household production that are analogous to the flows of resources within the NTA framework. Details of the NTTA methodology have been published in Donehower (2018).

While time-use surveys collect information on a range of different activities, from the perspective of constructing NTTAs the focus is specifically on productive activities. In order to identify those activities that comprise non-market work, Reid's (1934) "third party

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[1]By 'household production' we mean productive activities that do not result in market goods or services. It is important to remember that this may include activities performed for non-household members, e.g. care for persons in other households. However, household production is distinct from unpaid family work in household enterprises or farms.

criterion" is used. According to this criterion, any unpaid activity performed by an individual that could be performed by a paid third party—and from which the individual could still derive the benefit—is a productive activity. In this sense, cooking is a productive activity, while learning for an exam is not. The International Classification of Activities for Time Use Statistics (ICATUS) has three categories of productive activities that fall outside of the SNA production boundary: these are household maintenance, management and shopping for own household (major group four); care for children, the sick, elderly and disabled for own household (major group five); and community services and help to other households (major group six).

Time-use surveys typically collect data on respondents' activities in 30-minute time slots over a 24-hour period. Provision is generally made for the occurrence of simultaneous activities (e.g. 30 minutes of gardening while monitoring children playing) or for sequential activities that do not necessarily occur for the entire time slot (e.g. 15 minutes of driving to work followed by 15 minutes of working at the place of employment). Often, surveys will ask respondents to designate the primary activity amongst any simultaneous activities. Since there is significant variation across surveys in dealing with simultaneous activities, the approach within NTTA is to ignore secondary activities so that multitasking is ignored. However, the time-use module in the 2003 Mauritius Continuous Multipurpose Household Survey (CMPHS) does not make this distinction between primary and secondary simultaneous activities. This means that the total time during which simultaneous activities are performed is divided evenly amongst these activities. Thus, if three activities are reported as occurring simultaneously during a 30-minute slot, each activity is allocated ten minutes.

Activities that comprise household production are divided into 14 groups, namely cleaning; laundry; cooking; household maintenance and repair; lawn and garden care; household management; pet care; travel; purchasing goods and services; childcare; care for adults and elders; travel related to the aforementioned activities; volunteering or other forms of care for community members, including related travel; and fetching wood and water. In the Mauritius NTTA, lawn and garden care is not distinguished due to the survey not distinguishing this activity.

Profiles for production, consumption and transfers (inflows and outflows) are constructed for each of the activity groups. Constructing the production profile is straightforward and is simply the average time spent performing a given activity at each age for a particular gender. As with NTAs, the average is calculated across all members of the cohort, irrespective of whether or not they performed the activity.

Consumption profiles are more complex to construct, since time-use surveys only focus on the production side. We therefore estimate consumption indirectly based on household members' production in one of three ways. First, for 'general' activities where the benefits accrue to all members of the household—cleaning or purchasing of goods and services, for example—production is divided equally amongst all members. Second, where only a subset of household members benefit from the activity, consumption is determined based on a regression with time 'produced' by respondents as the dependent variable and the number of

beneficiaries of each age within the household as independent variables. This latter method is used in the allocation of childcare to household members: time spent caring for children is the dependent variable, while the independent variables are the number of household members aged zero, the number of household members aged one, and so on up to the upper age limit for children as defined by the survey. Finally, where beneficiaries are not members of the household such as in the case of volunteering, production is allocated to all members of the target population using the intra-household care profiles as weights.

Broadly speaking, time transfers are dependent on the balance between production and consumption. Exactly how this balance is calculated depends on whether or not the producer is also a consumer. For the 'general' activities, producers are also consumers. For these activities, the portion of time consumed by the producer does not constitute a transfer. For example, where an individual spends 30 minutes cooking for her three-person household, according to the NTTA methodology she consumes one-third of that time (10 minutes) and transfers the remaining 20 minutes (10 minutes each) to the other household members. Considered from the perspective of the household, production of cooking and consumption of cooking are both 30 minutes; however, there is a transfer outflow of 20 minutes and transfer inflows of 20 minutes. For each individual, production less consumption equals the net transfer outflow. For care activities, however, all production is transferred to others for consumption. Thus, where an individual produces 30 minutes of care, he would transfer the full 30 minutes of care to beneficiaries within the household. Again, at the household level, production and consumption both equal 30 minutes, as do both transfer outflows and inflows. Finally, where beneficiaries are non-household members—in the case of care for non-household members, for example—production equals transfer outflows, and consumption equals transfer inflows.

NTTA profiles are smoothed as is the case in NTA. This is done for all profiles except for consumption (and therefore transfer inflows) of care for infants as smoothing is likely to result in a significant underestimation. Smoothed profiles are checked to ensure consistency across profiles so that, at the aggregate level, production equals consumption, inflows and outflows between households are in balance, and inflows and outflows within households are balanced.

2.1.3 Determining the Value of Household Production

In national accounts, production is valued based on the price of the outputs (Abraham and Mackie, 2005). However, in the case of household production, none of the outputs have prices since they are not bought and sold in an open market. In order to determine the value of household production, the time spent in the various household production activities needs to be valued using an appropriate set of wages. One option is to value household production from the perspective of the prices and quality of the inputs, but such information is unavailable in most contexts. Certainly, this type of data is not collected in conventional time-use surveys.

A common approach, which NTTA also employs, is to focus purely on the labour inputs in

order to determine the value of household production. This requires attaching an appropriate wage rate to each activity. However, in focussing only on labour inputs, this approach discounts the value of capital inputs and introduces a downward bias in the valuation of household production. Nevertheless, this approach does mean that issues of double-counting are avoided in instances where production includes both purchased and non-purchased inputs, such as cooking (Donehower, 2018).

There are two main types of wage rates used to value time spent in household production, namely replacement wages or opportunity cost wages (Abraham and Mackie, 2005; Budlender, 2008). "Replacement wages are the answer to the question of what it would cost to hire someone in the market to perform the activity…[while, for opportunity cost wages, the question is] what [might] an individual…otherwise have earned in the market instead of spending time in household production activities" (Oosthuizen, 2018*a*). There are two types of replacement wages, which depend on the assumptions regarding who is able to perform the task. Specialist replacement wages are calculated on the assumption that only those engaged in the market in activities similar to a particular household production activity are appropriate replacements. For example, a specialist replacement wage for valuing household maintenance activities might be calculated using the wages of builders, handymen and other similar occupations. Generalist replacement wages, in contrast, assume that the activity can be performed by anyone from a broad range of occupations (or simply any employed individual). Thus, a generalist replacement wage for household maintenance activities might be calculated as the average wage for construction workers or, even more general, as an economy-wide average wage, as per Budlender and Brathaug (2004). Opportunity cost wages are different in that their levels are determined per individual as the wage that the individual performing a household production activity might otherwise have earned in the labour market. For the employed, the wage they earn is their opportunity cost wage; for those without employment, a wage is imputed based on the wages earned by employed individuals with similar characteristics. The NTTA approach favours the specialist replacement approach.

In terms of terminology, we follow that presented by Oosthuizen (2018*a*, p.6), outlined in Figure 1. The third party criterion is used to distinguish activities that are productive, and these are termed 'work'. The System of National Accounts (SNA) production boundary delineates SNA work from non-SNA work; these are referred to here as market work, and non-market work (or household production). Two types of activities are distinguished within household production: unpaid domestic work, also referred to as housework, and unpaid care work, including care for household members as well as non-members.

2.2 Data

The construction of NTAs and NTTAs require various types of data from a number of different sources. For NTAs, one requires detailed information on income and expenditure at the household level. This is typically obtained from a household survey of income and expenditure, although idiosyncrasies of national-level surveys may necessitate using more

Figure 1: Types of Work

Productive activities
('Work')

SNA production
('Market work')

Non-SNA production
('Non-market work',
'Household production')

Unpaid domestic work
('Housework')

Unpaid care work
('Care')

For household
members
('Intra-household care')

For non-household
members
('Inter-household care')
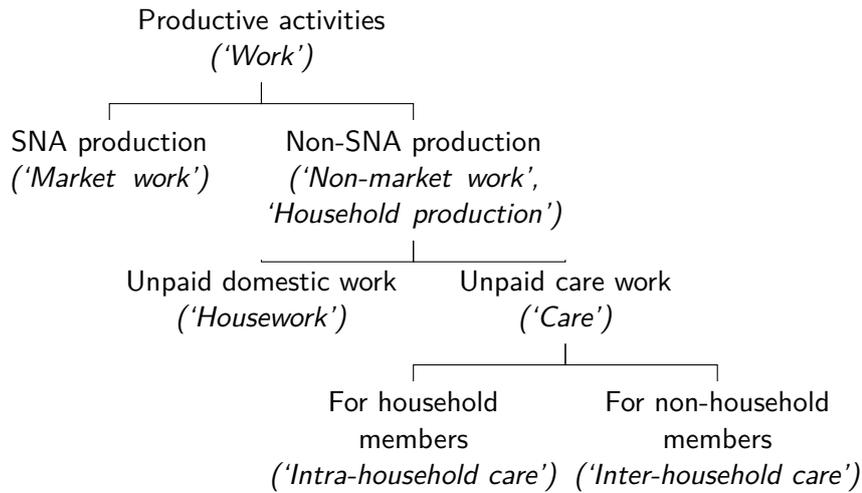
Source: Oosthuizen (2018a, p.6).

than one survey to be utilised. For NTTAs, the key source of data is a time-use survey. As time-use surveys are relatively rare in most countries, the availability of time-use data generally dictates the year in which the accounts are anchored.

Statistics Mauritius has conducted only one time-use survey. The survey was conducted in 2003 as part of the Continuous Multipurpose Household Survey (CMPHS) (Statistics Mauritius, 2003*b*). The survey was conducted over the full 2003 calendar year, with 540 households surveyed each month, for a total sample size of 6 480 housholds and nearly 20 000 individual respondents (Statistics Mauritius, 2005, p.1). The survey is representative of the urban, semi-urban and rural areas of the country; one-twelfth of the sample was from the Island of Rodrigues, with the remainder (5 940 households) from the Island of Mauritius.

Somewhat unusually, the Mauritius time-use survey collects data on time use from *all* household members over the age of ten years (Statistics Mauritius, 2005, p.1). Time-use surveys typically collect data from only one or two age-eligible respondents per household, so this full coverage of age-eligible household members in the Mauritius survey is an advantage. Data was collected through a 24-hour diary with half-hour slots, beginning from 4am. Respondents were able to list up to three activities within a given 30-minute slot, and could indicate whether or not they were conducted simultaneously. Activities were classified according to "a new activity classification system developed by the United Nations (UN) Statistical Division" (Statistics Mauritius, 2005, p.2), now known as the International Classification of Activities for Time Use Statistics (ICATUS). Importantly, the Mauritius time-use module includes prompts related to care at the end of the questionnaire and directs respondents to fill in any care work performed that might have been omitted.

Data collection was arranged so that households were surveyed evenly across the week, two households per day in each region. Since there were 15 surveyed households in each region, the fifteenth household was surveyed on any day of the week. The result is that there is some variation in the distribution of respondents across days of the week, as shown in

Table 1. Data from each day of the week are weighted by Statistics Mauritius in order to ensure a representative week, the weights being calculated as the daily average divided by the total number of respondents (male plus female) for each day.[2]

Table 1: Respondents by sex and day of the week, 2003

Day of the week	Males		Females		Total	
	Number	Deviation (%)	Number	Deviation (%)	Number	Deviation (%)
Monday	1 338	-4.6	1 389	-3.6	2 727	-4.1
Tuesday	1 325	-5.5	1 366	-5.2	2 691	-5.4
Wednesday	1 301	-7.3	1 326	-8.0	2 627	-7.6
Thursday	1 336	-4.8	1 381	-4.2	2 717	-4.5
Friday	1 640	16.9	1 692	17.4	3 332	17.2
Saturday	1 446	3.1	1 489	3.3	2 935	3.2
Sunday	1 434	2.2	1 444	0.2	2 878	1.2
Total	9 820		10 087		19 907	
Average	1 403		1 441		2 844	

Source: Statistics Mauritius (2005, p.2), and own calculations.

Notes: Deviations are calculated as the percentage difference between the number for that particular day and the average across all seven days.

Time spent in household production activities is valued using specialist replacement wages. These wage rates are calculated as mean hourly wage rates for employed individuals in occupations matched to particular activities. While the employment module in the CMPHS is asked of all individuals age 10 years and older, for the purposes of calculating specialist replacement wages only employed individuals age 15 to 59 years are considered. The exact wage rates used are presented in Table 3 in the Appendix.

NTA profiles were constructed using the microdata for the 2003 CMPHS, being the survey in which the time-use module was incorporated. The CMPHS is one of the main household surveys conducted by Statistics Mauritius: it is conducted across the full calendar year with results being released on a quarterly basis. A total of 6 480 households—540 households per month—were surveyed, with the number of respondents totalling 24 393. The survey includes a variety of modules, with the 2003 survey including modules related to labour market activity, and income and expenditure, in addition to the time-use module.

The shapes of the various NTA profiles—labour income; private consumption of education; private consumption of health; other private consumption; public consumption of education; public consumption of health; other public consumption—are constructed from the survey as sets of average values at each age. However, for various reasons including under- or over-reporting in the survey and the type of data used to construct the profile, the *levels* of these profiles are adjusted to ensure consistency with aggregate control totals calculated from national accounts and national budgets. The adjustment involves multiplying profiles by a unique factor that is constant across age for a given profile. Aggregate control totals are constructed using data on national accounts (Statistics Mauritius, n.d.*a*), institu-

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[2]The weight variable `daywght` is stored to only two decimal places in the microdataset, and is thus recalculated for greater accuracy. It should be noted that these weights do not account for gender differences in the distribution of respondents across days of the week, nor for any other differences that may exist.

tional sector accounts (Statistics Mauritius, n.d.*b*) and the national budget (Government of Mauritius, 2005). Data from UNESCO (2018) was used to disaggregate public consumption of education across levels of education, while weights from the consumer price index (CPI) (Statistics Mauritius, 2003*a*) were used to disaggregate private consumption into its main components. The aggregate control totals used are presented in Table 4 in the Appendix.

Estimates of the population of Mauritius are from the 2017 Revision of the *World Population Prospects* (United Nations, 2017). Where future population projections are required, these are the medium fertility variant.

3 Results

3.1 National Transfer Accounts by Gender

NTAs describe the resource flows across cohorts that arise as individuals produce, consume, share, and save. The focus in this paper is on producing and consuming, the activities on the lefthand side of equation 2 and which comprise the lifecycle deficit or surplus. These flows vary by age and are described by the labour income age profile ('producing') and the consumption age profile ('consuming'). The particular shapes of these age profiles are the product of numerous factors, including individual behaviours, social norms, economic conditions and institutional contexts.

Across countries, labour income profiles are typically bell-shaped, with very low levels of labour income for children and the elderly. As age increases, young people enter the labour market, resulting in steep increases in labour income, which peaks at some point during the prime working age years and then falls again. By old age, labour income is low and approaches zero. Consumption, on the other hand, tends to be relatively low amongst younger cohorts, after which it flattens out. Depending on the country context, the consumption profile may rise or fall or remain constant at the oldest ages.

Figure 2 presents the national (upper panel) and gender-disaggregated (lower panel) labour income and consumption profiles for Mauritius in 2003, with age-specific average values on the vertical axis. As is standard practice in NTA, monetary values are normalised by dividing by the unweighted mean labour income for 30 to 49-year olds, which we term an 'income unit'.

Labour income is zero below the age of 15, after which it gradually increases in the teenage years as young people move into the labour market. At age 20, labour income is 30.4 percent of peak labour income. This increases rapidly to over 100 percent of peak labour income for age cohorts aged 41 to 53 years, and is highest at age 48. Between the ages of 59 and 60 years, the national retirement age in Mauritius in 2003, there is a very steep decline in labour income as individuals rapidly exit the labour market. From 74.4 percent of peak labour income at age 59, mean labour income drops to 27.2 percent at age 60 and, by age 73, is under ten percent.

In contrast, consumption ranges between 36.4 percent and 78.7 percent of peak labour income throughout the lifecycle. Amongst children below the age of five, consumption is

Figure 2: Labour Income and Consumption in Mauritius, 2003
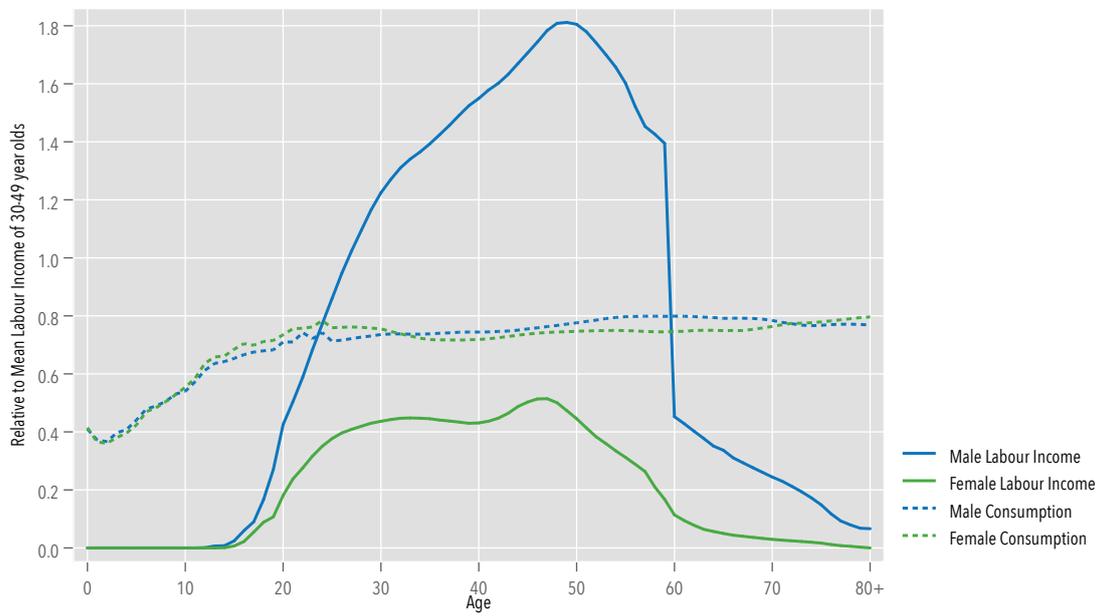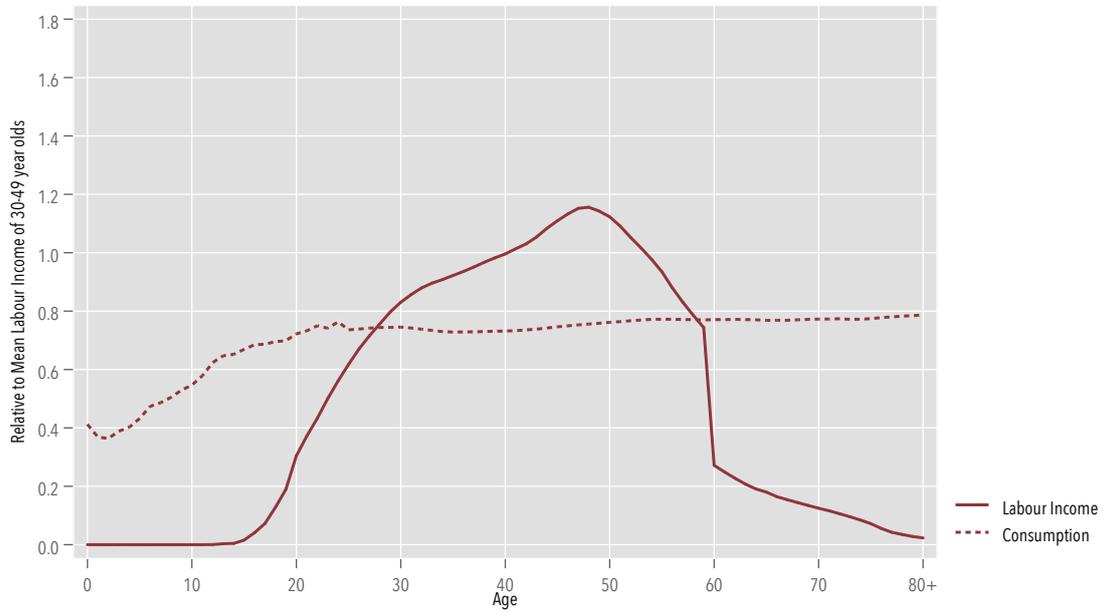
Source: Own calculations, using Statistics Mauritius (2003b, n.d.a).

highest for infants (aged below one), and ranges between 36.4 percent and 41.2 percent of peak labour income. Consumption rises thereafter, reaching 50 percent of peak labour income by age eight, and remains above 70 percent of peak labour income from the age of 20, reaching a maximum for those aged age 80 plus at 78.7 percent. This gradual increase in consumption during older ages is driven by rising consumption of health.

Once disaggregated by gender (lower panel), however, it is clear that although male and female consumption patterns are very similar, there are marked differences in labour income between males and females over the lifecycle. Labour income for males is higher than for females at every age for which labour income is not zero. For males, it rises rapidly from the late teens onwards, peaking at over 1.8 income units between the ages of 48 and 50. In contrast, female labour income rises more slowly and peaks at just over 0.5 income units between the ages of 45 and 48. These differences result in a substantial gap opening up between the genders. By the age of 26, labour income for males is 0.55 income units (or almost 140 percent) higher than for females. The absolute gap is largest for cohorts aged 37 to 59: at these ages labour income for males is higher than that of females by over 100 percent of peak labour income. After the age of 60, the absolute gap narrows substantially, driven by the sharp decline in labour income for both men and women after retirement age, although mean labour income for males remains several times that of females.

Gaps in consumption are far more modest, with females consuming marginally more than males between the ages of 10 and 31 years and male consumption exceeding female consumption between the ages of 32 and 71 years. However, methods for allocating household consumption to males and females are not particularly sophisticated. For private consumption other than health and education, for example, the adult equivalence scale used to allocate consumption varies by age, but not by gender. This limits our ability to detect differences in consumption patterns between males and females as only differences across households are detected, while consumption between same-aged persons of different genders within the household is assumed to be equal.

Comparisons of labour income and consumption reveal that while male labour income exceeds consumption between the ages of 24 and 59 years, female labour income never exceeds female consumption. In other words, males generate a lifecycle surplus during the prime working ages, while females remain in deficit at every age. As highlighted earlier, though, these NTA profiles include only market work and consumption and do not include any measure of household production or consumption. The following section aims to address this to obtain a more complete understanding of dependence across the lifecycle.

3.2 Time Use Across the Lifecycle

### 3.2.1 Patterns of Time Use

Time-use surveys provide a wealth of information on the activities performed by individuals throughout the day, enabling us to determine average time-use patterns over age and gender. Figure 3, based on data from the time-use module of the 2003 CMPHS, presents the age-specific average allocation of time in terms of seven activity categories for Mauritians aged 10

years and older. These time activity categories are market work, housework, care, learning, sleeping, 'doing nothing', and all other activities. Across the entire population aged 10 years and older, Mauritians spent on average 2.9 hours in market work, 2.9 hours doing housework, and 0.4 hours caring for others—all of which are classified as productive activities—and 0.7 hours per day learning. Thus, the average Mauritian spent a total of 6.3 hours per day in productive activities in the household and the labour market in 2003. Most of the typical day (17.7 hours) is spent on non-productive activities, including personal care, leisure and sleep. While time spent sleeping is lowest for working-age cohorts (aged 15 to 59 years), even these respondents report sleeping an average of 8.2 hours per day.

Figure 3: Time Use by Age in Mauritius, 2003
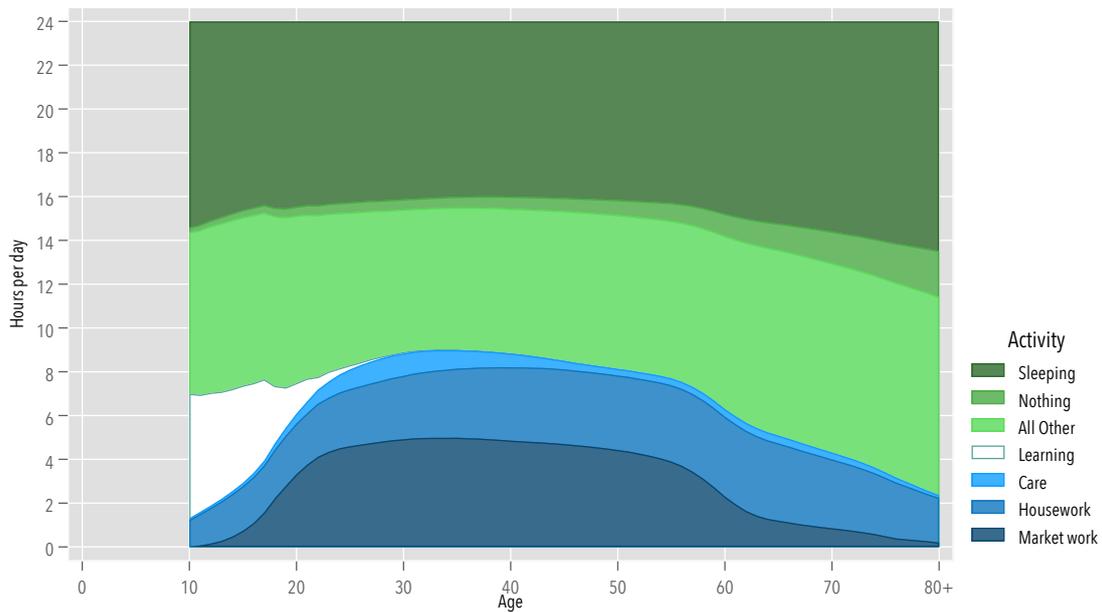
Source: Own calculations, using Statistics Mauritius (2003b).

A number of activities are revealed to have a strong lifecycle component to them. For example, time allocated to learning is concentrated amongst the youngest cohorts, averaging 4.9 hours per day for cohorts aged 10 to 16 years and dropping substantially to one hour per day by age 21. Time spent in market work is concentrated in cohorts aged 19 to 59, averaging 4.4 hours per day. For cohorts younger than 19, this figure is 0.7 hours, while the average for those aged 60 years and above is 0.9 hours.

Time spent doing housework is more stable over the lifecycle, averaging 1.9 hours per day under the age of 20 and rising very gradually with age to peak at more than 3.5 hours per day during the ten years on either side of 60. Even amongst those aged 80 years and older, an average of 2.0 hours per day is spent doing housework. Time spent caring for others peaks sooner, at around one hour per day between the ages of 26 and 32 years. Within ten years, this allocation is halved but averages around 0.3 hours for much of the remainder of the lifecycle.

In order to determine gender differences in time allocation across the lifecycle, Figure 4

plots the difference between male and female time use across the seven activity categories by age. Where the difference is positive, females in that age cohort allocate more time, on average, to that activity than males; conversely, when the difference is negative males allocate more time to the activity.

Figure 4: Gender Specialisation in Time Use by Age in Mauritius, 2003
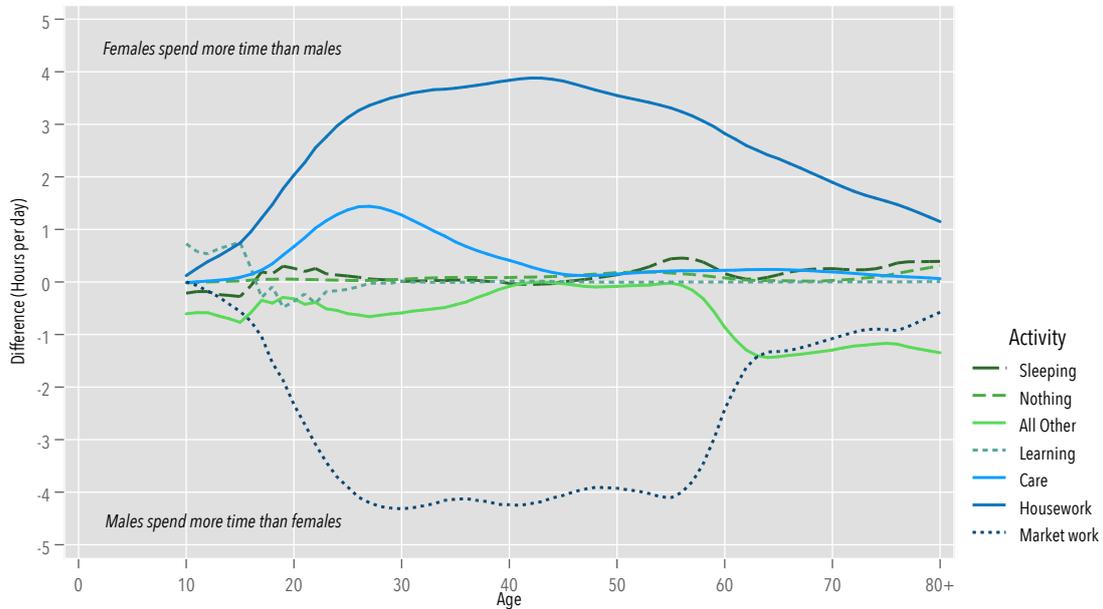
There are four activities with substantial gender specialisation over the lifecycle. Females specialise in housework and care work, while males specialise in market work and all other activities, which includes leisure and personal care. Housework and market work reveal the greatest degree of gender specialisation. For those aged between 17 and 72 years, males spend at least one hour more per day in market work than females. This difference is largest between the ages of 22 and 59, when males spend on average 4.0 more hours per day in market work than females. Similarly, females spend on average at least one more hour on housework than males from the age of 16 onwards. This difference peaks between 20 and 69 years of age, with females spending on average 3.2 hours more per day doing housework than males.

Care work is also an activity in which females specialise, although the gender differential is smaller in absolute terms than for either market work or housework. The extent of specialisation is greatest for younger cohorts. Females aged 22 to 33 years spend at least one hour more per day caring for others than males, with the difference peaking at age 27 at 1.4 hours per day. While this figure is smaller than the gender differential for household chores or market work, it is substantial when compared with the average time spent on care work across the overall population. As noted above, the average Mauritian allocates 0.4 hours per day to care work. At 1.4 hours per day, the peak gender difference for care activities

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is 3.2 times the average allocation to care for the population as a whole. In comparison, the peak gender difference of 4.3 hours per day for market work is 1.5 times the population average of 2.9 hours per day. The greatest gender differential in allocation of time to "all other activities" is from the retirement age of 60, when men spend on average 1.3 hours more per day in these activities than women, coinciding with the steep decline in market work for men.

Gender differentials in time allocated to learning are important as they have clear implications for differences in the development of human capital between men and women. Time spent in learning is marginally higher for girls than for boys up until age 16 (between 0.3 and 0.8 hours per day), after which males allocate slightly more time in learning activities until the age of 26 (between 0.1 and 0.5 hours per day). This specialisation in learning for males in early adulthood may indicate disadvantage for females in terms of higher educational attainment, either through lower enrolment rates or through constraints on their ability to allocate time to learning in the day.

3.2.2 Housework and Care

We now look more closely at the both the time and monetary value of the gender differential in unpaid household work across age cohorts. Time inputs are valued using specialist replacement wage rates, which are detailed in Table 3 in the Appendix, and are calculated on a per annum basis. Figure 5 presents the profiles of housework (or household chores) by gender in terms of both time (lefthand panel) and the monetary valuation of that time (righthand panel). For females, time spent on household chores follows an inverted-U pattern, rising steadily from 1.3 hours per day at age 10 to 5.4 hours at age 43, before declining to below three hours per day by the late seventies. For males, the time-profile of household chores is bimodal: time spent on chores is 1.2 hours at age 10, rising to 1.7 at age 15. After a small decline until the mid-twenties, time allocated to chores averages 1.6 hours for age cohorts 27 to 65, peaking at 2.3 hours in the years immediately following retirement, before falling again.

The broad patterns observed in terms of time spent doing household chores across the lifecycle are similar when viewed in monetary units. For females, the value of the time spent on chores peaks at age 43, at Rs 70 600 per capita per annum[3], equivalent to 54.7 percent of nominal GDP per capita, estimated at Rs 128 998 in 2003 (World Bank, 2018). The value of time spent on household chores for females is at least Rs 50 000 for age cohorts 23 to 71. For males, the value of time spent on chores peaks at Rs 32 000 per annum at age 64, equivalent to 24.8 percent of GDP per capita.

Figure 6 reveals that time allocated to care work is substantially lower than that allocated to housework for both genders. For females, time allocated to care work unsurprisingly peaks during prime reproductive years. Between the ages of 21 and 38, the average woman spends at least one hour on care work per day, and as much as 1.7 hours per day at age 28. From this peak, time allocated to care falls sharply until the late forties. A second, but much lower,

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[3]All valuations are reported to the nearest Rs 100.
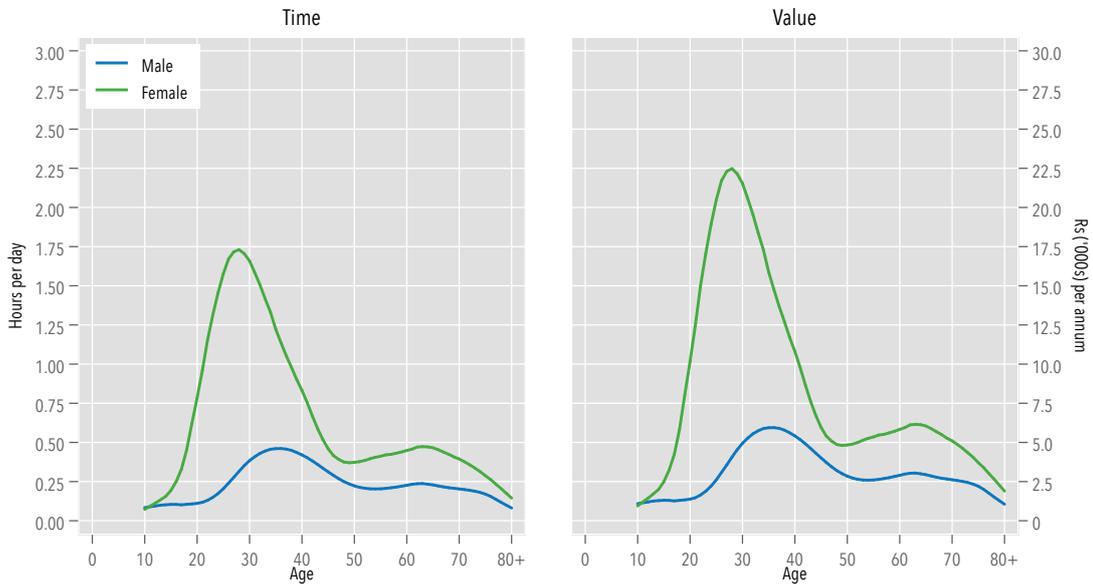
Figure 5: Housework in Mauritius, 2003
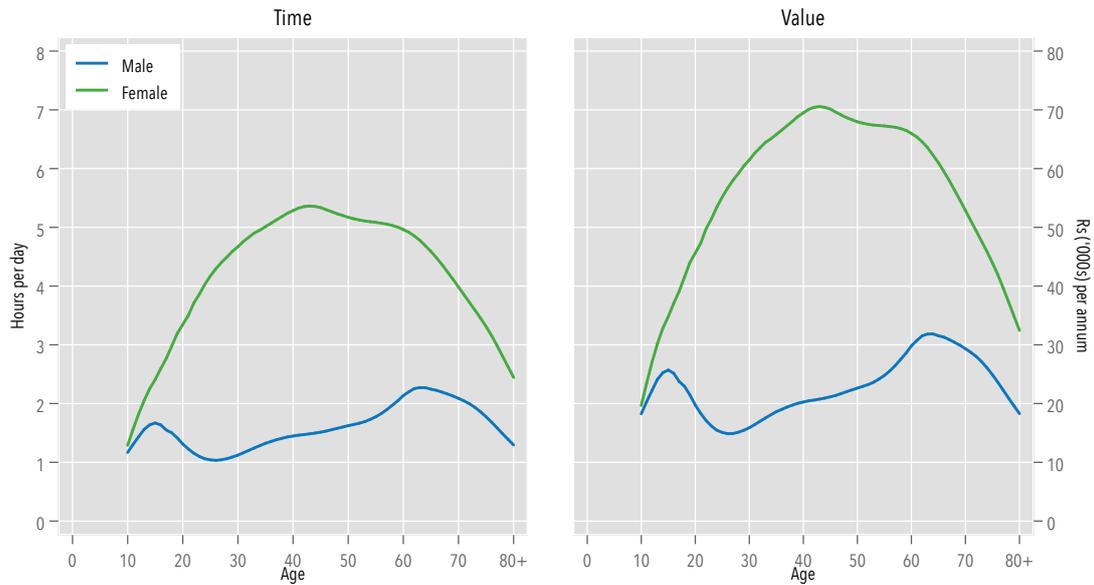
peak—just under 0.5 hours per day—is observed for women in their early- to mid-sixties. Males, on the other hand, allocate on average no more than half an hour to care work per day throughout their lifecycle, even during their prime reproductive years. Time allocated to care work averages 0.26 hours (16 minutes) from age 19 to 80, peaking at 0.46 hours (28 minutes) at age 36. It is therefore clear from the time profiles that there is substantially more variation across the lifecycle in terms of time allocated to care work for women than is the case for men.

In monetary terms, the value of the time females allocate to care work peaks at age 28 at Rs 22 500 per annum or 17.4 percent of GDP per capita. It remains over Rs 10 000 per annum from the ages of 20 to 40. This stands in stark comparison to a peak of Rs 5 900 per annum for men, which occurs at age 36 and is equivalent to a mere 4.6 percent of GDP per capita.

To obtain the gender-disaggregated age profiles of non-market work in Mauritius, Figure 7 combines the time allocated to housework and care work (lefthand panel) and presents the monetary value of this time in the righthand panel. The production of non-market work in Mauritius is substantial, with women aged 23 to 65 allocating over five hours per day to non-market work. Women around age 30 spend the most time in non-market production: on average, 31-year-olds allocate 6.3 hours per day to non-market work, valued at Rs 83 200 or 64.5 percent of GDP per capita. The value of household production for females remains over Rs 70 000 per annum from ages 24 to 62 years.

Time allocated by men to non-market production is highest amongst those cohorts in early retirement and peaks at age 63 at 2.5 hours per day. This translates to a peak in the value of non-market production of Rs 34 900 per annum at the same age (equivalent to

Figure 6: Care in Mauritius, 2003

Source: Own calculations, using Statistics Mauritius (2003b, n.d.a).

Figure 7: Non-Market Work in Mauritius, 2003
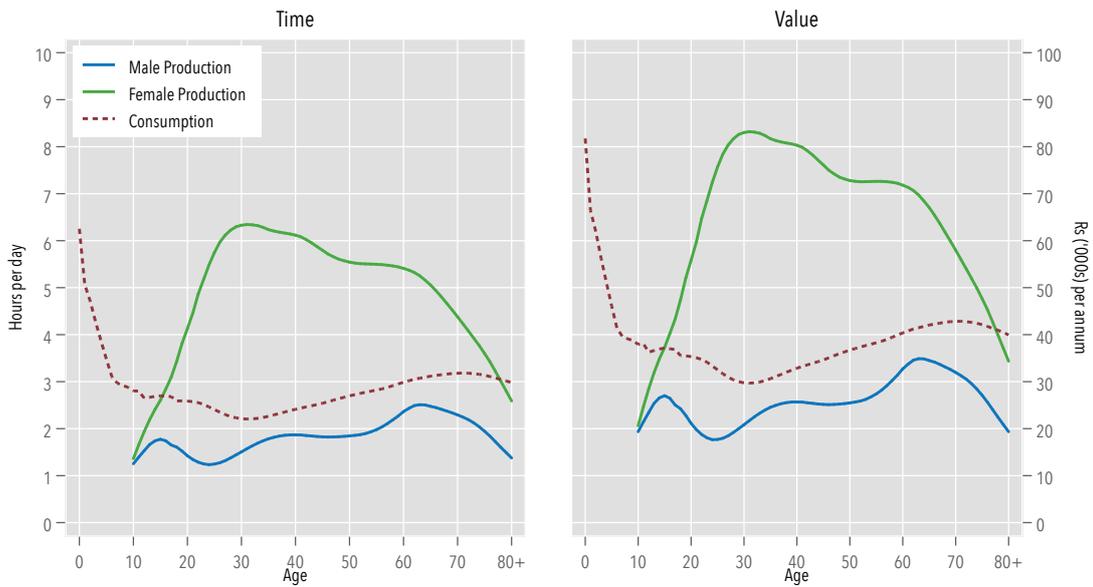
Source: Own calculations, using Statistics Mauritius (2003b, n.d.a).

27.1 percent of GDP per capita). Two other local peaks are observed in both the time and value profiles, one during the mid-teens and one in the late thirties. While the two sets of profiles—time and value—are quite similar, the relatively high specialist replacement wages for care activities means that the peak for women is slightly more pronounced in monetary terms.

Also included in Figure 7 is the consumption profile for males and females combined. While it is possible to disaggregate the consumption profile by gender, the methods used to impute non-market consumption are not able to accurately account for gender differentials. As a result, male and female consumption profiles are typically very similar and using the overall consumption profile therefore provides a good approximation for both genders. The consumption profile indicates that consumption of non-market work is highest for infants and young children. Infants under one consume on average 6.3 hours of non-market work per day, a figure that includes both housework and care. This falls to 5.1 hours for one-year olds and 3.5 hours for five-year olds. From the age of seven, consumption of non-market work remains below three hours per day until age 61, bottoming out at 2.2 hours in the early thirties. After age 60, consumption of non-market work averages 3.1 hours per day. In monetary terms, the value of consumption by infants is estimated at Rs 81 800 per annum (63.4 percent of GDP per capita), falling to Rs 39 700 by age seven. At its lowest point, at age 31, per capita consumption is estimated at Rs 29 700, or 23.0 percent of GDP per capita, before rising to average Rs 41 800 from age 60 (32.4 percent of GDP per capita).

A comparison of the production and consumption of non-market work reveals that females produce more non-market work than they consume for extended periods of their lives: women are net producers of non-market work from age 15 to 77. On the other hand, males consume more non-market work than they produce at every age; in other words, men are always net consumers of non-market work and this is true whether measuring in time or monetary terms. This is in stark contrast to Figure 2, which showed a substantial market lifecycle surplus for males, but no surplus for females at any age.

3.3   Market and Home Production Combined

3.3.1   Total Production and Consumption

These profiles of the value of non-market production and consumption can be incorporated into the NTA age profiles of market production and consumption in order to construct a picture of total production and consumption across the lifecycle. Figure 8 provides the total production profiles (solid lines) and market production profiles (dotted lines) by gender. This is given both in terms of time allocated to production (lefthand panel) and the monetary value of that time (righthand panel).

It is clear that incorporating our estimates of non-market production into the NTA profiles has considerable impact on the total hours of production for men and women across the lifecycle. While we previously noted that men specialise in market work and women specialise in non-market work, combining these profiles reveal that, in terms of time allocated, men spend more time than women on productive activities only between the ages of 41 and 58
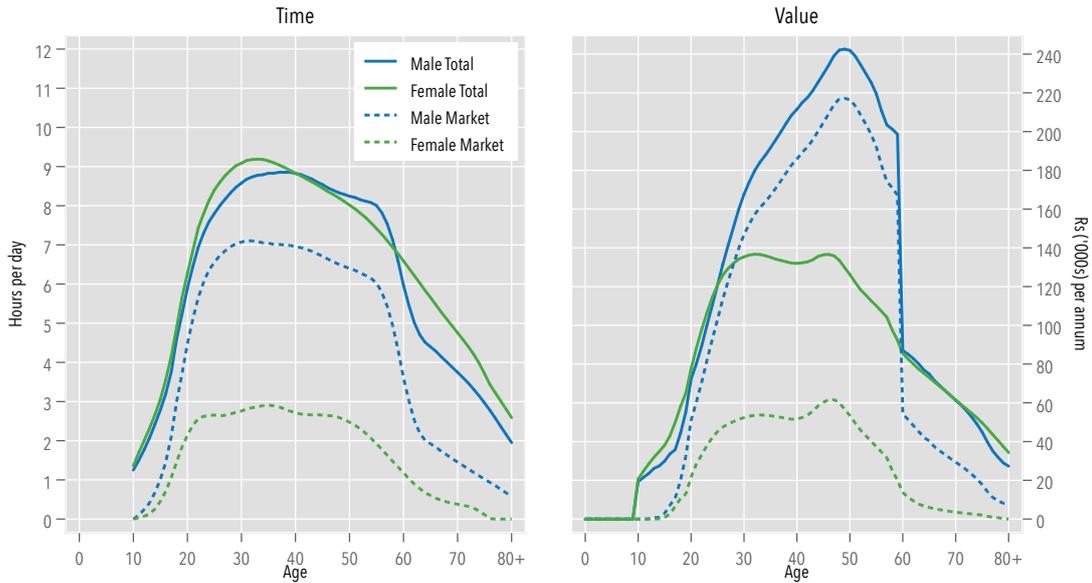
years. Amongst these cohorts, men's time allocations to productive activities is up 0.6 hours more than that of their female counterparts. Similarly, amongst cohorts under the age of 41, females also allocate up to 0.6 hours more than males to productive activities; however, amongst cohorts over the age of 58, the gap is as much as 1.3 hours.

In monetary terms, the two dotted lines in the righthand panel indicate a substantial gap in labour income between men and women, a result of both the differences in the time allocated to market work and the monetary value of that work between men and women. After adjusting for the value of non-market work, there is a small increase in the value of total production for men, with larger increases in the teenage years and for retired cohorts (i.e. those over the age of 60 years). For women, the difference in the profiles of market and total work is substantial across all age cohorts but is largest for women from their late twenties to age 40; including non-market production adds more than Rs 80 000 to the value of total production for each of these age cohorts. As a result, females outproduce males in terms of the value of total production amongst the youngest and oldest age cohorts (10 to 25 years, and 70 years and above). In monetary terms, the gap between male and female total production is largest amongst cohorts aged 47 to 59 years. At these ages, males outproduce females by at least Rs 100 000 per annum—except for age 57 when it is Rs 99 300—with a peak of Rs 116 800 per annum (90.5 percent of GDP per capita) observed at age 51.

Figure 9 presents production and consumption profiles for males and females in order to assess the impact of including non-market work in our estimates of total production and consumption across the lifecycle. Dotted lines represent market production and consumption, while solid lines represent total production and consumption. A number of key observations are worth highlighting. First, including household production into our estimates of total

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production reveals that both the young and old are substantial contributors to the economy. This is especially the case for older females: while market production for females over the age of 59 was on average Rs 4 400 per annum, total production was nearly 14 times as large, averaging Rs 61 000 per annum.

Figure 9: Total Production and Consumption in Mauritius, 2003
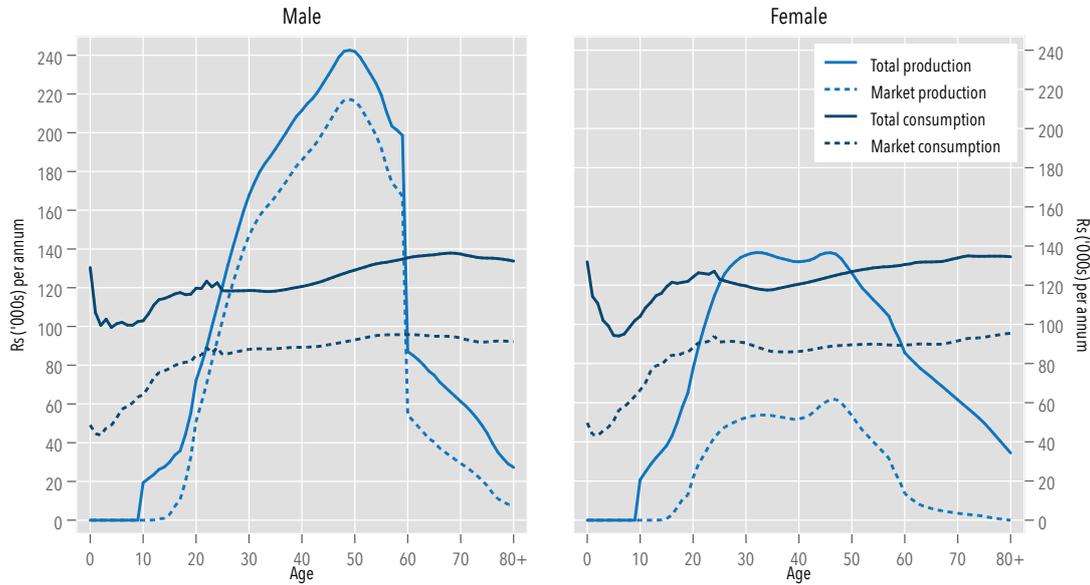
Source: Own calculations, using Statistics Mauritius (2003b, n.d.a).

Second, while for females market production is below market consumption across the lifecycle, accounting for the production of non-market work results in a modest surplus in total production for cohorts between the ages of 26 and 49 years. Conversely, the large surplus in market production for men is reduced when accounting for non-market work, as the consumption of non-market work is higher than its production for men at all ages. Third, factoring in non-market consumption reveals that young children are substantially more expensive than if we only account for the consumption of market work. This is especially true for infants, who consume large amounts of care. Total consumption amongst infants is between Rs 130 000 and Rs 132 000 per annum, depending on their gender, compared with market consumption of between Rs 49 000 and Rs 50 000 per annum. There is therefore a substantial difference between the market cost of having children and the total cost, when allowing for the cost of time spent caring for them. This cost will therefore feed into the decision to have children, particularly for women, on whom the burden of care is most likely to fall.

While per capita profiles are useful, they do not provide a sense of total production and consumption at a national level. In order to assess these national level flows, Table 2 provides aggregate measures of household production for Mauritius in 2003 by gender and age-group, both in terms of time allocated and monetary value. In total, the population of Mauritius spent almost 2.5 billion hours in productive activities in 2003. This was split almost

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equally between market and household production, with market production accounting for 50.5 percent of total production. Within household production, housework accounts for 84.9 percent of the total, while the majority of time spent on care (88.5 percent) is for household members. The gender split in terms of time spent in productive activities is almost equal: females make up 50.4 percent of the population and account for 51.4 percent of time in productive activities. As already seen, there is substantial gender specialisation in terms of the type of productive activity performed: females account for 74.8 percent of all time allocated to household production, while males account for 71.6 percent of all time allocated to market production. The only household activity where there is almost equal division of labour between men and women is in the care of non-household members, although time allocated to this activity makes up a very small fraction of overall time spent on productive activities in Mauritius.

Although making up only half of the population (51.1 percent), almost three-quarters (73.9 percent) of total productive time is accounted for by those aged between 18 and 49 years old. There is considerable variation in the types of productive activities performed across age cohorts. While the age cohort under the age of 18 accounts for 5.7 percent of total time spent in productive activities, this cohort's share of time in household production is 9.1 percent, driven by a disproportionate share of the time allocated to housework (10.0 percent) and to the care of non-household members (8.1 percent). The cohort aged 18 to 29 years account for a disproportionately high share of time allocated to care of household members (37.0 percent), while contributing relatively less of the time spent on housework (21.6 percent), compared with their share of 26.4 percent of total productive time. Cohorts age 30 to 49 years account for 52.0 percent of market production, compared with their share of 47.5 percent of total productive time. Finally, the oldest cohorts—aged 50 to 59, and 60 years and older—account for relatively large shares of housework and care for non-household members.

Total production in Mauritius in 2003 is valued at Rs 120.9 billion for the year. Three-fifths (62.2 percent) of this is accounted for by market work, or labour income. The value of unpaid household production in the economy is Rs 45.7 billion, or 37.8 percent of the value of total production. Within household production, housework makes up 85.6 percent of its overall value. While females account for 28.4 percent of the time allocated to market work, they earn only 23.1 percent of total labour income, indicative of lower average wages for women than men. Similarly, the two youngest cohorts make up 2.4 percent and 29.0 percent of time allocated to market production, but earn only 0.3 percent and 19.9 percent of labour income. On the other hand, the share of labour income for age cohorts 30 to 49 is 7.1 percentage points higher than this cohort's share of time allocated to market work.

To put these figures in context, labour income is equivalent to 47.8 percent of GDP in 2003. Household production is equivalent to 29.0 percent of GDP, of which 24.8 percentage points are attributable to housework, 4.2 percentage points to care for household members, and 0.5 percentage points to care for non-household members. Labour income earned by males is equivalent to 36.7 percent of GDP; more than three time the proportion for females

Table 2: Value of Aggregate Household Production relative to GDP, 2003

	Under 18 yrs	18-29 yrs	30-49 yrs	50-59 yrs	60 yrs plus	Male	Female	TOTAL
Total Time (millions of hours per annum)								
Housework	105	227	443	149	127	265	785	1 049
Care	8	66	89	13	12	46	141	187
For HH members	6	61	81	9	8	36	130	165
For non-members	2	4	7	4	4	10	12	22
Household Production	113	292	531	162	139	310	926	1 236
Market Production	31	367	657	167	41	904	359	1 263
Total	143	659	1 188	329	180	1 215	1 285	2 499
Share of Time (%)								
Housework	10.0	21.6	42.2	14.2	12.1	25.2	74.8	100.0
Care	4.1	35.1	47.4	7.1	6.3	24.5	75.5	100.0
For HH members	3.6	37.0	49.1	5.5	4.8	21.6	78.4	100.0
For non-members	8.1	20.7	33.8	18.9	18.5	46.4	53.6	100.0
Household Production	9.1	23.6	43.0	13.1	11.2	25.1	74.9	100.0
Market Production	2.4	29.0	52.0	13.3	3.3	71.6	28.4	100.0
Total	5.7	26.4	47.5	13.2	7.2	48.6	51.4	100.0
Total Value (Rs billions per annum)								
Housework	4.3	8.5	16.2	5.5	4.7	10.4	28.7	39.1
Care	0.3	2.3	3.1	0.5	0.4	1.6	5.0	6.6
For HH members	0.2	2.2	2.9	0.3	0.3	1.3	4.6	5.9
For non-members	0.1	0.1	0.2	0.1	0.1	0.3	0.4	0.7
Household Production	4.6	10.8	19.3	5.9	5.1	12.0	33.7	45.7
Labour Income	0.3	15.0	44.4	13.6	1.9	57.8	17.4	75.2
Total	4.9	25.8	63.7	19.5	7.0	69.8	51.1	120.9
Share of Value (%)								
Housework	11.0	21.7	41.3	13.9	12.0	26.7	73.3	100.0
Care	4.1	35.1	47.4	7.1	6.3	24.2	75.8	100.0
For HH members	3.6	37.0	49.1	5.6	4.8	21.6	78.4	100.0
For non-members	8.0	20.4	33.4	19.2	19.0	45.8	54.2	100.0
Household Production	10.0	23.7	42.2	13.0	11.2	26.3	73.7	100.0
Labour Income	0.4	19.9	59.1	18.1	2.5	76.9	23.1	100.0
Total	4.0	21.3	52.7	16.1	5.8	57.8	42.2	100.0
Value Relative to GDP (% of GDP)								
Housework	2.7	5.4	10.3	3.5	3.0	6.6	18.2	24.8
Care	0.2	1.5	2.0	0.3	0.3	1.0	3.2	4.2
For HH members	0.1	1.4	1.8	0.2	0.2	0.8	2.9	3.8
For non-members	0.0	0.1	0.2	0.1	0.1	0.2	0.2	0.5
Household Production	2.9	6.9	12.3	3.8	3.2	7.6	21.4	29.0
Labour Income	0.2	9.5	28.2	8.6	1.2	36.7	11.1	47.8
Population share (%)	*29.9*	*20.3*	*30.8*	*9.7*	*9.3*	*49.6*	*50.4*	*100.0*

Source: Own calculations, using Statistics Mauritius (2003b, n.d.a); United Nations (2017).

Note: Figures expressed as share of GDP, which was Rs 157 394 billion in current prices. Rupee values of household production are in 2003 current prices.

(11.1 percent). In contrast, the value of household production for females is equivalent to 21.4 percent of GDP, compared with 7.6 percent for males. The aggregate figure of 29.0 percent of GDP for household production is in the general range of estimates derived for various countries around the world (see, for example, Jiménez-Fontana (2017); Oosthuizen (2018b); Rivero (2018)).

3.3.2 Lifecycle Deficits

The difference between the flows of production and consumption examined above can be captured in the concepts of the lifecycle deficit (consumption exceeds production) or surplus (production exceeds consumption). This can be calculated using the conventional NTA methodology, using only market production and consumption, or amended to include household production and consumption. Figure 10 presents the total and market only lifecycle deficits for men and women across the lifecycle. As per standard practice in NTA, values are expressed relative to mean labour income of 30 to 49-year olds (the y-axis). For males, the NTA lifecycle deficit (indicated by the dotted line) is positive before the age of 24 and after the age of 59. Males therefore consume more than they produce through the market at these ages. This implies that the market lifecycle deficit is negative for ages 24 to 59; in other words, men generate a lifecycle surplus at these ages. Females, on the other hand, do not generate a market lifecycle deficit at any age.

Figure 10: Total Economy Lifecycle Deficits by Gender in Mauritius, 2003
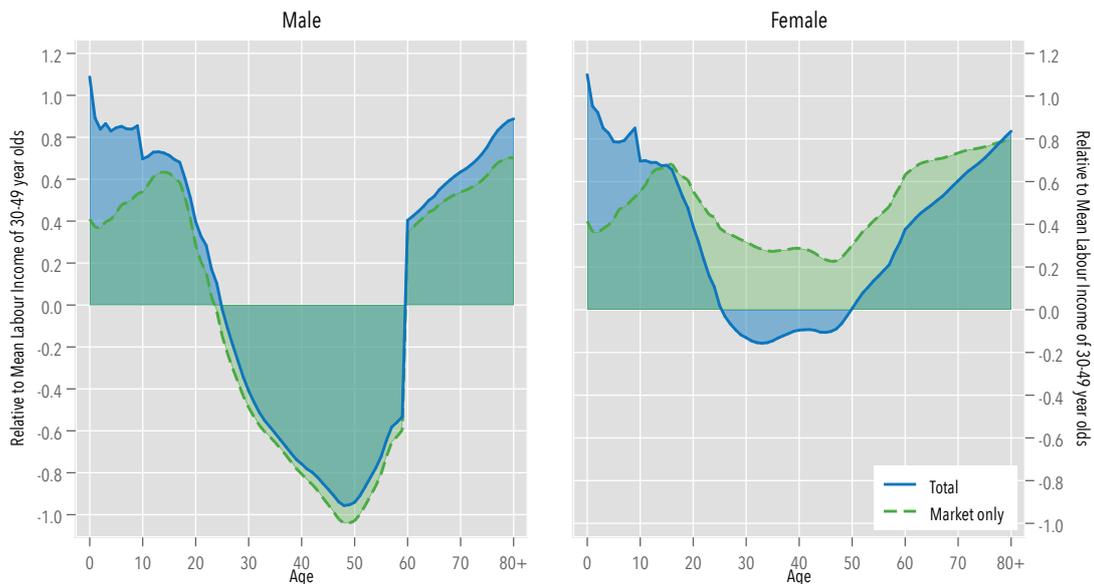
Source: Own calculations, using Statistics Mauritius (2003b, n.d.a).

The addition of the production and consumption of non-market work has little effect on the lifecycle deficit for males. While the deficit is increased and the surplus decreased across the lifecycle, the overall effect is small, primarily increasing the deficit for younger cohorts who are high consumers of non-market work. The increase for infants is largest, at 67.8 percent of peak labour income, and it remains above 30 percent for children under the age of 10. Among older cohorts, the largest increase is for those over 70 years, averaging 14.1 percent of peak labour income.

For females, the difference between the NTA and total economy lifecycle deficits is more pronounced. The prominent result is that, once household production is accounted for, females aged 26 to 49 who were in a lifecycle deficit now generate a modest lifecycle surplus.

As with males, accounting for household production increases the lifecycle deficit for young cohorts (age 14 and under). The lifecycle deficit is also greatly reduced for cohorts aged 50 to 65, by between 20.8 percent and 29.5 percent of peak labour income. The lifecycle deficit is smaller (or the lifecycle surplus is larger) for females than for males for age cohorts aged 10 to 23 years, as well as those aged 60 years and above.

3.4 Demographic Dividends

The notion of a demographic dividend has gained increasing prominence over the past decade or more, particularly as countries seek to accelerate economic growth and development. Within the African context, this recognition of the importance of the demographic dividend is manifested in the African Union's designation of the theme for 2017 as "Harnessing the Demographic Dividend through Investments in Youth". Many African countries face significant demographic pressures: it is estimated, for example, that the continent's working-age population will expand by 214 percent between 2013 and 2063, with even more rapid increases expected in Central, West and East Africa (Ewinyu et al., 2018). If this expansion can be properly harnessed, these countries will be able to enjoy a demographic dividend.

Within the NTA framework, two demographic dividends are distinguished. The first demographic dividend is dependent on falling fertility and is described as the additional growth in per capita consumption that is potentially available as a country's largest age cohorts enter the working ages. The second dividend, which can permanently boost productivity and growth, comes about due to growth in a country's stock of savings as these large cohorts approach retirement. The focus here is only on the first demographic dividend, which can be estimated using NTAs. To do so, we begin with the following identity, which describes consumption per effective consumer (Mason and Lee, 2007, p.133):

$$\frac{C(t)}{N(t)} = c(t)\frac{Y(t)}{L(t)}\frac{L(t)}{N(t)} \tag{3}$$

where $C(t)$ is total consumption, $Y(t)$ is labour income, and $c(t)$ is the ratio of consumption to labour income. $N(t)$ and $L(t)$ refer to the effective number of consumers and the effective number of producers respectively. These aggregates are derived from the NTA labour income and consumption profiles as:

$$L(t) = \sum_{a=0}^{\bar{\omega}} \gamma(a)P(a,t) \tag{4}$$

$$N(t) = \sum_{a=0}^{\bar{\omega}} \phi(a)P(a,t) \tag{5}$$

where $P(a,t)$ refers to the population aged a in period t, while $\gamma(a)$ and $\phi(a)$ are "age-specific, time-invariant vectors of coefficients measuring age variation in productivity and consumption, respectively" (Mason and Lee, 2007, p.133) or simply the per capita labour and consumption age profiles.

The first demographic dividend measures the pure demographic effect of a changing

population structure on consumption per effective consumer, *ceteris paribus*, and operates through the final factor within equation 3. This factor, $L(t)/N(t)$, is known as the economic support ratio and is defined, using the same notation as above, as:

$$SR_t = \frac{L(t)}{N(t)} = \frac{\displaystyle\sum_{a=0}^{\bar{\omega}} \gamma(a)P(a,t)}{\displaystyle\sum_{a=0}^{\bar{\omega}} \phi(a)P(a,t)} \tag{6}$$

The rate of change of the support ratio is the first demographic dividend.

Mauritius is something of an outlier in Africa in terms of the age structure of its population. In 2018, it is estimated that 57.5 percent of the population are between the ages of 20 and 59 years; 25.3 percent are under the age of 20, while 17.2 percent are aged 60 years and above (own calculations, United Nations, 2017). In contrast, for Africa as a whole, the population aged 20 to 59 years accounts for just 43.6 percent of the total, with those under the age of 20 accounting for 50.9 percent and those aged 60 years and above representing 5.5 percent of the population. The population of Mauritius is therefore considerably older and is expected to age rapidly, with the median age nearly doubling from 24.9 in 1990 to 37.4 in 2020 and further to 48.6 in 2060, an increase of almost 24 years compared to just 9.2 years (from 17.6 to 26.8 years) for Africa as a whole.

Given the age structure of the population and the anticipated population ageing over the next four decades, one would expect Mauritius to already have proceeded through much of its first demographic dividend. Estimates of the demographic dividend for Mauritius between 1990 and 2060 are presented in Figure 11. The baseline demographic dividend is estimated to have fallen from just over one percent in 1990, to just under 0.6 percent in 2003 and by 2011 is estimated to have fallen below zero. This means that the effect of the changing population age structure in Mauritius between 1990 and 2010 raised per capita consumption (or living standards), but from 2011 onwards changing demographics will exert downward pressure on living standards.

With only a single year's worth of NTAs, however, demographic dividend projections assume that the patterns of labour income and consumption across the lifecycle are unchanging. The result is that the entire effect on per capita consumption can be ascribed to changes in the population age structure; however, it does not allow for changes in any of the factors that influence the shapes of these profiles. In terms of the focus of this paper, this reliance on a static age profile of labour income does not allow for improvements (or deteriorations) in women's access to jobs and wages, for example. To explore this issue, we provide two simulations of the demographic dividend that allow for a narrowing of the gap in male- and female-specific labour income profiles (i.e. the profiles presented earlier in lower panel of Figure 2).

To do this, we allow the female labour income profile to shift gradually over a 40-year period, beginning from 2003. Thus, while a static male labour income profile is used for the full period, we use the original female labour income profile prior to 2003, the gradually

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shifting female labour income profiles from 2003 to 2043, and then continue to use the new 2043 profile for subsequent years. The two scenarios differ in terms of the extent to which the gender gap in the labour income profiles is narrowed: the first scenario allows the gap to narrow by 25 percent, while the second allows it to narrow by 50 percent.

Figure 11: Demographic Dividends in Mauritius, 1990-2060
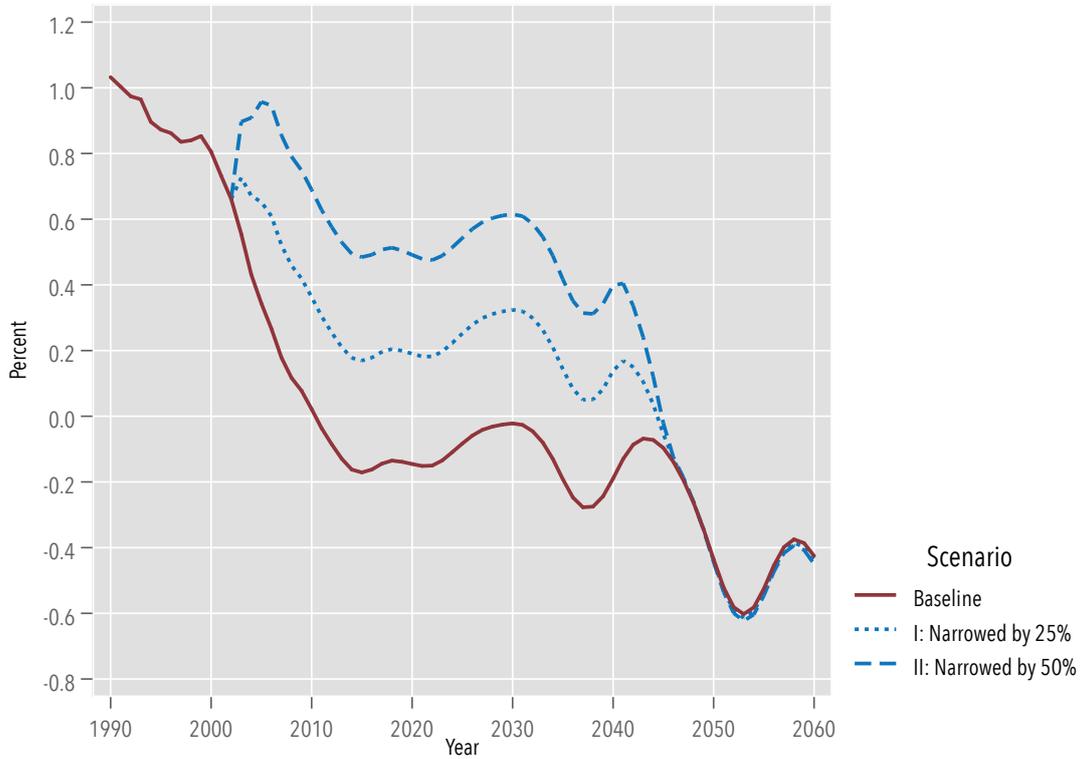
Source: Own calculations, using Statistics Mauritius (2003b, n.d.a); United Nations (2017).

As is clear from Figure 11, narrowing the gap between the male and female labour income profiles boosts the magnitude of the demographic dividend during the 40-year adjustment period and extends the period during which Mauritius enjoys a positive demographic dividend. Narrowing the gap by 25 percent sees the dividend fall more slowly during the 2000s, allowing it to stabilise around 0.2 percent per annum by the mid-2010s and remain around that level until the early 2040s. For much of this period, the 50 percent narrowing yields a dividend roughly 0.3 percentage points per year higher than that observed with a narrowing of 25 percent. Considered across the entire 2003-2043 period, the baseline estimates indicate that the changing structure of the population will lower real per capita consumption by 2.1 percent. In contrast, narrowing the gender gap in labour income by 25 percent would allow per capita consumption to rise by 11.8 percent over the period; a 50 percent narrowing would allow it to rise by 25.6 percent.

These simulations might lead one to the conclusion that in order to prolong the demographic dividend policy should simply encourage greater access to employment and wages for women. While this is true to an extent, these simulations do not account for the fact that

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this greater access to employment and wages would generally have implications for the time that women have available to allocate to household production. If women are to allocate more time to market work without significantly increasing their total time allocations to productive activities, then household members would need to negotiate a new distribution of household production across gender and possibly age that would support women's ability to work outside the household.

Fortunately, though, narrowing the gender gap in labour income profiles does not necessarily require an increase in the time women allocate to the market, since it can be achieved through a number of mechanisms. These include "increased labour force participation; lowered unemployment rates; raised employment-to-population ratios; increased hours of work or higher wages for existing workers; or reduced occupational segregation" (Oosthuizen, 2018*b*). Thus, even progress towards narrowing gender wage gaps and encouraging greater employment of women in better paying occupations can have beneficial effects on the demographic dividend without further raising women's time allocations to productive activities.

4 Conclusion

National Transfer Accounts depict the nature of the generational economy, as individuals, households and societies produce, consume, share and save. However, as soon as gender is explicitly introduced into the NTA framework, it becomes clear that NTAs do not provide a comprehensive overview of all productive activities due to the fact that national accounts exclude unpaid services. Mauritius is a good example of this in that comparisons of gender-disaggregated labour income and consumption profiles reveal that, on average, while men produce substantial surpluses of labour income over consumption during the prime working ages, women's labour income does not exceed their consumption at any age.

This paper has explored patterns of time-use across the lifecycle by gender in Mauritius in 2003 and represents, as far as we can tell, one of only a handful of detailed analyses of the Mauritian time-use data. Gender specialisation in productive activities is observed in societies around the world and such specialisation is found to be significant in Mauritius. At every age, males are found to spend more time than females in market work activities, while the opposite is true in terms of both housework and care. Overall, males account for more than 70 percent of all time spent in market work in 2003, while females account for 75 percent of time spent in household production. On average, males also tend to spend more time than females in what is termed 'all other activities', which includes leisure and self-care. This gap is largest amongst retirement-aged cohorts and, to a lesser extent, amongst cohorts under the age of 35 years.

Valuing the time spent in household production activities provides some contextualisation of the extent of unpaid work. Using specialist replacement wages, aggregate household production is valued at approximately Rs 45.7 billion in 2003 prices, equivalent to 29.0 percent of GDP or three-fifths of the value of total labour income. Of this amount, almost three-quarters (73.7 percent) is produced by females, close to 15 percent derives from care

activities, and 42.2 percent is contributed by 30 to 49 year olds.

There is, however, substantial variation in time allocations to housework and care activities across the lifecycle for both women and men. For females, the average pattern of time allocations to housework follows an inverted-U shape, peaking from the late thirties to the late fifties. In contrast, males on average allocate substantially less time at every age, with two peaks observed: the higher peak is observed amongst men in their sixties, while the lower peak is observed amongst teenagers. Allocations to care are significantly smaller, peaking for women during their late twenties and for men during their mid-thirties. For women, though, there is a second much lower peak during their early sixties. In combination, this means that females account for 74.8 percent of total time allocated to housework and 75.5 percent of time allocated to care. Considering only care for household members, only 21.6 percent of time is accounted for by males.

Given the magnitude of household production, in terms of both time and value, it is unsurprising that these estimates have a considerable impact on estimates of total production and consumption. When restricting production to only market production, males on average spend more time in productive activities than females at every age; however, once household production is included, females allocate more time to these activities than males at all ages except for those between the ages of 41 and 58 years. Even then, though, the gap is not particularly wide. However, in value terms, the gap remains large, particularly during the prime working ages. In monetary terms, females only outproduce males between the ages of 10 and 25 years, and from age 70 onwards. It is important to note, though, that the specific wage rates chosen to value time in household production play an important role in determining the magnitude of this gap in value. Higher specialist replacement wages would further reduce women's observed disadvantage.

A key result of the NTTA research for Mauritius relates to the costs associated with having children. Conventional NTA estimates suggest that infants and young children are not particularly costly in terms of their levels of consumption compared with older cohorts. However, NTTA estimates reveal that these cohorts consume significant amounts of household production. In fact, per capita consumption of non-market work amongst infants is almost as high as peak per capita production by women, whether measured in terms of time or value. The effect of including consumption of non-market work is to almost triple per capita consumption for infants (an increase of 165 percent) from just under Rs 50 000 per capita to around Rs 131 000. Even at age five, per capita total consumption is almost double per capita NTA consumption. This is an important finding in terms of decisions related to fertility, particularly given the disproportionate burden that these non-market costs represent for women.

Labour income in Mauritius is characterised by stark gender differences, with the result that females do not produce a lifecycle surplus at any age despite males generating substantial surpluses during the prime working ages. Inclusion of non-market production and consumption within our estimates changes this picture somewhat, with women in their late twenties, thirties and forties able to generate surpluses. Simulations of the demographic

dividend that allow for women to narrow the labour income gap with men over time suggest that the period during which Mauritius enjoys a positive dividend can be extended by more than 30 years. This narrowing of the gap is therefore able to temporarily counteract the pure demographic effects associated with population ageing.

However, while the gender gap in labour income can be narrowed in various ways, a number of these would imply a significant reallocation of women's time from home production to market production activities. Without concomitant changes in the distribution of the responsibilities for housework and care to males, to other age cohorts, or to other providers (market or government), such reallocations would result in substantial increases in the demands on women's time or would necessitate households to accept lower levels of household production. These are important issues for policymaking that aims to increase women's involvement in the labour market.

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A Specialist Replacement Wage Rates

Table 3: Specialist Replacement Wage Rates, 2003

Activity	Rs per hour (2003 prices)
Cleaning	37.50
Laundry	35.88
Cooking	34.45
Household maintenance	35.29
Household management	45.42
Pet care	32.55
Travel	44.79
Purchases	32.55
Collecting fuel and water	32.55
Childcare, intra-household	35.63
Childcare, inter-household	35.63
Adultcare, intra-household	36.98
Adultcare, inter-household	36.98
Care, unspecified recipient	36.98
Volunteering	32.55

Source: Own calculations, using Statistics Mauritius (2003b).

B Aggregate Control Values

Table 4: Aggregate Control Values, 2003

Aggregate		Rs millions (2003 prices)	Relative to GDP (%)
Labour Income	YL	75 195	47.8
Employment Earnings	YLE	59 313	37.7
Self-Employment Earnings	YLS	15 882	10.1
Consumption	C	98 646	62.7
Private Consumption	CF	76 374	48.5
Private Consumption, Education	CFE	1 833	1.2
Private Consumption, Health	CFH	2 138	1.4
Private Consumption, Other	CFX	72 403	46.0
Public Consumption	CG	22 272	14.2
Public Consumption, Education	CGE	3 082	2.0
Public Consumption, Health	CGH	1 927	1.2
Public Consumption, Other	CGX	17 263	11.0
Lifecycle Deficit	LCS	23 451	14.9
GDP		157 394	100.0

Source: Own calculations, Government of Mauritius (2005); Statistics Mauritius (2003a); Statistics Mauritius (n.d.a); Statistics Mauritius (n.d.b); UNESCO (2018).

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