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Inequality and the generational economy

Race-disaggregated National Transfer Accounts for South Africa, 2015

Morné Oosthuizen

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Abstract: Differences in the economic lifecycle between countries at different levels of development suggest that there may be differences between sub-populations within countries, particularly where the sub-populations have different levels of income. Given stark inequalities by race in South Africa, this paper constructs a full set of race-disaggregated National Transfer Accounts for 2015 and finds substantial differences between them in patterns of producing, consuming, sharing, and saving across the lifecycle. Resources flow strongly downwards to younger cohorts for all groups, while older Africans make large transfers to household members when compared with their counterparts of other races. Differences in the financing of consumption at older ages between race groups suggest that South Africa's second demographic dividend may be overstated by reliance on national-level profiles. The results suggest that National Transfer Accounts-based estimates of the demographic dividends would benefit from accounting for differences between sub-populations.

Keywords: demographic dividend, economic lifecycle, intergenerational transfers, National Transfer Accounts, race, South Africa
JEL classification: J10, E01, J11, J15

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1 Introduction

Since its inception, National Transfer Accounts (NTA) research has demonstrated the differences between countries in the patterns of resource flows across generations. Despite these differences, there are broad similarities in the patterns of flows across all countries; further, there are often important similarities between countries at similar levels of development, or that are culturally or geographically proximate. This has become particularly evident as the NTA network grows to include an increasingly diverse set of countries.

The existence of differences between countries at different levels of development suggests that such differences may also manifest themselves within countries when comparing sub-populations with different levels of income. This has led to various efforts aimed at constructing accounts for key sub-populations within countries. These sub-populations have been defined in a variety of ways, including position within the income or consumption distribution (e.g. Abrigo 2011; Angulo 2011; Bucheli and González 2011); geographic location and rural–urban status in particular (e.g. Maliki 2011; Li et al. 2011); socioeconomic status (SES) (e.g. Turra and Queiroz (2005) and Mejía-Guevara (2015), using educational attainment of the household head; or Tovar and Urdinola (2014), using a quality of life index); or gender (e.g. Zagheni and Zannella 2013). In a static or cross-sectional sense, these types of categorizations of the population are useful, but they can become problematic for analysis over time as individuals or households may switch groups from one period to the next.

South Africa remains a deeply unequal country. Indeed, according to the World Bank (2019), among 104 countries with estimates between 2013 and 2017, South Africa has the highest Gini coefficient at 63.0 in 2014. The extent of these inequalities suggests that understanding differences in the generational economy across sub-populations may be particularly important for South Africa. However, instead of using a measure of SES or position within the income distribution to define sub-populations, this paper constructs separate accounts by race using data for 2015. Within the South African context, race continues to be closely intertwined with SES, and racial disaggregations remain useful from a policy perspective in monitoring progress towards a more equitable non-racial society. Race is also less likely to suffer from problems of individuals switching between groups over time.

This paper focuses on analysing the generational economy in South Africa in 2015, constructing separate profiles for the country's four main race groups. Based on the accounts constructed, this paper aims to answer three key questions. First, how and to what extent does the economic lifecycle differ across race groups within South Africa? Second, how do the systems of intergenerational flows differ across groups and, in particular, what are the implications for the demographic dividend? Third, based on the findings for South Africa, what are the implications for the construction of NTAs in high-inequality countries?

From the perspective of NTAs, the paper contributes to the relatively sparse literature on sub-population NTAs and, excluding work on gender, represents the first known attempt at constructing full NTA profiles for sub-populations in Africa. In assigning individuals to sub-populations based on their individual characteristics, rather than on the basis of the characteristics of the household head, the approach here is more closely aligned to the current research on European countries. However, in terms of the extent of inequality, South Africa is more closely comparable to Latin American countries. The results presented here are, therefore, the first for a high-inequality country where classification of individuals is done on the basis of individual characteristics. Finally, this paper includes the first effort at demonstrating the impact that inequality can have on the results from projections of NTA profiles.

2 Literature review

2.1 NTAs for sub-populations

As their name suggests, NTAs were originally conceived of as describing the generational economy at a national level. However, the growth in the number of countries constructing NTA estimates—of which many are developing countries—has brought an increasing level of diversity among NTA countries in terms of variables such as income level, population dynamics, and socioeconomic context. This has led to increasing interest in the interplay between inequality and NTA estimates, as evidenced by the establishment of the Inequality Working Group within the NTA network.

There are two broad and inter-related areas of interest related to inequality as it relates to NTA. First, there is interest in describing and analysing variations across different subnational populations in the patterns of economic flows across the lifecycle. Second, there is the question as to the extent to which inequalities within a country may affect projections of national-level NTA profiles over time.

Defining sub-populations

The description and analysis of sub-population NTAs is useful in understanding potential differences in behaviour that exist in response to different constraints, contexts, or norms faced by these groups, and may be able to highlight key issues related to the generational economy from a policy perspective. However, relatively little has been published describing sub-population NTAs, while nothing seems to exist that assesses (or even explicitly recognizes) the implications of inequality on projections of NTA profiles.

The work on inequality within the context of NTAs has been dominated by Latin American countries, who have framed their sub-populations in terms of SES. The earliest research on the issue is that by Turra and Queiroz (2005) using Brazilian data for 1996, with a particular focus on public and private transfers. The authors use the educational attainment of the household head—0–4 years, 5–8 years, 9–11 years, and 12 years or more—to create four SES groups. Education of the household head has also been used to define SES categories in research on Mexico (Fernàndez-Varela and Mejía-Guevara 2012; Mejía-Guevara 2015). Mejía-Guevara (2015: 25) justifies the choice of educational attainment as a proxy for SES by noting that education 'shapes income, work, and economic conditions; it determines the likelihood of being employed, the job position and income associated'.

Bucheli and González (2011) also use educational attainment, but broaden the measure so as not to focus on the household head as the sole determinant of SES in their analysis of Uruguay. Instead, they construct a four-category SES variable using the number of years of education averaged across all adult household members, with the lowest group averaging up to 6 years of education and the highest 12 or more years.

While these studies define groups according to educational attainment precisely because of its ability to proxy for SES and cross-country comparability, Tovar and Urdinola (2014: 167) argue that education is 'endogenous to the underlying idea of intergenerational transfers'. They contrast sub-population NTA profiles constructed using educational attainment of the household head with those based on quartiles of a multidimensional quality of life index (MQLI). This MQLI builds on the preceding work in that it includes education of the household head and average education of other adult household members as components; however, it goes further to include variables such as access to refuse collection, water source, type of fuel for cooking, and the materials used in the construction of the dwelling (Tovar and

Urdinola 2014: 173). The authors show that use of educational attainment of the household head rather than the MQLI to proxy for SES yields anomalies in the case of Colombia that may impact on the interpretation of results.

While the point made by Tovar and Urdinola (2014) focuses on the endogeneity of educational attainment, the ability of educational attainment to distinguish different levels of SES may also simply be weaker in certain contexts. This may occur, for example, where expansion of access to education over time results in rising educational attainment for younger cohorts: a 70-year-old with only primary education may have faced a very different labour market compared with a 30-year-old with the same level of education, which may likely lead to significant differences in SES. Similarly, changing quality of education over time or changing minimum education requirements for specific occupations may have similar types of effects on the link between educational attainment and SES. Expansion of access to education may also result in the education of the household head being very different from that of other younger adult household members. For example, in Colombia, just 6 per cent of the population reside in households where the head's educational attainment is higher than that of all other adult household members; in contrast, 42 per cent reside in households where the head has the lowest attainment (Tovar and Urdinola 2014: 177–178). Further, as Tovar and Urdinola (2014: 169) note, in contexts in which household heads are increasingly not the only income earner within households (as would arise with greater employment of women, for example), the link between education of the household head and the household's SES is further weakened. Their key argument is that educational attainment on its own is unable to accurately distinguish differences in SES in the Colombian context, hence their preference for the MQLI, which incorporates other variables.

Some work on sub-population NTAs has also been done in Europe, again with education as the variable of interest. The key difference between this work (Hammer 2015; Rentería et al. 2016) and the Latin American work is that it uses educational attainment at the individual, rather than the household, level. This change in approach immediately creates an important challenge: how should children and young adults, the vast majority of whom may still be within the education system, be classified? Rentería et al. (2016) effectively make two different decisions, one for the labour income profile and one for the consumption profile. In the construction of the consumption profiles, they treat the population under the age of 25 years as a single group: these individuals are allocated the mean per capita household consumption (i.e. the per capita values from the conventional consumption profile). The result is a single profile up to age 24, at which point it splits suddenly into four separate profiles corresponding to each of the sub-populations. In contrast, no special consideration is given to this age group in the construction of the labour income profiles, resulting in four separate labour income profiles that cover the entire life course. Indeed, this different treatment is not discussed by the authors at all and the underlying rationale is unclear.[1]

Hammer (2015) takes a different approach to creating the three categories used in his study: individuals who have completed their formal education are assigned to a particular group on the basis of their highest level of education, while those who are still enrolled in the education system are assigned on the basis of the qualification they are pursuing. The effect of this approach is to create a single profile at young ages, which gradually separates into the three profiles from the age at which individuals are able to move out of the lowest educational category.

[1] One possibility is that the authors take the position that, if individuals are generating labour income, their participation in the education system is ended and their membership of one of the educationally defined groups is settled. This, however, ignores the possibility of individuals working while still attending an educational institution. Further, such an assumption would provide the basis upon which to differentiate consumption, even if only for those who are earning labour income; however, the authors do not do so.

Another strand of the literature has linked the definition of groups more closely to standard money-metric measures typically associated with the analysis of poverty and inequality. Thus, for example, unpublished research by Abrigo (2011) constructs terciles based on a ranking of Philippine households according to per capita labour income. Similarly, using Peruvian data, Angulo (2011) constructs NTA profiles for quintiles based on household per capita consumption, while Shen and Lee (2014) construct quartiles based on per capita income. However, using income- or consumption-based measures for defining sub-populations can be problematic. Specifically, these measures suffer from the same type of endogeneity problem as educational attainment. Indeed, the problem may be more severe here, and may be exacerbated by the type of analysis envisaged: income or consumption are both the basis of the categorization and the outcome of, or at least strongly correlated with, various aspects of the generational economy.

Sub-populations may also be defined in ways that are not explicitly linked to money-metric and non-money-metric measures of welfare or inequality. For example, geographic location—specifically the rural–urban divide—has been used to delineate sub-populations (e.g. Maliki (2011) for Indonesia, and Li et al. (2011) and Shen and Lee (2014) for China). These categorizations are defined at the household level, but it is also possible to categorize individuals based on their own characteristics. Nevertheless, these groupings are implicitly based on perceptions of inequalities or differences between groups, without which there would be no reason to construct the group-specific profiles.

Findings from disaggregated NTAs

Most of the research on sub-population NTAs is focused on describing and explaining the differences (or lack thereof) in patterns of resource flows across these groups. As a result, the research tends to be narrowly focused on implications for the particular country, rather than on trying to draw out conclusions or recommendations for a broader set of countries. There are, though, some common themes that can be drawn from the existing research.

First, unsurprisingly, there are substantial differences in the monetary value of resource flows across groups. In Colombia, for example, per capita labour income for the top quartile of the MQLI is, at its peak, more than double that of the second quartile (Tovar and Urdinola 2014: 176). In Mexico, mean per capita consumption among the population residing in households whose heads have not completed primary education is estimated to be half the national average across the life course (Mejía-Guevara 2015: 26). Based on Brazilian data for 1996, mean per capita consumption for 30–39-year-olds in households whose heads have at least 12 years of education is estimated to be more than five times that of their counterparts in households with heads with fewer than five years of education (author's own calculations based on Turra and Queiroz (2005)); for labour income, the ratio is close to 8.5 times.

Second, there are differences, sometimes significant, in the patterns of resource flows with respect to (1) the timing of peaks or troughs; (2) the timing of transitions between net inflows or net outflows; and (3) the relative levels of different types of flows. For example, Tovar and Urdinola (2014: 177, 182) find that per capita labour income peaks between the ages of 35 and 55 years for individuals in the top quartile, compared to 45–50 years for those in the bottom quartile; and that the transition from lifecycle deficit to lifecycle surplus, and the subsequent return to deficit, occurs at younger ages for those in lower quartiles. Rentería et al. (2016: 660) show that the Mexican population in the lowest two educational categories (less than primary, and primary) are unable to generate a lifecycle surplus at any age, while even those with secondary education generate only a small surplus over a narrow age range. Mejía-Guevara (2015: 27) finds substantial differences between the top and bottom SES categories in 2004 in the financing of consumption among 0–19-year-olds. In the top group, private transfers account for almost 100 per cent of consumption, compared to 39.8 per cent in the bottom group (with another 48.0 per cent and

11.9 per cent financed by public transfers and labour income respectively). Similarly, Turra and Queiroz (2005: 9) find that, for children in low SES households, consumption is financed through both public and private transfers, while private transfers are substantially more important in this regard in high SES households.[2] Their findings also seem to suggest later transitions from lifecycle deficit to surplus and back to deficit for higher SES individuals compared with those in lower SES groups, as well as later transitions from net private transfer inflows to outflows and back to inflows (Turra and Queiroz 2005: 18). However, the authors construct their estimates using 10-year age cohorts, which obscures the true timing of the transitions.

In his analysis of Austrian data, Hammer (2015: 20) defines three educational groups—basic education, higher secondary education, and tertiary education—and finds that, although the period of lifecycle surplus is almost identical across the three groups, their timing differs significantly. Individuals with basic education begin generating a lifecycle surplus at age 21, while those with tertiary education only generate a surplus at age 28; the two groups return to deficit at ages 58 and 66 respectively. Further, based on the profiles presented (Hammer 2015: 16), the gap in per capita private consumption between those with basic education and those with tertiary education appears to increase with age over the life course. Estimates for Spain show that, while all groups generate a lifecycle surplus at some point over the life course, surpluses are extremely small and brief for those with less than primary education; in contrast, those with post-secondary education generate substantially larger per capita surpluses than those with less education, and over a wider age range (Rentería et al. 2016: 660).

Related to the above, inequalities in access to public transfers not evident in national profiles are clearly revealed in a number of cases. In Colombia and Brazil, for example, the sub-population profiles reveal the ability of individuals of higher SES to secure higher per capita public transfer inflows, such as from public pensions, at older ages than those in lower socioeconomic groups (Tovar and Urdinola 2014; Turra and Queiroz 2005). Shen and Lee (2014) focus their analysis on benefit incidence of public expenditure and find, in terms of education, higher levels of per capita public spending for individuals in the top quartile under the age of five and particularly after age 15 as lower-income groups face greater constraints in terms of access to secondary and higher education (Shen and Lee 2014: 13–14). However, among older cohorts, in terms of both healthcare and pensions, public spending is found to be strongly skewed towards the top quartile (Shen and Lee 2014: 15–18).

To sum up, measures based on income or consumption to create SES sub-groups suffer from an endogeneity problem, while there are some challenges when using educational attainment that may be more of a concern in the South African context, given the rapid changes in patterns of educational attainment in the post-apartheid period. Using an index-based measure has its advantages, but would complicate comparability of the results presented here with future estimates. Instead, this paper will use race at the individual level, not the household level, as a basis for creating sub-populations. The specific advantages of using race are its invariant nature, its high correlation with SES across a range of covariates, and its usefulness in terms of monitoring progress towards a more equal society.

Inequality and projections

NTA profiles are commonly used in projections that aim to simulate the effects of changing population age structures on national economies. For example, in the estimation of the first demographic dividend,

[2] The study by Turra and Queiroz (2005) is relatively old in terms of the development of the NTA methodology and appears to use certain methods—for example, the allocation of consumption to individual household members using Engel equivalence scales—that are not (or are no longer) part of the standard NTA methodology. The authors were also unable to construct profiles of asset-based reallocations. As such, the results may not be strictly comparable with those published more recently.

static age profiles of consumption and labour income calculated from cross-sectional data are projected decades into the future. Inequality *per se* does not pose problems in this regard; however, where inequalities interact with demography, there may be important implications for projections over time. In particular, complications arise where membership of a particular sub-population is correlated with that sub-population's progress in terms of the demographic transition.

In many contexts, for example, lower SES may be associated with relatively higher fertility and lower life expectancy. The result is that the composition of cohorts may vary systematically with age, with higher SES groups accounting for disproportionately large shares of older cohorts, and that it may vary within cohorts over time.

The impact of this composition effect is implicitly recognized in work by Rentería et al. (2016), who use NTA profiles for educationally defined groups to assess the separate contributions of demographic change and education on the first demographic dividend. The authors combine these sub-population profiles with population projections by age, sex, and level of education, published by the Wittgenstein Centre for Demography and Global Human Capital for the 1970–2100 period. Thus, they are 'able to evaluate the impact of population age structure on the support ratio while taking into account that changes in education also influence the level of production and consumption' (Rentería et al. 2016: 652).

Unfortunately, since the impact of estimating the demographic dividend from profiles for separate sub-populations as opposed to national profiles was not their focus, the authors do not present a comparison of the two sets of estimates and it is therefore not possible to directly ascertain the extent to which the estimates are affected.[3] However, the authors do note that 'education expansion delays the start of the negative growth of the support ratio' (Rentería et al. 2016: 668), suggesting that using the sub-population estimates has a non-negligible impact on projections of the support ratio and demographic dividend.

The consequences of inequality for projections of NTA profiles, operating through differences in demography, have not been explored in much detail. To date, there does not appear to be any literature that either attempts to quantify the effect or contrasts projections of national-level profiles with those derived from profiles for sub-populations.

2.2 Poverty, inequality, and race in South Africa

South Africa has a long and painful history of colonial and White-minority rule, dispossession, and discriminatory policy, the effects of which—directly or indirectly—undermined the economic position of the country's Coloured, Asian, and, in particular, African population. A key outcome of this history is stark inequality between the four race groups across a range of variables that has persisted over a long period of time. According to Leibbrandt et al. (2010: 13), real per capita incomes for Coloureds, Asians, and Africans were respectively 22.0 per cent, 22.1 per cent, and 9.1 per cent of those of Whites in 1917; by 1980, these proportions were virtually unchanged. Even in 2008, per capita income among Coloureds was still 22.0 per cent of that of Whites, while those of Asians and Africans had risen to respectively 60.0 per cent and 13.0 per cent. Thus, despite the passing of two and a half decades since the end of apartheid, race remains a key covariate of SES in South Africa.

[3] Prskawetz and Sambt (2014) present estimates of the demographic dividend for Spain constructed from standard NTA profiles, but they do not use the same population projections or the same base year (profiles are constructed using data for 2000, as opposed to the 2006 profiles used by Rentería et al. (2016)).

One of the key areas impacted has been the labour market. Job reservation and spatial segregation policies, combined with limited access for the majority of the population to quality education, have had enduring effects on the labour market, while economic policy has tended to favour large-scale capital-intensive industries, such as mining. Under apartheid, Whites were given a head start in accumulating human capital, while lower-skilled White workers were, to a large extent, protected from direct competition with other race groups for employment. Less-educated workers, who are primarily African, have also found themselves on the wrong side of technological change that has favoured the employment of higher-skilled workers over the last half-century.

The fall of apartheid brought with it the removal of restrictions on access to education and employment, along with policies aimed at redress. However, gaps in the labour market have been slow to narrow, with their initial advantage in terms of education enabling Whites and Asians to capitalize on opportunities presented by the post-sanctions economy. The post-apartheid period has therefore seen high and rising unemployment rates, particularly among less-educated workers, with skills shortages driving wage growth at the upper end of the skills distribution. Race differentials in educational attainment have meant that Africans, and to a lesser extent Coloureds, suffer particularly high unemployment rates. Further, when they are able to find employment, Africans dominate in lower-skilled occupations (Table 1).

Table 1: Selected economic and social indicators for South Africa, by race

Indicator	Year	Overall	African	Coloured	Asian	White
Economic indicators						
Employment-to-population (15–64, %)	2018Q3	43.1	40.1	49.2	53.1	63.2
Unemployment rate, narrow (15–64, %)	2018Q3	27.5	31.1	21.8	10.1	7.1
Unemployment rate, broad (15–64, %)	2018Q3	37.3	41.8	27.6	17.5	9.3
Poverty rate (UBPL, %)	2015	55.5	64.2	41.3	5.9	1.0
Multidimensional poverty rate (%)	2011	8.0	9.9	2.2	0.4	0.1
Gini coefficient	2008	0.70	0.62	0.54	0.61	0.50
Social indicators						
Adults (25+) with degrees (%)	2018Q3	5.8	3.7	3.5	11.1	22.1
Adults (25+) with post-secondary (%)	2018Q3	13.6	10.4	9.0	20.5	40.1
Adults (25+) with secondary only (%)	2018Q3	65.0	65.3	69.2	71.7	57.5
Medical aid coverage (%)	2017	16.8	10.0	20.1	48.6	71.7
Mean household size	2018Q3	3.3	3.3	3.8	3.5	2.7
Demographic indicators						
Population share (%)	2015	100.0	80.3	8.9	2.5	8.3
Population under 20 (%)	2015	38.3	40.6	36.2	26.3	22.0
Population 20–39 years (%)	2015	35.2	36.5	31.8	34.8	25.9
Population 40–59 years (%)	2015	18.4	16.7	22.9	26.1	28.3
Population aged 60+ (%)	2015	8.1	6.2	9.1	12.9	23.7
Population growth rate (ave. ann., %)	2007–17	1.60	1.84	1.34	1.55	–0.22

Source: author's calculations based on Statistics South Africa (2014, 2015, 2018a, 2018b, 2018c); Leibbrandt et al. (2012).

The result is a clear pattern of racial disadvantage in terms of labour market earnings and household income, which is echoed across a variety of other measures: Africans are worse off than Coloureds, who are worse off than Asians, who are worse off than Whites. This pattern is clearly observed in terms of poverty rates. Indeed, Gradin (2012: 188) notes that 'the differential in poverty levels across racial groups stands out as one of the most important' features documented in the South African poverty literature. Poverty rates, using a lower-bound poverty line, are estimated to be 47 per cent for African-headed households, compared to 23 per cent for Coloured-headed households, just over 1 per cent for Asian-headed households, and less than 1 per cent for White-headed households (World Bank 2018: 13). The same ranking—and substantial inter-race differences—is observed for money-metric poverty throughout the post-apartheid period (e.g. Leibbrandt et al. 2010: 37), and in terms of asset-based

(Bhorat and Van der Westhuizen 2013) and multidimensional measures of welfare (Finn et al. 2013; Fransman and Yu 2018).

The end result of these patterns is extreme inequality. South Africa has consistently ranked as one of the most unequal countries in the world in terms of Gini coefficients. According to the World Bank (2019), among 104 countries with estimates between 2013 and 2017, South Africa has the highest Gini coefficient at 63.0 in 2014 (the same value is observed for 2015 (World Bank 2018: xv)). Various authors have confirmed that the income source responsible for the largest share of the Gini coefficient is income from work (Hundenborn et al. 2016; Leibbrandt et al. 2010, 2012)—estimated to contribute around 80–90 per cent to the Gini—with 'at least one-third [of this share] attributable to the large percentage of households with zero wage income' (Leibbrandt et al. 2010: 19). Income is highly concentrated at the upper end of the income distribution, with the richest 10 per cent accounting for 58 per cent of total income in 2008 (Leibbrandt et al. 2010: 26).

Within this context, successive post-apartheid governments have pursued various policy interventions aimed at reducing poverty and inequality. A key component of this effort has been social grants. Building on a pre-existing system of social assistance, government has removed race-based discrimination within the system and has expanded the system to cover additional vulnerable groups. It is estimated that a total of 10.91 million grants—equivalent to 18.9 per cent of the population—were paid out in July 2018; by December 2018, this had risen to 11.03 million (author's calculations, based on SASSA 2019; Statistics South Africa 2018b). Thus, it is estimated that the proportion of households receiving any form of transfer from the state more than doubled from 21.9 per cent in 1993 to 47.8 per cent in 2008 (Leibbrandt et al. 2010: 34–35). Van der Berg (2011: 134) further reports that not only did real per capita social spending by government increase by 21 per cent between 1995 and 2000, and by another 40 per cent between 2000 and 2006, but the targeting of this spending to the poor also improved.

Assessments of the social grant system reveal a significant impact on poverty, particularly at lower poverty lines, but with an ambiguous or weakly positive effect on inequality. Hundenborn et al. (2016: 20), though, show that the increase in grants 'limited the increase in inequality over [the 1993–2008] period immensely'. However, considering fiscal policy beyond merely the grants system, Inchauste et al. (2015) have found South Africa to be particularly effective in reducing inequality. Nevertheless, they find that 'consumable income'[4] inequality in South Africa (i.e. inequality post-fiscal policy) is still higher than 'market income' inequality in other highly unequal countries such as Brazil (Inchauste et al. 2015: 15). Further, improvements in municipal infrastructure have helped significantly reduce asset inequality (Wittenberg and Leibbrandt 2017: 727) and multidimensional poverty (Finn et al. 2013).

The extent of inequality in South Africa means that averages mask the true situation for the vast majority of the population. As Van der Berg (2011: 120) notes, '[for] an upper middle income country . . . , South African social indicators (e.g., life expectancy, infant mortality or quality of education) are closer to those of lower middle income or even low income countries . . . [reflecting] the unequal distribution of resources and opportunities'.

Race, poverty, and inequality are clearly closely intertwined in South Africa. This section has provided an overview of some of the facets of inequality as context for the profiles and other results that are detailed in Section 4. The ordering of race groups according to the majority of indicators presented here is an ordering that will be repeatedly observed in the various descriptions of the generational economy.

[4] 'Consumable income' is defined as market income less direct and indirect taxes plus direct cash transfers, social security contributions, and consumption subsidies and taxes. 'Market income' consists of 'pretax wages, salaries, and income earned from capital assets (rent, interest, or dividends) and private transfers' and includes contributory pensions and imputed rent for owner-occupied housing (Inchauste et al. 2015: 15).

This discussion has also highlighted the important role that the state fulfils in addressing poverty and inequality, which is further confirmed in the analysis below.

3 Methodology and data

3.1 Methodology

National Transfer Accounts

In constructing estimates of the generational economy, the NTA framework is followed. The development of the NTA framework began with the seminal work of Lee (1994a, 1994b), and has its conceptual roots in earlier research by Samuelson (1958), Diamond (1965), Arthur and McNicoll (1978), and Willis (1988). While the formal methodology has been published by the United Nations (2013), this section provides an overview of some of its key elements.

The NTA framework is governed by the NTA flow identity (Mason and Lee 2011: 56), namely:

$$\underbrace{C_x - Y_x^l}_{\text{Lifecycle deficit}} = \underbrace{\underbrace{\tau_x^+ - \tau_x^-}_{\text{Net transfers}} + \underbrace{Y_x^A - S_x}_{\text{Asset-based reallocations}}}_{\text{Age reallocations}} \tag{1}$$

where C refers to consumption, Y^l is labour income, τ^+ is transfer inflows, τ^- is transfer outflows, Y^A is asset income, and S is saving, while the subscript x denotes the age cohort. This identity derives from the fact that, for each individual, inflows (labour income, asset income, and transfer inflows) must equal outflows (consumption, transfer outflows, and saving). Since the identity holds for each individual, it must also hold for each age cohort and for the population as a whole; it must also hold for any group of individuals. The identity in Equation 1 can therefore be modified as follows (Mejía-Guevara 2015: 25):

$$C_{x,s} - Y_{x,s}^l = \tau_{x,s}^+ - \tau_{x,s}^- + Y_{x,s}^A - S_{x,s} \tag{2}$$

where the subscript s denotes the particular sub-population.

According to the NTA identity, the lifecycle deficit refers to the difference between consumption and labour income at each age. For the young and the elderly, consumption exceeds labour income resulting in a deficit; prime working-age adults, though, generate lifecycle surpluses, since labour income exceeds consumption. The lifecycle deficit can therefore be financed through a combination of two channels—net transfers and asset-based reallocations—which together are referred to as age reallocations. Conversely, cohorts generating lifecycle surpluses may use those surpluses to make net transfers or to asset-based reallocations (e.g. saving).

NTA distinguishes three sectors or types of institutions acting as intermediaries between individuals: the private sector (corporations and households, including household enterprises and non-profit institutions serving households); the public sector (general government); and the rest of the world (United Nations 2013: 27). This distinction allows for the disaggregation of various flows according to the sector mediating the flow. Consumption, transfers, and asset-based reallocations can all be disaggregated into private and public flows. Transfers can be disaggregated into inflows and outflows, the difference between the two being net transfers.

Private transfers consist of transfers between households and transfers within households, respectively inter-household and intra-household transfers, each of which consist of both inflows and outflows. Pub-

lic transfer outflows typically refer to transfers to government in the form of taxes; public transfer inflows are composed of the inflows from state-funded programmes such as education, health, and social grants.

Asset-based reallocations are disaggregated both by mediating sector (private, public), and into inflows (asset income earned, dissaving) and outflows (asset income paid, saving). '[Returns] to capital, dividends, interest, rent, and the imputed return from owner-occupied housing' constitute private asset income; public asset income, on the other hand, includes 'income earned from publicly owned assets and interest paid on public debt (a negative value)' (United Nations 2013: 58).

NTAs are therefore composed of profiles of per capita economic flows by single-year age cohorts, from age zero to the very oldest (usually a combined 90+ age cohort). Together, these flows 'reflect a fundamental feature of all societies: the economic lifecycle' (Mason and Lee 2011: 55), captured as it is at a given point in time.

In practice, constructing a set of accounts entails the following broad process. First, for a particular flow, a profile is constructed across age using survey or administrative data. The profile is calculated as a mean across the population within each age cohort, and its shape is a function of behavioural and institutional factors. Since the age profiles thus constructed are often subject to noise, age profiles are typically smoothed using a cross-validation smoother: Friedman's SuperSmoother (Friedman 1984) is the preferred method to smooth the weighted per capita profile. By incorporating the (unweighted) number of observations as weights, this smoothing method attaches greater weight to those estimated values calculated from a larger number of observations in the microdata. Education age profiles are not smoothed, due to the real discontinuities in educational participation, while care is taken not to smooth over potential discontinuities in other age profiles.

Second, the level of the profile is adjusted multiplicatively using aggregates (referred to as aggregate controls) from national accounts, official government financial reports, and other official sources. The intention is that, once a profile is multiplied by the population in each age cohort and summed, this total will equal the relevant aggregate derived from the national accounts. Third, these detailed aggregate controlled age profiles are combined as per the NTA flow identity (Equation 1) to derive the higher-level age profiles. Profiles may be expressed in terms of currency, or relative to 'peak labour income', which is the unweighted average labour income of cohorts aged 30–49 years. The latter is particularly useful for comparisons across countries. In the context of sub-groups, comparisons of profiles expressed in currency terms are best suited for revealing differences in the levels of the profiles, while comparisons of profiles expressed relative to peak labour income are best suited for revealing differences in the shapes of the profiles.

While a full detailing of the methodology is not possible here, it is worth highlighting certain assumptions within the NTA methodology with regards to households that may influence the final profiles. While NTA profiles are constructed with the individual as the unit of analysis, much of the data used to construct profiles is available at the level of the household. In several instances, depending on the exact structure of the available data, flows are recorded at the household level and therefore need to be allocated to individual household members. A good example of this is the various flows related to private consumption. For education and health, where consumption is not observed at the individual level, allocations to household members are done using regression methods. For education, for example, household-level spending is regressed on the number of enrolled and non-enrolled household members of each age to derive scales of relative consumption by age; these scales are used to assign household-level spending to individual members, with the resulting individual-level allocations used to derive the profile of mean per capita consumption at each age for the population. Other private consumption (i.e. private consumption other than education or health) is allocated using a standard equivalence scale: chil-

dren under five years old have a weight of 0.4, with weights increasing linearly with age to age 20, from which point it is equal to 1 (Mason and Lee 2011: 62).

Private transfers between individuals are rarely observed in survey data. Inter-household transfers may be recorded at the individual level (in South Africa they are recorded at the level of the household), but intra-household flows are only directly observed in exceptional cases. For inter-household transfers, the assumption is that flows move to and from household heads only. In contrast, intra-household transfers are 'estimated indirectly as the balancing item between private consumption and disposable income (labor income plus net private transfers plus public cash transfers inflows less taxes paid) for each household member' (Mason and Lee 2011: 72). Where household members have less disposable income than their private consumption, they receive transfers from household members with surpluses. If, at the household level, there is insufficient disposable income to cover private consumption, household heads are assumed to make additional transfers out of asset income or by dissaving. Conversely, where disposable income exceeds private consumption after all deficits have been covered, members with surpluses transfer these surpluses to the household head for saving. Household heads are also assumed to own all household assets and, as a result, consumption of durables by household members is funded by intra-household transfers from the household head. Due to data limitations in most countries, including South Africa, this only applies to owner-occupied housing.

The handling of private transfers highlights the importance of the household head: changing the rule according to which household headship is determined may potentially have a significant impact on the patterns of private transfer and asset-based reallocation flows. Hammer (2015: 7), for example, finds that the impact is minimal in the case of national-level profiles for Austria, but is significant for subpopulation profiles. There are numerous ways of defining household headship, including assigning headship to the oldest household member or to the member that generates the most income, although all have limitations. In many surveys, headship is self-reported, and this is the definition used in this paper. One final point to note about private transfers is that they include only current transfers, while excluding transfers such as bequests and dowries (Mason and Lee 2011: 71).

NTAs and the demographic dividends

This section presents the first and second demographic dividends within the context of the NTA framework, and draws from Mason and Lee (2007, 2012) and Mason et al. (2017).

We begin with the relationship between aggregate income, Y, and aggregate consumption, C, in an economy:

$$C(t) = Y(t) \times [1 - s(t)] \tag{3}$$

where s is the savings rate. Income (or consumption) per capita is typically viewed as a measure of the general standard of living; employing NTA concepts, we adapt this slightly to account for the fact that consumption varies with age and instead consider income or consumption per effective consumer. The number of effective consumers N and the number of effective producers L in period t are defined as:

$$N(t) = \sum_{x=0}^{\omega} \varphi(x) P(x,t) \tag{4}$$

and

$$L(t) = \sum_{x=0}^{\omega} \gamma(x) P(x,t) \tag{5}$$

where φ and γ represent 'age-specific, time-invariant vectors of coefficients measuring age variation in consumption and productivity' (Mason and Lee 2007: 4), $P(x,t)$ is the population of age x in time

t. In terms of the NTA framework, $N(t)$ is the population-weighted sum over ages 0 through ω (the oldest age) of the consumption profile and $L(t)$ is the population-weighted sum of the labour income profile; alternatively, these aggregates are respectively total consumption and total labour income in time t.

From Equation 3, it is possible to express consumption per effective consumer as the product of three factors:

$$\frac{C(t)}{N(t)} = \frac{L(t)}{N(t)} \times \frac{Y(t)}{L(t)} \times [1 - s(t)] \tag{6}$$

Thus, consumption per effective consumer is determined by the savings rate, income per effective producer $Y(t)/L(t)$, and the ratio of effective producers to effective consumers $L(t)/N(t)$, also referred to as the support ratio. Assuming a constant ratio of labour income to total income over time, Equation 6 can be restated in growth terms as:

$$gr\left[\frac{C(t)}{N(t)}\right] = gr\left[\frac{L(t)}{N(t)}\right] + gr\left[\frac{Y(t)}{L(t)}\right] + gr\left[1 - s(t)\right] \tag{7}$$

where $gr[z]$ denotes the growth rate of z. The first term on the right-hand side of Equation 7, the rate of change of the support ratio, represents the first demographic dividend. If the support ratio is rising—i.e. if the number of effective producers is rising relative to the number of effective consumers—consumption per effective consumer rises; a falling support ratio constrains economic growth and puts downward pressure on living standards.

The second demographic dividend operates through the second term, namely the rate of change of output per effective producer or, simply, workers' productivity. While demographic change may raise productivity through various channels, the focus here is on the role of capital. The general idea as described by Mason et al. (2017: 8) is as follows: '[As] populations age they rely less on work and more on assets and transfers to fund their consumption. An increase in old-age transfers will have no favourable effects on labour productivity, but an increase in assets (capital) leads to higher productivity. Thus, changing demography generates the potential for more rapid economic growth.'

Methodological adaptations for sub-population estimates

The construction of sub-population NTAs presents two specific challenges: first, the sample size is significantly reduced; second, in most instances it is not possible to construct sub-national aggregate controls. A small sample size has implications for the extent to which age profiles can be relied on and it is not inconceivable that sub-population age profiles, once aggregated, may differ substantially from the original national-level profile. To address this, sub-population age profiles are adjusted at each age using an age-specific factor to ensure consistency with the national-level profile. These age-specific factors are unique for each age, but are identical for each of the sub-populations. Some authors (e.g. Mejía-Guevara 2015; Turra and Queiroz 2005) go further and choose to use age groups rather than single-year age cohorts, although this results in a loss of detail in the age profiles.

Depending on the sub-populations being analysed, it may or may not be possible to construct sub-national aggregate controls. For example, some countries may publish details of national accounts at the provincial or state level. However, in cases where sub-populations are defined according to individual characteristics such as gender, race, or SES, disaggregated national accounts do not exist. In this case, the assumption is that the adjustments required at the national level are constant across the sub-populations. While this approach is common in studies of this nature, it is not without its problems. Specifically, constant adjustments across sub-populations assume that there is no variation in under- or over-reporting between sub-populations. Given that income may be correlated with both membership of a particular

sub-population and the likelihood of misreporting, this assumption may not be entirely appropriate. At the same time, though, it could be argued that this is true of conventional aggregate controlling, where age, income, and the likelihood of misreporting may also be linked.

3.2 Data

In constructing the 2015 NTA for South Africa, the primary data source was the 2014/15 Living Conditions Survey (LCS), a nationally representative household survey conducted by Statistics South Africa (2017b). The data were collected over a 12-month period from 13 October 2014 to 25 October 2015, with each household participating over the course of four weeks. A total of 27,527 households were sampled, with an overall response rate of 84.9 per cent. Response rates were lowest in Gauteng (65.3 per cent) and the Western Cape (79.1 per cent), the country's two wealthiest provinces, and as high as 95.6 per cent in Limpopo (Statistics South Africa 2017c).

The LCS consists of three data collection instruments, two of which—the household questionnaire and the weekly diaries—were administered to households.[5] While much of the survey was dedicated to collecting information on income and expenditure, the survey included various other modules with questions relating to employment, education, utilization of health services, household assets, welfare, living conditions, and crime.

Aggregate control values were compiled from several sources, with official macroeconomic data drawn from the South African Reserve Bank (2018). In addition, supplementary data were required to construct certain aggregate controls. This included:

- data from the LCS 2014/15 (Statistics South Africa 2017b) for the estimation of gross mixed income;
- data on the non-profit sector (Statistics South Africa 2017d) to estimate the relative size of the non-profit institutions serving households (NPISH) sector;
- World Bank (2019) data to estimate the distribution of current expenditure on education by level;
- national budget documentation from the National Treasury (2018) for expenditures on social benefits, the Unemployment Insurance Fund and the Compensation Fund; and
- data from Statistics South Africa (2017a) and the National Treasury (2014) relating to government revenues.

Estimates and projections of single-year age cohorts of the South African population are obtained from the 2017 Revision of the *World Population Prospects* produced by the United Nations (2017). For estimates by race, Statistics South Africa's *Mid-Year Population Estimates* were used (Statistics South Africa 2018b), which are published in five-year age cohorts. Estimates of the population by race for single-year age cohorts were calculated using Sprague multipliers (Sprague 1880; see also Calot and Sardon 2004 for full details of multipliers). The mismatch between the two sets of estimates—the United Nations (2017) estimates the 2015 population at 55.291 million, while Statistics South Africa (2018b) puts the figure at 54.957 million—was dealt with by applying the racial composition of each

[5] The third instrument, a summary questionnaire, was used by the survey worker to assign appropriate codes to items recorded in the weekly diaries, and to provide summary information relating to households' consumption expenditures so that the survey workers might be able to better assess the completeness and accuracy of information collected via the diaries (Statistics South Africa 2017c).

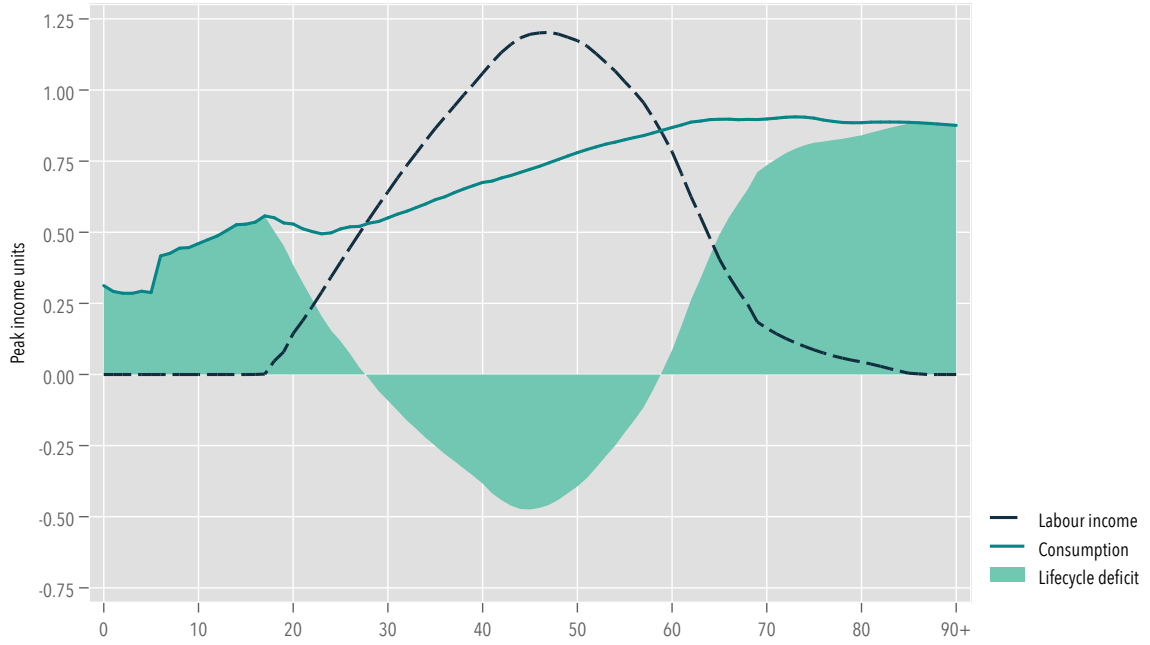
age cohort derived from the *Mid-Year Population Estimates* to the United Nations (2017) estimates for the total population in 2015.

4 Results

4.1 Overview of the South African generational economy

Race-based differences in the generational economy are usefully analysed within the context of patterns at the national level. The focus here is on the high-level profiles corresponding with the NTA identity outlined in Equation 1. Figure 1 presents the lifecycle deficit and its components, consumption, and labour income. To facilitate comparison, all profiles are normalized by dividing through by the unweighted average labour income among cohorts aged 30–49 years. As an example, the figure reveals that, in 2015, across all individuals aged 40 years, labour income averages 106 per cent of peak labour income (1.06 peak income units) per annum, while consumption averages 68 per cent of peak labour income (0.68 peak income units) per annum.

Figure 1: Labour income, consumption, and the lifecycle deficit



Notes: profiles are standardized by dividing through by the average labour income for 30–49-year-olds ('peak labour income'); this average value is referred to as a 'peak income unit'.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

The labour income profile is bell-shaped, rising from zero for young children to a peak of 1.2 in the mid- to late forties. It falls rapidly during the late fifties and sixties, but much more slowly from age 70 onwards. Interestingly, the notion that underlies the normalization of the profiles, namely that cohorts between the ages of 30 and 49 years are the peak income earners, is clearly inaccurate in the case of South Africa in 2015. Instead, the 20 cohorts with the highest per capita labour incomes are those between the ages of 38 and 57 years.

Consumption shows less variation across age than labour income. For the youngest cohorts, consumption is equivalent to approximately 30 per cent of peak labour income—at least partially driven by the equivalence scale—but jumps sharply as children start attending school from age six onwards. During the school-going years, consumption gradually increases, peaking at over 0.55 peak income units at ages 17 and 18, and falls slightly in early adulthood. From age 23, however, consumption begins to rise again and is over 0.90 peak income units during the early seventies; for older cohorts, per capita consumption is only marginally lower than this peak. This considerable rise in per capita consumption across age—it increases by 70 per cent between the ages of 20 and 70—stands in contrast to the general cross-country pattern of relatively stable consumption after age 20. Oosthuizen (2015: 16), for example, illustrates this stability using the interquartile range of normalized estimates from 33 countries and shows that per capita consumption in South Africa in 2005 is below the 25th percentile among children and close to the 25th percentile among the oldest cohorts, but was above the 75th percentile for cohorts between the ages of 30 and 60 years.

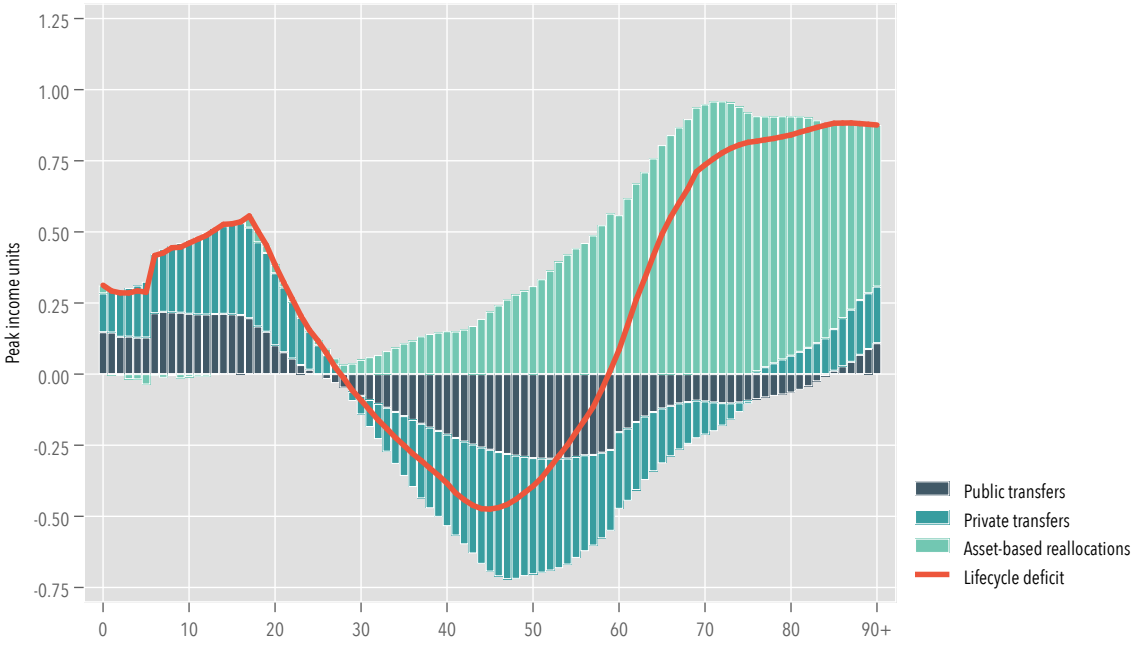
Together, the consumption and labour income profiles determine the lifecycle deficit—$C(x)$ less $Y^l(x)$—which follows the consumption profile at young ages where there is no labour income. The deficit peaks at age 17 (0.56 peak income units) and falls rapidly as cohorts enter the labour market and begin to earn labour income. The deficit turns negative (i.e. a lifecycle surplus) at age 28, reaching 0.47 peak income units during the mid-forties. Averaged across cohorts, per capita surpluses are generated between the ages of 28 and 58 years, with older cohorts experiencing per capita deficits that are substantially larger than those observed among children.

The lifecycle deficit profile is reproduced in Figure 2, along with the three sources of lifecycle deficit financing. The importance of these sources—net public transfers, net private transfers, and asset-based reallocations—varies substantially over the life course in terms of both magnitude and sign. Among younger cohorts, the lifecycle deficit is almost entirely financed through transfers. Within total transfers, private transfers are dominant and represent 50–65 per cent of the total among all but two cohorts under 20 years. Public transfers are largest relative to total transfers for infants (52 per cent) and for the youngest school-going cohorts (46–51 per cent among 6–9-year-olds). At the peak of the lifecycle deficit at age 17, per capita public transfers are equivalent to 0.20 peak income units, compared to 0.32 units for private transfers and 0.04 units for asset-based reallocations.

Both public and private transfers turn negative (i.e. net outflows) in the late twenties, at around the age that cohorts start producing lifecycle surpluses. For public transfers, this is driven by increases in public transfer outflows linked to rising per capita labour income, combined with reduced public transfer inflows, which include in-kind transfers such as spending on education and health. Private transfer outflows are, again, larger than public transfer outflows. In contrast, asset-based reallocations rise at an increasing rate from the early twenties onwards. The result is that the substantial transfer outflows during the prime working ages are offset by increasing inflows associated with asset income, which includes inflows related to owner-occupied housing. Peak lifecycle surplus equivalent to 0.47 income units per capita is generated at age 45; at this age, net transfer outflows total 0.69 peak income units (of which 0.43 units are private transfer outflows), while inflows from asset-based reallocations total 0.22 income units. In other words, at age 45, net public transfer outflows are almost completely balanced by inflows from asset-based reallocations.

Among post-retirement cohorts, inflows from asset-based reallocations peak at 0.96 income units in the early seventies, but fall by two-fifths to 0.57 units for the 90+ cohort. During the post-retirement years, net private transfers turn positive at age 76 and net public transfers at age 85. Thus, for the oldest cohort, the LCD of 0.88 income units is financed through net public transfer inflows of 0.11 income units, net private transfer inflows of 0.20 income units, and asset-based reallocations of 0.57 income units.

Figure 2: Financing the lifecycle deficit



Notes: profiles are standardized by dividing through by the average labour income for 30–49-year-olds ('peak labour income'); this average value is referred to as a 'peak income unit'.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

The overall picture, then, is one of lifecycle deficits for children and elders, with deficits particularly large for the latter. Surpluses are produced by the 31 cohorts between the ages of 28 and 58 years. The deficits generated by children are financed almost exclusively through transfers, with private transfers accounting for one-half to two-thirds of the total, while deficits for elders are primarily financed through asset-based reallocations. However, transfers are increasingly important to the financing of the deficit among the elderly and finance more than one-third of the deficit for the oldest cohort.

These per capita profiles, though, obscure some of the effects of the population age structure. Table 2 provides a better sense of the interaction between the profiles and the population age structure by presenting the aggregate flows (i.e. the aggregate control values) and their distribution across four age groups. By construction, the per capita profiles multiplied by the population age structure are equal to the aggregate control values.[6]

There are a number of key points that emerge from the table. First, the aggregate lifecycle deficit among young people is substantially larger than that among elders, despite the per capita deficits being smaller. The aggregate deficit among those under the age of 19 years is equivalent to 116.6 per cent of the total deficit, 3.5 times elders' 33.2 per cent share. This is the result of this cohort outnumbering elders by a factor of more than four to one. Second, the cohort age 19–39 years is virtually in lifecycle balance, accounting for just 1.0 per cent of the aggregate deficit. Third, elders receive relatively large shares of both private and public transfer inflows compared with their share of the population (approximately 12 per cent compared with their 8.0 per cent population share), while children's share of total transfer inflows is similar to their population shares (although they account for a relatively large share of public transfer inflows). Fourth, elders account for 45.9 per cent of aggregate asset-based reallocations, while adults aged 40–59 years account for 40.8 per cent. The large share for elders is driven by private asset-

[6] For rand values, see Table A1 in the Appendix.

based reallocations, which in turn is the result of a high share of private asset income and a low share of private saving. The somewhat lower share for 40–59-year-olds is the result of this cohort accounting for nearly two-thirds (64.1 per cent) of private saving.

Table 2: Aggregate controls and distribution across age, 2015

Flow		Overall	Proportion (%) attributable to...			
		R billion	0–18 yrs	19–39 yrs	40–59 yrs	60+ yrs
Labour income	**YL**	**2,166.5**	**0.2**	**45.2**	**48.3**	**6.3**
Employment earnings	YLE	1,945.8	0.1	44.8	49.4	5.7
Self-employment earnings	YLS	220.7	1.6	48.2	38.8	11.4
Consumption	**C**	**2,820.5**	**27.2**	**34.9**	**25.4**	**12.5**
Private consumption	CF	1,991.6	19.9	36.7	29.0	14.4
- Education	*CFE*	*69.9*	*61.0*	*35.3*	*3.3*	*0.5*
- Health	*CFH*	*135.0*	*19.2*	*22.7*	*36.7*	*21.4*
- Other	*CFX*	*1,786.7*	*18.3*	*37.8*	*29.4*	*14.4*
Public consumption	CG	828.9	44.8	30.6	16.6	8.0
- Education	*CGE*	*204.6*	*77.1*	*20.7*	*2.2*	*0.0*
- Health	*CGH*	*120.8*	*23.8*	*24.4*	*30.3*	*21.5*
- Other	*CGX*	*503.5*	*36.8*	*36.0*	*19.1*	*8.0*
LIFECYCLE DEFICIT	**LCD**	**654.0**	**116.6**	**1.0**	**–50.8**	**33.2**
REALLOCATIONS	**R**	**654.0**	**116.6**	**1.0**	**–50.8**	**33.2**
Transfers	**T**	**–33.5**	**–2,284.6**	**264.4**	**1,826.6**	**293.6**
Private transfers	TF	12.8	3,390.8	–76.8	–2,806.8	–407.2
- Inflows	*TFI*	*1,346.5*	*32.6*	*33.4*	*21.2*	*12.9*
- Outflows	*TFO*	*1,333.8*	*0.4*	*34.4*	*48.2*	*16.9*
Public transfers	TG	–46.3	–720.5	170.3	549.7	100.5
- Inflows	*TGI*	*1,034.7*	*43.2*	*28.0*	*16.5*	*12.3*
- Outflows	*TGO*	*1,081.0*	*10.5*	*34.1*	*39.3*	*16.0*
Asset-based reallocations	**RA**	**687.6**	**–0.5**	**13.8**	**40.8**	**45.9**
Private ABR	RAF	746.9	0.4	15.4	40.7	43.5
- Private asset income	*YAF*	*902.2*	*0.2*	*18.0*	*44.7*	*37.0*
- Private saving	*SF*	*155.3*	*–0.6*	*30.6*	*64.1*	*6.0*
Public ABR	RAG	–59.3	10.7	33.9	39.2	16.2
- Public asset income	*YAG*	*–109.9*	*10.7*	*33.9*	*39.2*	*16.2*
- Public saving	*SG*	*–50.6*	*10.7*	*33.9*	*39.2*	*16.2*
Population		**55.3 mil**	**36.8**	**36.0**	**19.1**	**8.0**

Notes: proportions in rows sum to 100.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

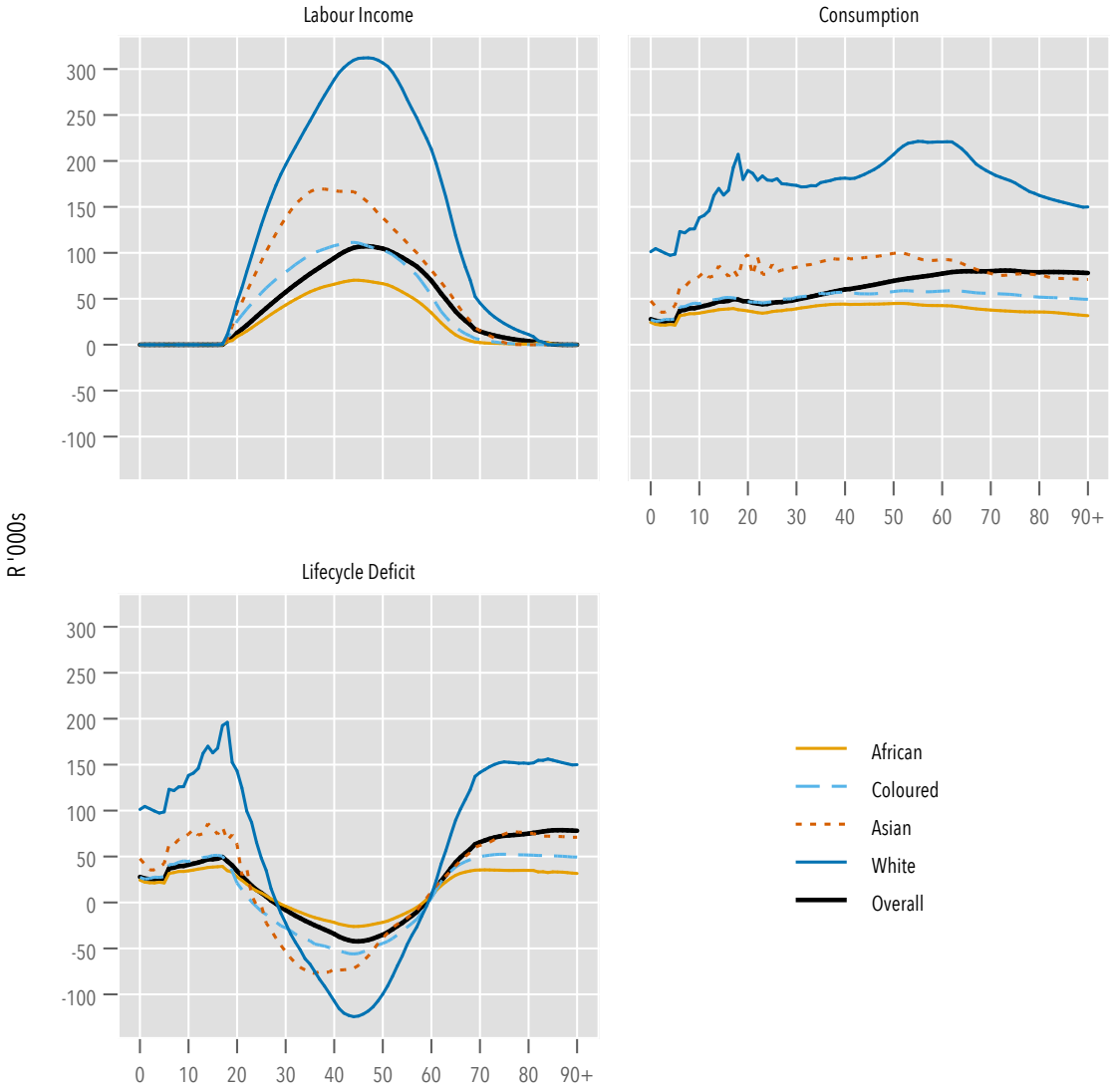
4.2 Race and the lifecycle deficit

Labour income, consumption, and the lifecycle deficit

Having described the broad outlines of the South African generational economy above, the focus here is on the race-specific profiles that comprise the lifecycle deficit. Figure 3 presents the labour income, consumption and lifecycle deficit profiles by race in 2015 rands, and reveals significant differences between the four groups. The overall profiles presented in Figure 1 are reproduced here for context.

While the labour income profiles of each of the four race groups follow the conventional bell-shaped pattern, their levels and timing of the peaks vary substantially. The national profile peaks at R107,000 in the late forties; in contrast, the peak for Africans occurs at R70,000 income units in the mid-forties, compared with R111,000 in the mid-forties for Coloureds, R169,000 in the late thirties for Asians,

Figure 3: Components of the lifecycle deficit by race, 2015



Notes: profiles are expressed in 2015 rands. Self-normalized profiles are available in Figure A1 in the Appendix.
Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

and R309,000 in the late forties for Whites. In other words, peak per capita labour income for Whites is nearly 2.5 times the national peak, while that of Africans is less than four-fifths of the national peak. The profiles therefore also differ in the extent to which they lean towards younger or older ages: the Coloured and Asian profiles lean towards younger ages, while those of Africans and Whites lean towards older ages.

Given the differences in labour income, it should not be surprising that consumption levels differ too. What is perhaps most interesting is the fact that the African, Coloured, and Asian profiles are relatively close to the overall profile, while the White profile stands out far above the others. At age 20, per capita consumption among Whites is R188,000 and ranges between R165,000 and R222,000 over the rest of the life course. In contrast, consumption at age 20 among Africans is just R37,000 (one-fifth that of Whites) and remains within a narrow band during adulthood (R33,000–R45,000). For Coloureds, consumption ranges between R45,000 and R59,000 over the same age range, while the range is R59,000 to R100,000

for Asians. Importantly, though, each of the race groups broadly exhibit the more conventional stable per capita consumption levels observed in other NTA countries, despite the overall profile gradually rising over much of the life course.

As a result of these differences in labour income and consumption, profiles of the lifecycle deficit are also different by race. In line with the differences observed above, the first point to note is the much larger per capita lifecycle deficits and surpluses for Whites compared with the other races. Among younger cohorts, the peak deficit of R194,000 among Whites occurs at age 18; this compares to peaks of R39,000 among Africans at ages 16 and 17, R51,000 among Coloureds aged 15 and 16 years, and R85,000 among Asians aged 14 years. The same ordering is observed for deficits in old age and in surpluses in the prime working ages.

There are also differences in the timing of the transitions between lifecycle surplus and deficit and, consequently, in the duration of the surplus-generating period. The transition to surplus among young adults occurs earlier for Coloureds and Asians (at age 24) than for Africans and Whites (both at age 29). However, transitions to deficit in later adulthood are almost simultaneous across the four groups, at ages 58 or 59. The result is shorter surplus-generating periods among Africans and Whites—30 and 31 years—than among Coloureds and Asians (36 and 35 years respectively). For context, on average across 40 countries for which publicly available NTA estimates are available, the age of transition to surplus is 26.6 years and the return to deficit occurs at 58.7 years of age; thus, the average duration of the period surplus is 32.1 years (author's calculations based on National Transfer Accounts Project 2019). This places Coloureds and Asians within the top quartile of the range of available national estimates in terms of the duration of the period of surplus, and Africans and Whites within the second-lowest quartile.

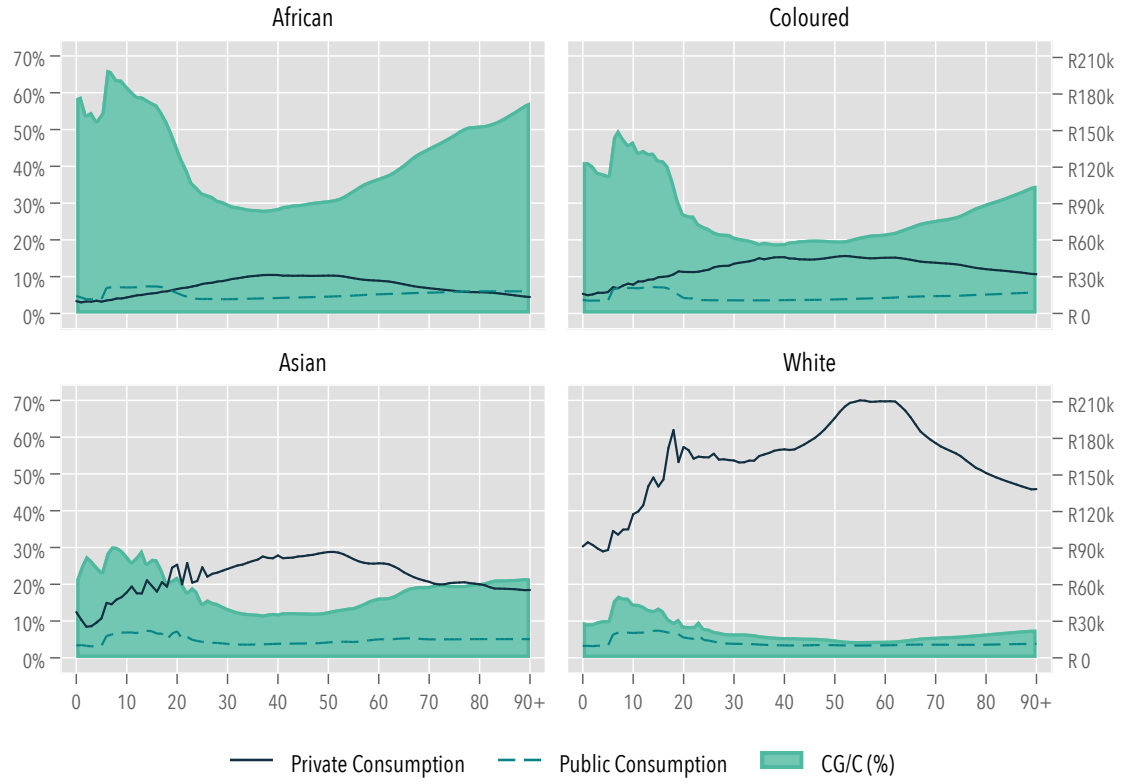
Private and public consumption

NTAs distinguish between the private and public sectors within the generational economy, with a number of flows—including consumption—having both private and public components. Within consumption, in addition to the distinction between consumption mediated by the private and public sectors, consumption of education and health are estimated separately, given their strong lifecycle dimensions. Within the context of inequality, looking more closely at the components of consumption will provide an indication of the relative importance of the two institutional sectors in mediating consumption.

Figure 4 plots the per capita profiles of private and public consumption for the four race groups, as well as the share of public consumption within the total. What is immediately evident is the dominance of the public sector within consumption for Africans and, to a slightly lesser extent, Coloureds, particularly among the young and the old. Public consumption accounts for between one-half and two-thirds of per capita consumption for Africans under the age of 19 years, and between 45 per cent and 54 per cent among those aged 70 years and older. Among Coloureds, these proportions are 36–50 per cent and 25–32 per cent respectively. In contrast, public consumption represents just 9–17 per cent of per capita consumption among Whites under the age of 19, and 6–7 per cent of consumption for those aged 70 years and above.

In terms of consumption of education, per capita public consumption is relatively similar across the four race groups, although a small gap does open up in the early twenties (Figure 5). This difference is the result of differences in attendance rates across institutional types, rather than differences in spending per

Figure 4: Private and public consumption by race, 2015



Notes: profiles are expressed in 2015 rands.

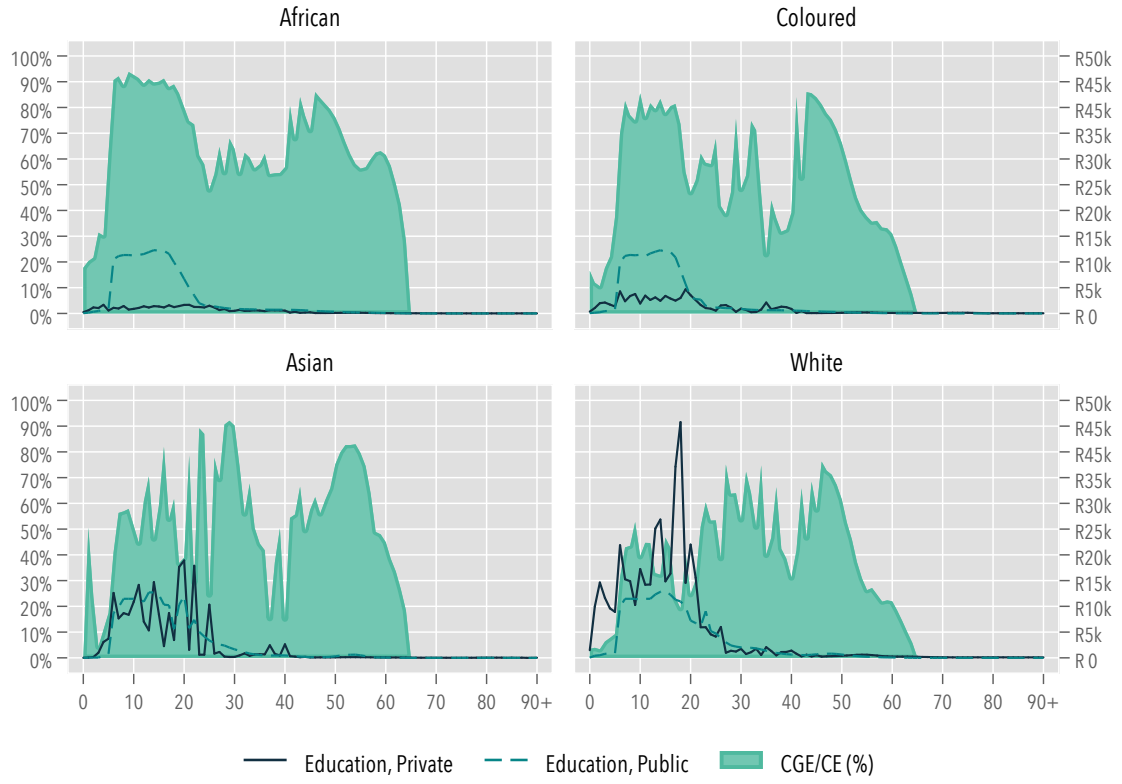
Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

learner within educational levels.[7] The key difference, though, is in the level of private consumption of education. Note that private consumption of education refers to consumption financed by private sector institutions, most notably households. It is not the same as spending on private education; instead, it refers to all private spending related to education, whether such education is provided by the state or not. These profiles are relatively noisy, but what is clear is that public consumption accounts for a significantly larger share of total consumption of education among Africans, Coloureds, and, to a lesser extent, Asians than for Whites. A key difference is the relatively high per capita levels of private spending on preschool education among Whites, compared to virtually nothing for the other three race groups. Across cohorts aged 6–20, the public sector accounts for an (unweighted) average of 90 per cent of education consumption among Africans, compared with 75 per cent for Coloureds, 55 per cent for Asians and 38 per cent for Whites.

This pattern of the relative importance of public and private consumption across race groups is repeated within health consumption (Figure 6). Among Africans, the public sector accounts for 60–80 per cent of total health consumption for virtually all age cohorts; in contrast, among Whites, the public sector never accounts for more than 15 per cent of health consumption for any cohort. Per capita public consumption of health rises in absolute and relative terms for all four race groups from the prime working-age cohorts onwards. The profiles suggest significant allocations of resources by households to health consumption for infants and young children. Among Whites, private consumption of health is estimated at R32,000

[7] In the construction of the NTA profiles, spending per user/learner is assumed to be constant within the educational phases used.

Figure 5: Education consumption by race, 2015



Notes: profiles are expressed in 2015 rands.

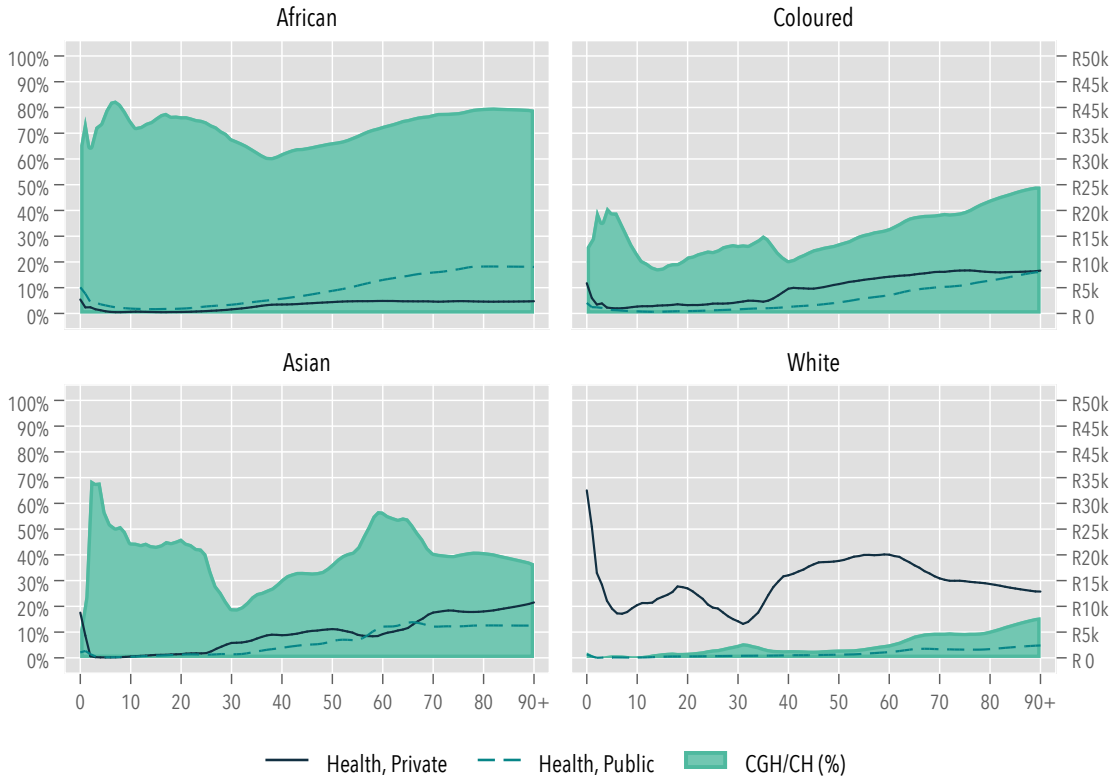
Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

per capita at age zero, compared to R9,000 among Asians, R6,000 among Coloureds, and R3,000 among Africans. Despite these differences in the rand amounts, a common feature across race is that private consumption of health for infants is higher than for most other age cohorts.

These patterns of the relative importance of public and private consumption of health are consistent with differentials in access to medical aid and utilization of public health services across income. Low rates of utilization of the public healthcare system among high-income groups (Alaba and McIntyre 2012: 711; Burger et al. 2012: 688) translate into low rates of utilization among Whites and to a lesser extent Asians and Coloureds, and although older cohorts have among the highest rates of medical aid coverage—coverage rates are estimated to be above 25 per cent for the population over 70, compared with under 20 per cent for the population under 40 (author's calculations based on data from Council for Medical Schemes 2018; Statistics South Africa 2018b)—they may be more constrained in terms of the quality of coverage and may increasingly opt for public healthcare at older ages.

The main driver of differences in consumption across race groups, however, is other consumption (i.e. all consumption excluding education and health), as illustrated in Figure 7. Other public consumption is, as noted, allocated on a per capita basis and there is therefore no age- or race-related variation in this type of consumption. Other private consumption, however, varies dramatically across both age and race. The variation by age is, to a large extent, by construction given the use of adult equivalence scales. However, a per capita allocation of other private consumption would still yield higher per capita consumption among working-age adults (see Figure A2 in the Appendix), given these cohorts' greater access to labour income. At its peak, other private consumption is estimated at R29,000 per capita, compared to R41,000 for Coloureds, R81,000 for Asians, and R191,000 for Whites. As a result, the

Figure 6: Health consumption by race, 2015



Notes: profiles are expressed in 2015 rands.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

public sector is more important within other consumption for Africans and Coloureds than for Asians and Whites.

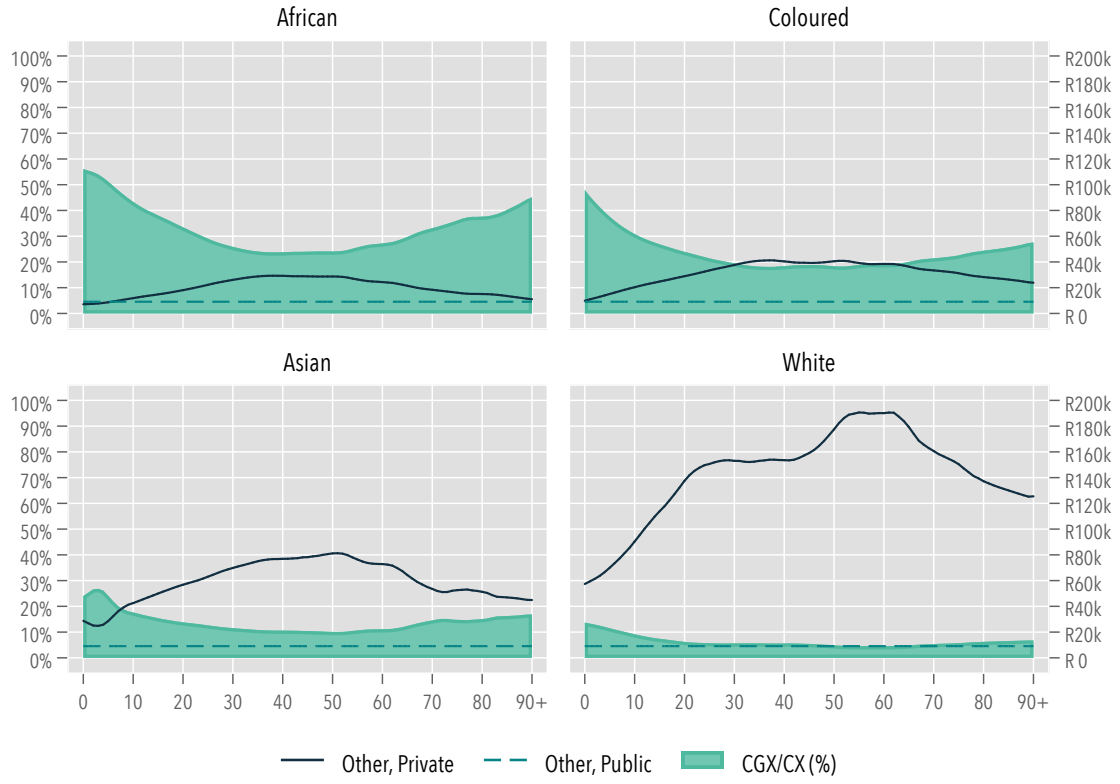
4.3 Age reallocations

Transfers and asset-based reallocations

Age reallocations consist of two categories of flows, namely transfers and asset-based reallocations (see Equation 1). Both categories of flows can be further subdivided into public and private flows, depending on whether or not they are mediated by the government. Further, both categories include both inflows and outflows.

Figure 8 provides an overview of net public and net private transfers, as well as net asset-based reallocations. The latter is not disaggregated into public and private flows since it is overwhelmingly composed of private asset-based reallocations. For the population as a whole, net public transfers range from net per capita inflows of R20,000 (among young children) and net outflows of R26,000 (in the late forties and fifties). Cohorts up to the age of 25 years and those aged 85 years and above receive net public transfer inflows, while cohorts between these ages experience net public transfer outflows.

Figure 7: Other consumption by race, 2015



Notes: profiles are expressed in 2015 rands.

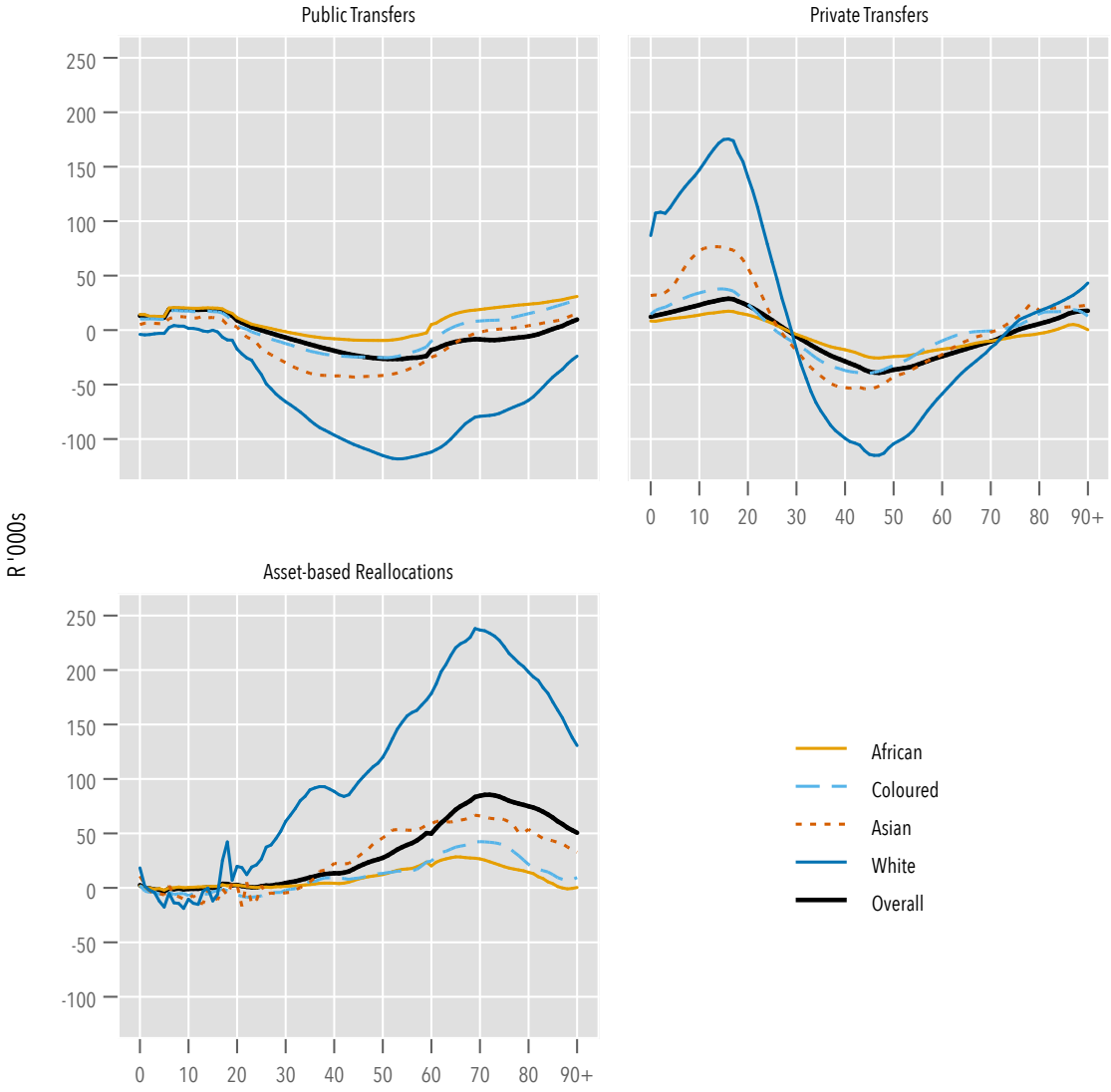
Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

The pattern observed for net private transfers is broadly similar: the youngest cohorts (up to the age of 28 years) receive net private transfer inflows, as do their counterparts over the age of 75 years, while private transfer outflows exceed inflows for cohorts between these ages. The key differences between the net public and private transfer profiles are that the latter has a wider range of values (ranging from a net outflow of R39,000 per capita to a net inflow of R29,000 per capita), and that more cohorts experience net public outflows than net private outflows, with this difference driven particularly by older cohorts.

For both of these flows, there are marked differences by race. In terms of public transfers, Whites are the outlier, with large net outflows across adulthood, in excess of R22,000 from the age of 21 onwards and with a peak of nearly R120,000 during the fifties. Among Whites, only primary school-age children receive net public transfer inflows. In contrast, net public transfer inflows are received by African cohorts under the age of 29 and those aged 60 years and older, while net outflows peak at under R10,000 per capita for cohorts around age 50. For Coloureds, net outflows are observed for cohorts aged 23–62, with a peak of just over R25,000 around age 50; for Asians this is true of cohorts aged 21–71, with a peak of almost R43,000 in the mid-forties. In other words, the socioeconomic gradient observed across South Africa's four race groups is correlated with the timing and duration of net public transfer outflows as well as their peak values. Importantly, differences between race groups are much less pronounced among children than for any other age.

For private transfers, the amplitude of the White profile is substantially greater than those of the other groups. Among Whites, net private transfer inflows peak at over R170,000 per capita for White cohorts aged 14–17 years, while net outflows peak at over R110,000 during the mid-forties before returning to net inflows of R43,000 per capita for the oldest cohort. Whites are typically followed by Asians and

Figure 8: Transfers and asset-based reallocations by race, 2015



Notes: profiles are expressed in 2015 rands.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

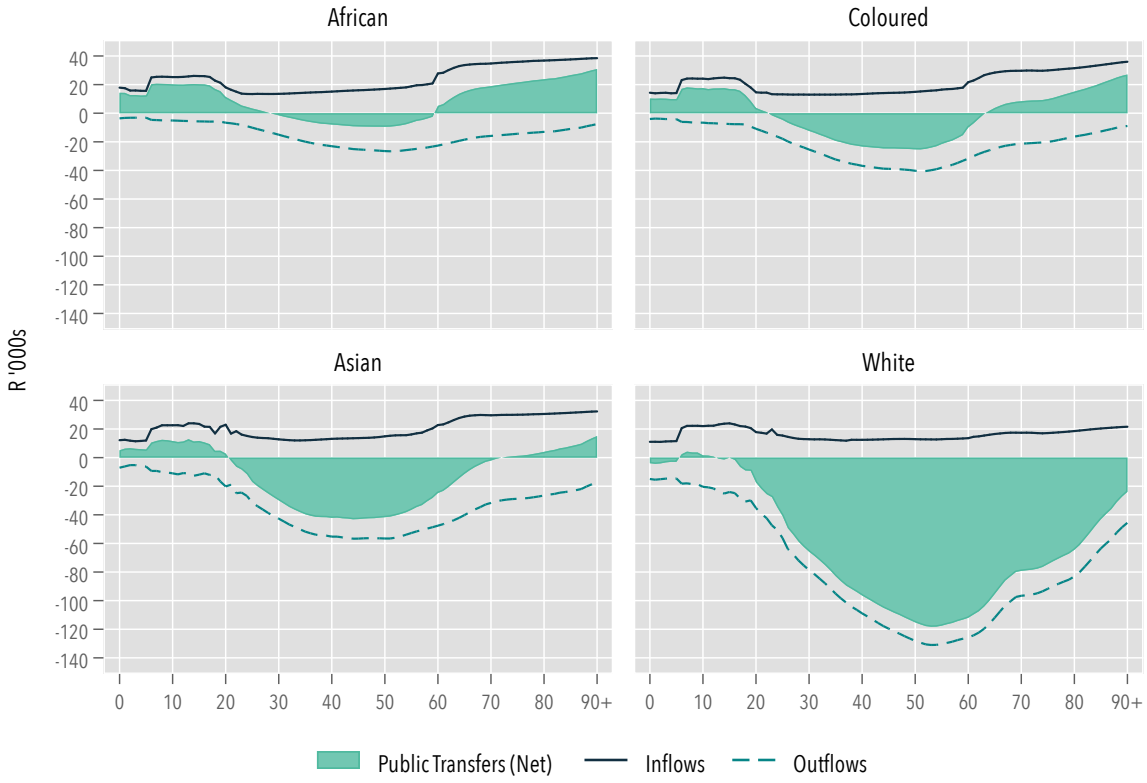
then Coloureds and Africans, although there are some idiosyncrasies at particular ages. Interestingly, the switch from net inflows to net outflows is similarly timed across all four race groups, occurring within a span of four years in the late twenties, while the switch back to net inflows occurs over a span of more than 10 years (starting at age 71 for Coloureds and rising to age 83 for Africans).

Asset-based reallocations (i.e. asset income less saving) are negligible at young ages, reaching R5,000 per capita at age 31 for the population as a whole. Net inflows rise gradually with age: by age 51 net inflows from asset-based reallocations are estimated at R30,000 and R50,000 around age 60, peaking at R85,000 per capita in the early seventies. Net inflows fall for older cohorts, reaching R51,000 at age 90. Net inflows from asset-based reallocations are substantially higher for Whites than for the other groups. At age 69, net inflows peak at R238,000 per capita for Whites: this is 3.6 times the level for Asians, 5.7 times that of Coloureds, and 8.8 times that of Africans.

Public transfers

Differences in net public or private transfers across groups are driven by differences in patterns of inflows and outflows. As a result, these net profiles may obscure differences, or similarities, of the underlying profiles. This phenomenon is clearly illustrated in Figure 9, which presents public transfer inflows and outflows by race, with the shaded area representing the profiles of net public transfer outflows shown in the top left-hand panel of Figure 8.

Figure 9: Public transfers by race, 2015



Notes: profiles are expressed in 2015 rands.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

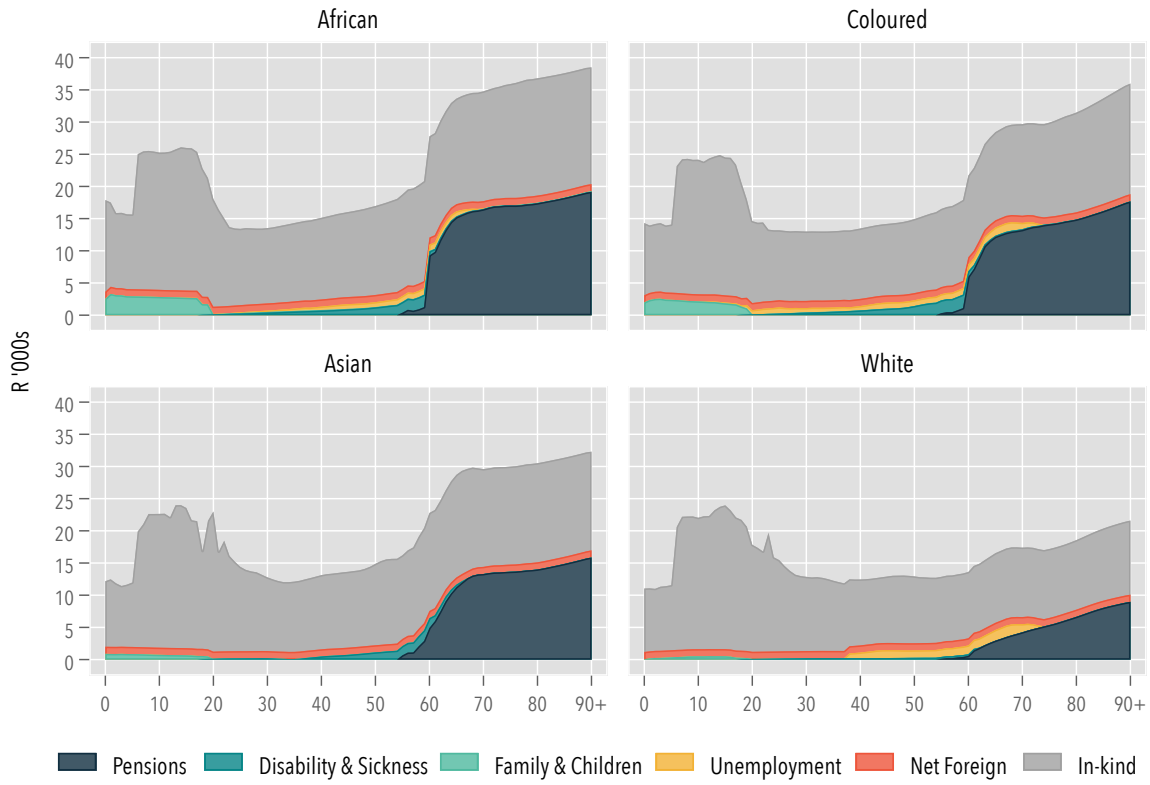
The differences in net public transfers highlighted in Figure 8 are more clearly visible here: net public transfer inflows are relatively larger for young and post-retirement African cohorts, while the net public transfer outflows are smaller and observed over fewer working-age cohorts compared with the other races. What Figure 9 reveals, though, is that these differences are primarily the result of differences in the public transfer outflow profiles, rather than differences in the inflow profiles. Race-specific public transfer inflow profiles remain within R7,000 of each other for cohorts under the age of 60 and within R14,000–R19,000 of each other for older cohorts, a narrow range considering the differences in net public transfers across groups.

Public transfer outflows are 'the current flows from each age group (or the rest of the world) that fund public transfer inflows' (United Nations 2013: 113), and consist of social contributions, taxes (on labour, capital, and consumption), and foreign grants to the government. Per capita public transfer outflows are most similar across race among children. At these ages, public transfer outflows derive almost entirely from taxes on consumption, per capita private consumption levels being most similar at young ages. However, the gap widens rapidly as cohorts enter the labour market and begin accumulating assets,

reaching R70,000 at age 33. Between the ages of 49 and 62 years the gap peaks at between R100,000 and R105,000 per capita and, even though the gap narrows for older cohorts, it is still R38,000 at age 90. At its peak, public transfer outflows for Whites are estimated at R131,000 per capita; this is nearly five times the peak for Africans, 3.2 times the peak for Coloureds, and 2.3 times the peak for Asians.

Total public transfer inflows include cash transfers and in-kind transfers, the latter comprising the public consumption (education, health, and other) described earlier. Figure 10 disaggregates public transfer inflows, with a particular emphasis on cash transfers. The figure groups the various social grants into three categories: pensions, which includes the old-age grant and the war veterans grant; disability and sickness, which includes the disability grant; and family and children, which includes the child support grant and foster care grant. Receipts from the Unemployment Insurance Fund and the Compensation Fund are combined under 'unemployment' in line with their treatment in the survey. Of these various transfers, the largest in terms of expenditure in the 2015/16 financial year were the old-age grant (R53.1 billion), the child support grant (R47.3 billion), the disability grant (R19.2 billion), and receipts from the Unemployment Insurance Fund and Compensation Fund (R16.1 billion combined) (National Treasury 2018: 344, 592, 595). These are relatively small amounts compared to the aggregate control for total public transfer inflows of R1,034.7 billion (see Table 2).

Figure 10: Public transfer inflows by race, 2015



Notes: profiles are expressed in 2015 rands.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

Despite their relatively low values—total spending on the old-age grant is just 5.1 per cent of the value of total public transfer inflows—these cash transfers are relatively important on a per capita basis in particular age groups. The near universality of the old-age grant and its relatively high value mean that pensions represent quite substantial public transfer inflows for retirement-age cohorts. This is particularly true for Africans, rising from R15,000 per capita at age 65 to R19,000 at age 90, Coloureds

(R12,000 to R18,000), and Asians (R11,000 to R16,000). Even among Whites, public transfer inflows in the form of pensions rise from around R3,000 to R9,000 for the same cohorts, the lower values linked to lower rates of access.

In contrast, while government expenditure on grants within the family and children category is slightly higher than that on pensions (5.4 per cent of total public transfer inflows), lower access rates and smaller grant values mean that they constitute much smaller public transfer inflows on a per capita basis. Among Africans, these grants amount to public transfer inflows of around R3,000 per capita up to the age of 17, compared to around R2,000 and R1,000 per capita among similarly aged Coloureds and Asians respectively; these inflows are negligible on a per capita basis for Whites.

The remaining inflows consist of unemployment and net foreign transfer inflows, the latter representing a distribution of receipts from foreign governments and international organizations net of payments. These inflows are small, never rising much above R1,500 per capita.

Private transfers

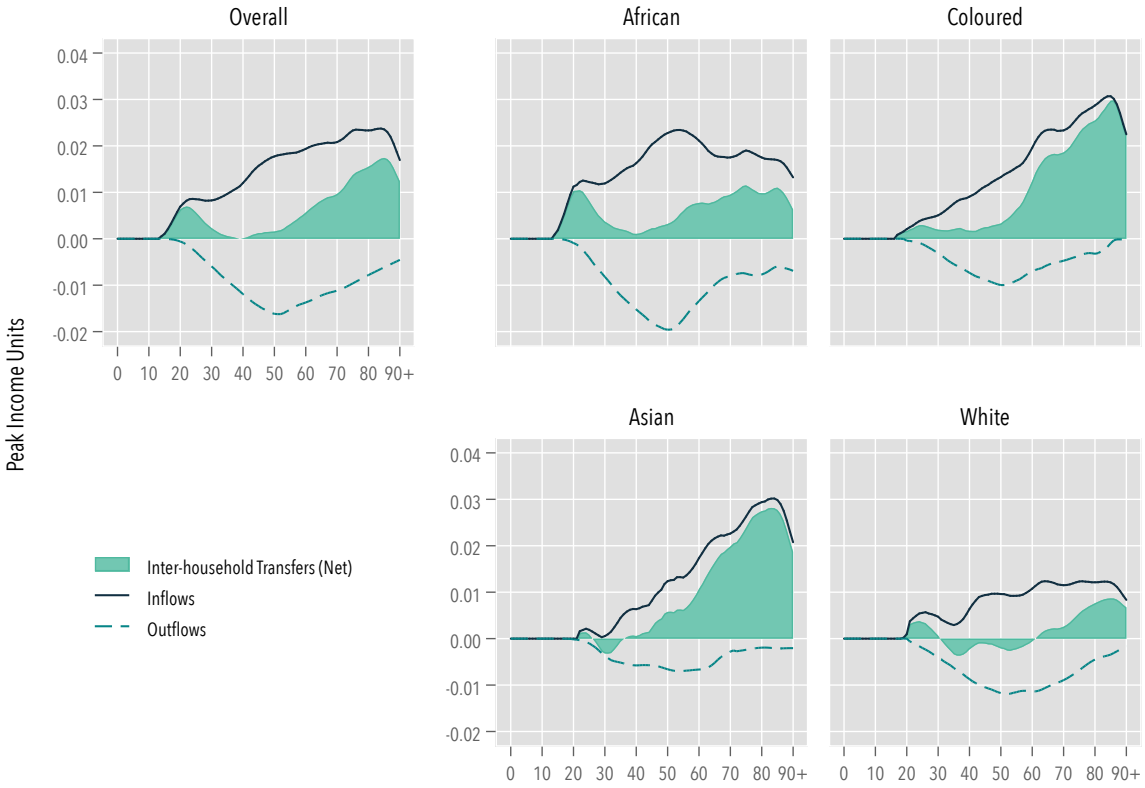
Private transfers are composed of transfers between households and transfers within households, referred to as inter-household and intra-household transfers respectively. Inter-household transfers include flows such as remittances, as well as maintenance payments and gifts; they also include transfers between households and the rest of the world (United Nations 2013: 137). Intra-household transfers, on the other hand, are not typically observed in household survey data and are instead derived on the basis of a simple model of resource sharing within households.

One of the challenges of analysing differences in private transfers across groups that vary considerably in terms of income levels and access to resources is that the magnitude of transfers is strongly correlated with income levels. As a result, lower per capita transfers would be observed for poorer groups and vice versa for wealthier groups. To ameliorate this problem, the inter- and intra-household transfer profiles presented in Figures 11 and 12 are normalized using the group-specific labour income profiles, allowing the level of transfers to be related to peak labour income for each of the groups.

Figure 11 presents net inter-household transfers by race (the shaded areas), as well as the separate profiles for inter-household inflows and outflows. The first thing to note is that, on average, these flows are small relative to peak labour income in each group: at no point in the lifecycle do either inflows or outflows exceed 3.5 per cent of peak labour income for any race group. Certainly, as will be shown below, inter-household transfers are dwarfed by intra-household transfers. The national profile, as discussed above, shows net inflows peaking around the age of 20, which dissipate by the late thirties, but gradually rise with age thereafter. The separate profiles of inflows and outflows, though, reveal that inter-household inflows and outflows are observed across the lifecycle (except for the youngest cohorts, who are rarely, if ever, household heads). However, while inflows rise throughout much of adulthood, outflows peak around age 50 and decline thereafter.

This general pattern does not, however, hold for each of the four race groups. While all four race groups see outflows rise during the working ages and peak at around age 50, it is clear that outflows for working-age Africans are relatively large and persist into old age. Outflows at ages 50 and 80 are equivalent to 2.0 per cent and 0.8 per cent of African peak labour income respectively; for Coloureds, they are only 1.0 per cent and 0.3 per cent of Coloured peak labour income, and for Asians the figures are even lower. This suggests that inter-household transfer outflows may represent a greater burden for Africans than other race groups, despite these transfers being smaller in rand terms for Africans, and is consistent with the notion of a ‘black tax’.

Figure 11: Inter-household transfers by race, 2015



Notes: profiles are normalized using group-specific labour income profiles.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

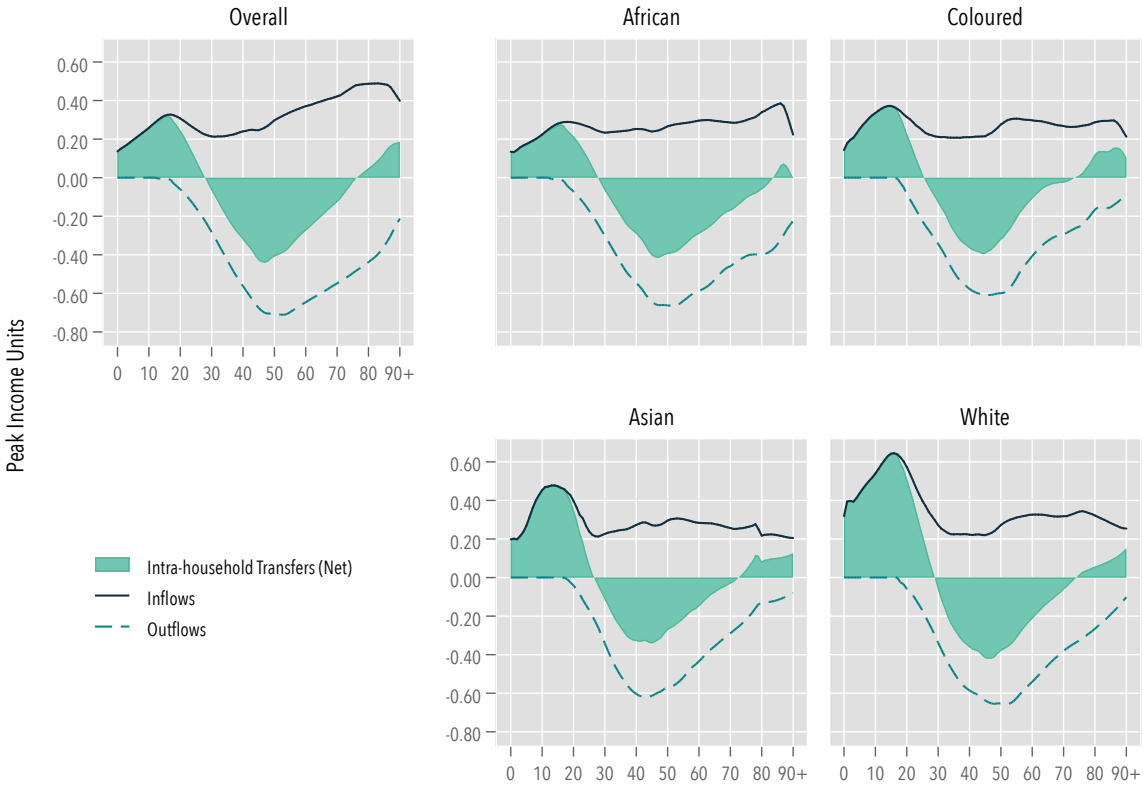
In terms of inflows, there are two types of patterns. Coloureds and Asians are similar in that inflows rise more or less consistently with age until the early eighties, where they peak at just over 3 per cent of their respective peak labour incomes. In contrast, among Africans and Whites, the correlation between age and the level of inflows is much weaker, with inflows relatively stable after age 40.

These various patterns of inflows and outflows give rise to unique patterns of net inter-household transfers for each race. Once again, the profiles for Coloureds and Asians are similar: net inter-household transfers are zero or very close to zero for cohorts under 45, but rise rapidly thereafter until the mid-eighties, where they peak at close to 3 per cent of peak labour income, before tapering off slightly. In contrast, all adult African cohorts experience net inflows, although these are negligible for cohorts in their thirties and forties. At their peak, net inflows are around 1 per cent of peak labour income. For Whites, inflows are slightly positive for cohorts in their twenties and slightly negative for cohorts aged 32–60 years. Post-retirement cohorts see a steady rise in net inter-household transfer inflows until the mid-eighties, but never rise above 1 per cent of peak labour income for Whites.

Inter-household transfers pale into insignificance, however, in comparison with intra-household transfers (Figure 12). For the population as a whole, net intra-household transfers are positive for cohorts under the age of 28 years, peaking at 32.1 per cent of peak labour income at age 16. Net transfers are similarly positive for elderly cohorts and reach almost 19 per cent of peak labour income by age 90. From age 28 to age 76, net intra-household transfers are negative (i.e. net outflows); at its peak, net outflows reach 44.1 per cent of peak labour income. Given that intra-household transfers are a key mechanism for financing the consumption of dependent household members, it is not surprising that intra-household transfer inflows are substantial over the entire lifecycle, ranging between 13.7 per cent and 48.9 per cent

of peak labour income. Intra-household transfer outflows are confined to adult cohorts and peak at over 70 per cent of peak labour income for cohorts aged 47–54 years.

Figure 12: Intra-household transfers by race, 2015



Notes: profiles are normalized using group-specific labour income profiles.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

In contrast to inter-household transfers, the net intra-household transfer profiles for the four race groups follow broadly similar patterns, differing primarily in amplitude and timing of transitions between net inflows and net outflows. For each group, the young and the elderly receive net inflows, while working-age cohorts experience net outflows. The transition to net outflows, which occurs at age 28 for the population as a whole, occurs at the same age for Africans but occurs two years and one year earlier for Coloureds and Asians respectively, and one year later for Whites. Net inflows among children and young adults peak at 27.7 per cent of peak labour income for Africans, 37.2 per cent for Coloureds, 47.8 per cent for Asians, and 64.5 per cent for Whites. These proportions are calculated using each group's own peak labour income, implying a much broader range for the per capita rand values.

The transition back to net inflows, while similar for Coloureds, Asians, and Whites around age 74, occurs a decade later for Africans at age 84. Further, while net inflows among these elderly cohorts average (unweighted) between 7.7 per cent and 10.4 per cent of own peak labour income for these three groups, for Africans the average is just 3.9 per cent of own peak labour income. Thus, intra-household transfer inflows are short-lived and relatively small in magnitude among elderly African cohorts compared to those received by both young Africans and elderly Coloured, Asian, and White cohorts.

The differences in net intra-household transfers across groups relate to differences in the patterns of inflows and outflows. Among young cohorts, cross-race differences are primarily the result of differences in inflows. Among older cohorts, however, the differences tend to be driven by differing patterns of outflows. In particular, the much more muted decline in outflows among African adults over the age of

70 underlies the late transition to and relatively small size of net intra-household transfer inflows among those elderly cohorts.

Figure 12 hints at the substantial flows of resources across age that occur within households. Using the NTA model of intra-household transfers (discussed in Section 3.1), it is possible to map transfer flows by the age of the giver of the transfer and the age of the receiver (as per Lee and Donehower 2011). Plotting the magnitude of the transfers between each pair of ages generates a visual representation of the major patterns of intra-household resource flows, allowing a characterization of the linkages between generations.

In constructing these matrices, only transfers made to finance consumption are included within the aggregate. This means that transfers of resources to household heads for the purpose of saving are excluded from consideration. The benefit of excluding this particular flow is that it removes confounding resource flows that exist in the transfer model but which may not appropriately reflect the situation in reality: it seems more plausible that saving occurs at the individual level where the surplus arises, rather than at the household level where it is performed by the household head. The matrices are based on the aggregate values of transfers between age-pairs; since these values are correlated with individuals' and households' access to resources, they are expressed as a proportion of total consumption-related intra-household transfers for the particular group. The choice of group-specific denominators is to allow a better comparison of the patterns of flows without them being obscured by magnitude differences.

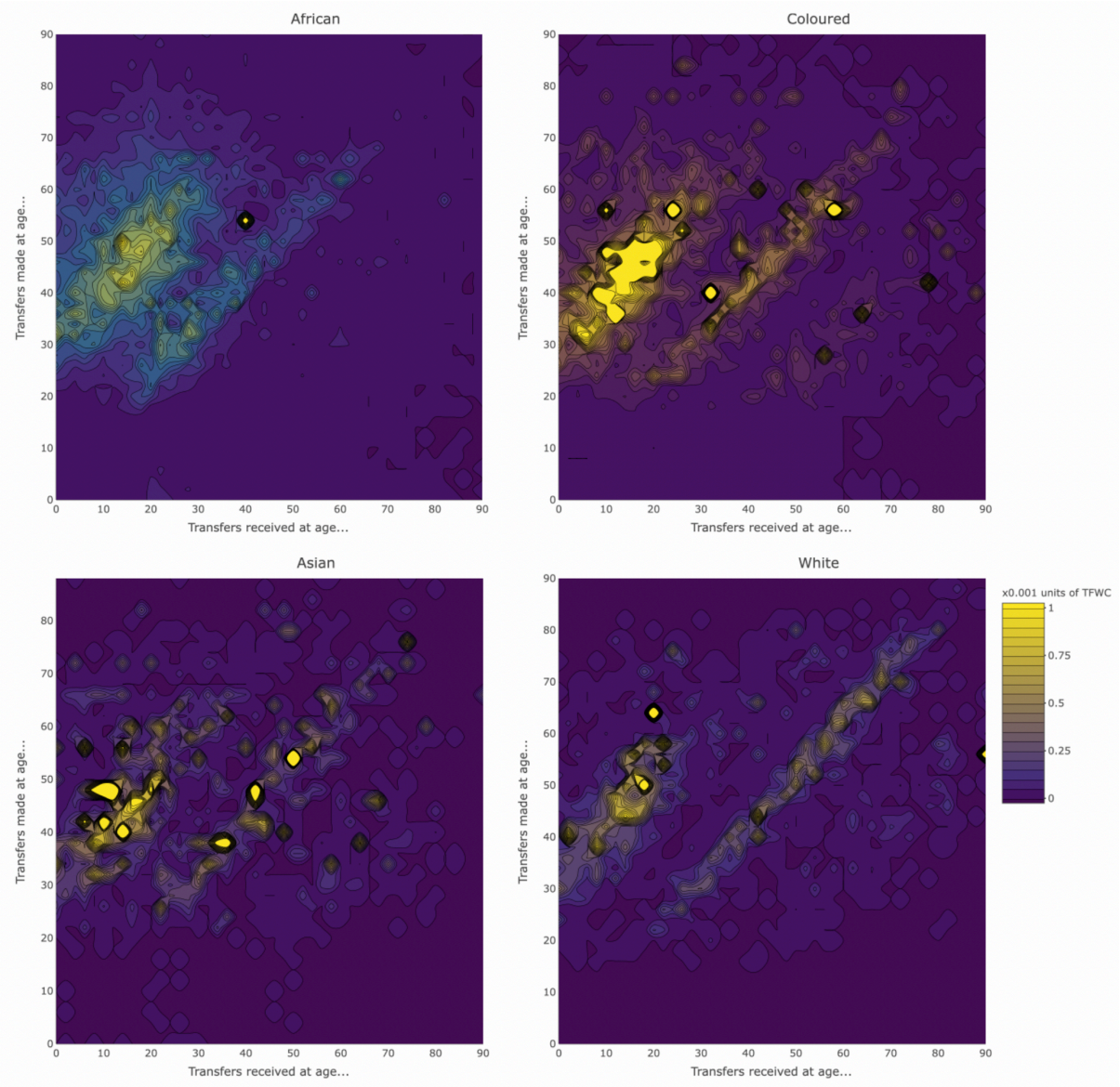
Figure 13 details the magnitude of consumption-related intra-household transfers between age-pairs for the four race groups. The matrix for the total population is presented in Figure A3 in the Appendix. Each graph has the age of the giver of the transfer on the vertical axis and the age of the receiver of the transfer on the horizontal axis; yellower shades reflect larger aggregate transfers, while bluer shades reflect smaller transfers. Reading from the vertical axis—say, at age 50—reveals the transfers made by this cohort to every other cohort, while reading up from the horizontal axis reveals the transfers received by a cohort from every other cohort.

There are three main transfer patterns that might typically be discerned in this type of matrix. First, there may be a ridge along the diagonal, where the age of the giver of the transfer is similar to that of the receiver. This ridge is typically thought of as representing spouse-to-spouse transfers (Lee and Donehower 2011: 194–95), although individuals may not be spouses or partners. A second ridge may exist to the left of the first ridge, with givers typically 20–45 years older than receivers; this ridge represents parent-to-child transfers, although again the individuals may not be parents and children. This ridge is less likely to be at a 45-degree angle and, towards the extreme upper end, may increasingly represent grandparent-to-grandchild transfers. A third ridge may exist to the right of the first, where givers are a generation younger than the receivers, representing adult child-to-parent transfers and, potentially, adult grandchild-to-grandparent transfers.

For all four races, the spouse-to-spouse ridge is clearly discernible, beginning with cohorts in their early twenties. The ridge extends more clearly to older ages for Whites than for Africans, with those of Coloureds and Asians intermediate between them. This is the combined result of differences across groups in various factors, including life expectancy, patterns of household formation, and marriage rates among older cohorts.

While the parent-to-child ridge is also evident for all four groups, the origin of transfers to young African cohorts is much more diffuse, as illustrated by the paucity of yellow-shaded areas. Thus, while the bulk of parent-to-child transfers for a given receiving cohort originate from a relatively narrow age range of givers among Whites, this age range is broader for Coloureds and substantially broader for Africans. In fact, compared with the other three groups, the parent-to-child ridge is far less distinct than the spouse-to-spouse ridge for Africans. This pattern of transfers is congruent with various aspects of

Figure 13: Aggregate intra-household transfers across age by race, 2015



Notes: flows are aggregated for the population and expressed relative to own-group total consumption-related intra-household transfers (TFWC). Flows are aggregated at two-year intervals (i.e. 46 intervals).

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

African household formation described in the literature, including the relatively high prevalence of multi-generational and skipped-generation households (Hall and Mokomane 2018), as well as the formation of households—and particularly the clustering of unemployed youth—around recipients of the old-age grant (Klasen and Woolard 2009).

Among Coloureds and to some extent Asians, there is evidence of the existence of an adult child-to-parent ridge. This ridge is not discernible in the African and White matrices though; in the case of Africans, this may be due to the prevalence of downward transfers illustrated by the very diffuse

(grand)parent-to-(grand)child ridge, while for Whites it may relate to the relative scarcity of multi-generational households.[8]

4.4 Intergenerational flows

Financing consumption across the life course

Previous NTA estimates for South Africa suggest that assets are by far the most important source of financing of consumption among older cohorts. Based on the 2005 accounts, Oosthuizen (2015: 27) estimates that asset-based reallocations accounted for 128.0 per cent of their lifecycle deficit for cohorts aged 65 years and older; at the same time, this age group made net public transfers to younger cohorts equivalent to 1.0 per cent of their lifecycle deficit and net private transfers of 27.0 per cent. Asset-based reallocations were even more important for the 'younger elderly', accounting for 134.9 per cent of the lifecycle deficit for 65–74-year-olds.

This result is somewhat surprising, given the country's socioeconomic context. High unemployment, informal employment, and a historically weak policy emphasis on ensuring workers save for their retirement has meant that access to private pensions and retirement savings is not widespread among older cohorts. Poverty rates among the elderly have historically been higher than those of other adult cohorts—Statistics South Africa (2014: 29) show this to be the case in 2006 and, to a lesser extent, in 2009 and 2011—with the old-age grant representing a key anti-poverty intervention by government. In the 2015/16 financial year, nearly 3.2 million individuals received more than R53.1 billion in old-age grants (SASSA 2016: 26). Total spending on the old-age grant is estimated at 3.8 per cent of households' consumption expenditure in 2014/15, with income from the old-age grant received by the poorest 20 per cent of households representing 28.5 per cent of their consumption and 15.6 per cent of consumption for households in the second poorest quintile (Oosthuizen 2017: 21). Despite this, the 2005 accounts indicate net public transfer outflows for post-retirement cohorts.

The importance of asset-based reallocations for older cohorts continues in 2015. From the data presented in Table A1, asset-based reallocations finance R315.3 billion (145.5 per cent) of the R216.8 billion lifecycle deficit for cohorts aged 60 years and older, while this age group makes downward transfers through both public and private systems of R46.5 billion and R51.9 billion (21.5 per cent and 24.0 per cent of the lifecycle deficit).[9] However, given the substantial variation in the patterns of resource flows across race groups, it seems likely that this breakdown for the total population aged 60 years and older may mask important group-specific differences.

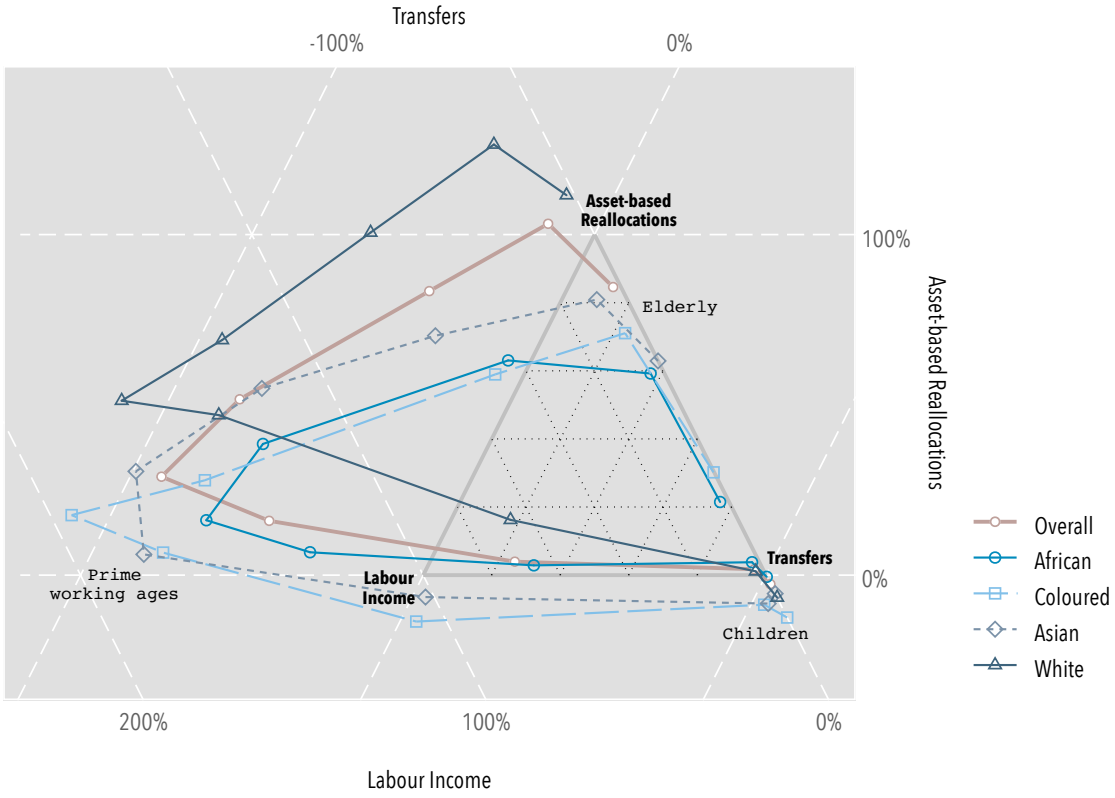
Figure 14 explores the changing balance between labour income, transfers, and assets in financing consumption for 10-year age cohorts across the lifecycle using a ternary plot. At each point on the diagram, the shares of labour income, transfers, and assets sum to 100 per cent. The grey-bordered triangle contains all combinations where the three shares are all positive; outside of the triangle, either one or two of the shares is negative. The three vertices of the triangle represent points where one of the flows finances 100 per cent of consumption and the other two are zero per cent. For example, at the bottom left-hand

[8] Although they focus on the distribution of children across household types, the results of Hall and Mokomane (2018) are indicative of the differences in the prevalence of different household structures across race. They find that 35 per cent of children in South Africa reside in nuclear or single-parent households, while 62 per cent reside in extended households, in which all members are related. These proportions are 32 per cent and 66 per cent for Africans, compared with 73 per cent and 23 per cent for Whites (Hall and Mokomane 2018: 35).

[9] Considering only cohorts aged 65 years and older, asset-based reallocations, net public transfer outflows and net private transfer outflows are equivalent to 121.1 per cent, –11.9 per cent, and –9.3 per cent of this group's lifecycle deficit in 2015.

vertex, the share of consumption financed by labour income is 100 per cent, while transfers and asset-based reallocations are both zero; in the same way, transfers finance 100 per cent of consumption at the bottom right-hand vertex, while asset-based reallocations finance 100 per cent of consumption at the top vertex. The negatively sloped gridlines relate to labour income and are read on the lower horizontal axis; thus, the white dashed gridline going through the bottom left-hand vertex indicates all combinations where labour income equals 100 per cent of consumption, while the white dashed gridline to the right—which coincides with the side of the triangle opposite the labour income vertex—indicates all combinations where the labour income share is zero. The positively sloped gridlines are read off the upper horizontal axis and relate to transfers, while the horizontal gridlines are read off the vertical axis and relate to asset-based reallocations.

Figure 14: Financing of consumption across the lifecycle, 2015



Notes: aggregate values calculated for 10-year age cohorts starting with 0–9-year-olds and ending with those aged 80 years and above. At each point, the proportions of consumption financed by labour income, transfers, and asset-based reallocations sum to 100 per cent. The proportion financed by labour income is measured using the negatively sloped gridlines, that by transfers is measured using the positively sloped gridlines, and that by asset-based reallocations using the horizontal gridlines.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

With no labour income and minimal assets, children find themselves around the bottom right-hand vertex, implying that transfers more than fully finance their consumption. For the entire 0–9-years cohort, transfers finance 102.6 per cent of consumption, with the excess saved. As cohorts move into the labour market, the importance of transfers declines in response to rising labour income: the share of transfers within consumption falls to 95.8 per cent for 10–19-year-olds and to 24.8 per cent for 20–29-year-olds, while that of labour income rises to 2.4 per cent and 71.3 per cent respectively. For the 40–49-years cohort, labour income accounts for 161.9 per cent of consumption, while net transfers are negative (outflows) and equivalent to 90.8 per cent of consumption. Across these cohorts, assets slowly increase as a share of consumption and this continues for older cohorts as labour income begins to decline in importance. Thus, assets account for 103.2 per cent of consumption for the 70–79-years cohort, while labour

income and transfers are just 12.0 per cent and –15.1 per cent respectively. For the oldest cohort—those aged 80 years and older—net transfers have turned positive (13.1 per cent of consumption), while labour income is negligible (2.3 per cent); the remaining 84.6 per cent is accounted for by assets.

Each of the four race groups follows this broad pattern: total reliance on transfers as children, dominance of labour income during the prime working ages, and decline of labour income in old age. However, while the four race groups are clustered together as children, they quickly begin to diverge with age. Compared with the overall path, that of Coloureds and Asians tends to loop out further to the lower left-hand corner of the figure, while that of Whites loops out further to the top left-hand corner. For Coloureds and Asians, asset-based reallocations remain slightly negative while labour income increases, so that the 10–19-years and 20–29-years cohorts are located below the horizontal base of the triangle. In contrast, for Whites and Africans, asset-based reallocations are positive from the 10–19-years cohort onwards; for both groups the 10–19-years and 20–29-years cohorts are located within the area of the triangle.

By the 40–49-years cohort, there are substantial differences between the four groups. Labour income is most important for Coloureds, accounting for 193.8 per cent of consumption, while it is least important for Africans at 155.2 per cent. Asset-based reallocations are most important for Whites (51.2 per cent of consumption), and least important for Africans (16.1 per cent) and Coloureds (17.6 per cent). Net transfers for all four groups are negative, with the largest proportional outflows observed for Whites (113.6 per cent of consumption) and Coloureds (111.4 per cent), and the smallest for Africans (71.4 per cent).

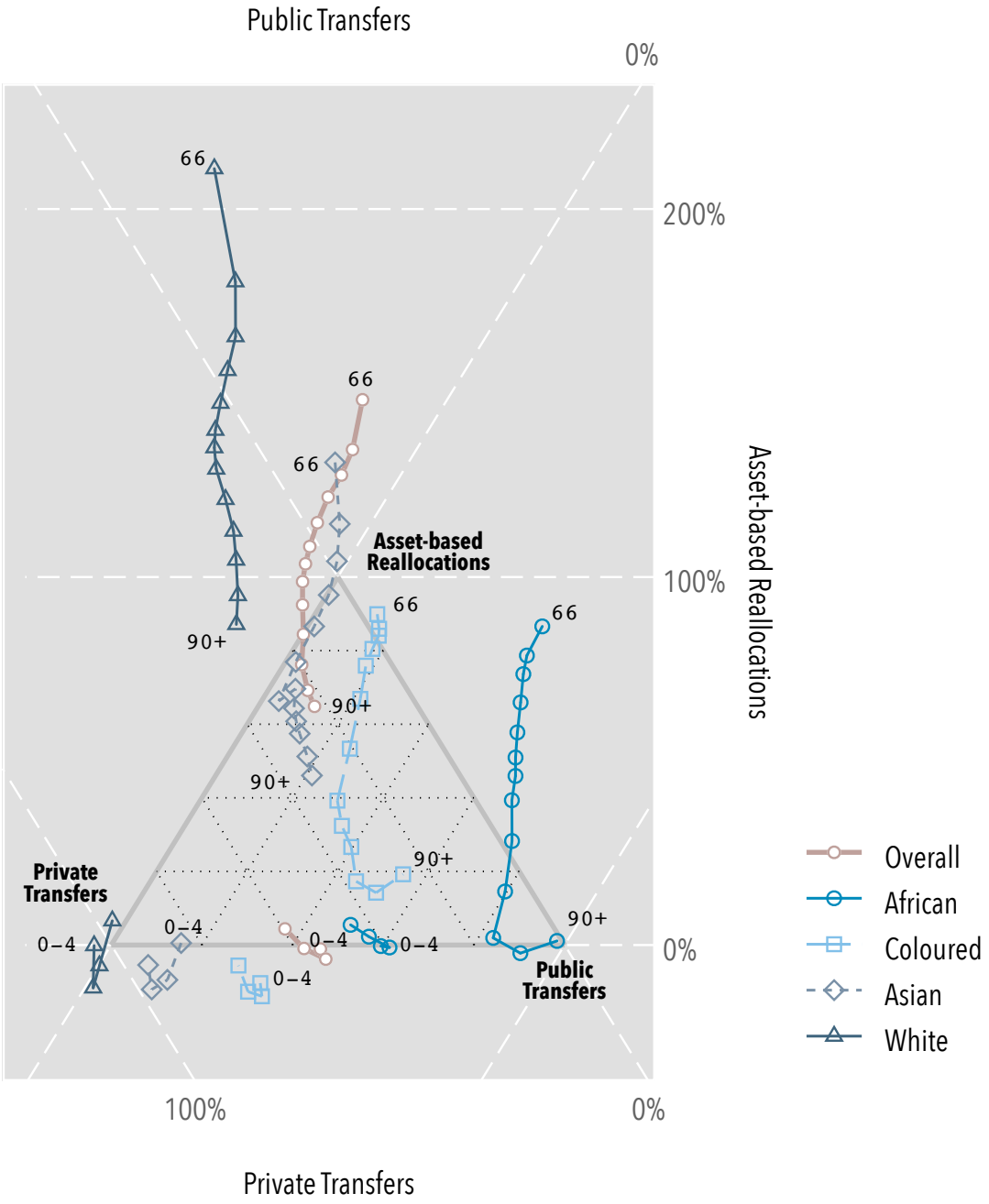
As cohorts move into old age, the four groups continue to diverge. Asset-based reallocations increase relatively rapidly with age among Whites, peaking at 126.5 per cent of consumption among 70–79-year-olds, as labour income and net transfer outflows fall relative to consumption. Nevertheless, even for the oldest cohort, net transfers are negative (–14.0 per cent of consumption). At the other extreme, labour income peaks at a much lower share of consumption among Africans, and asset-based reallocations grow relatively slowly as cohorts move towards and beyond retirement age. Asset-based reallocations peak at just 63.1 per cent of consumption for Africans in the 60–69-years cohort; the share falls marginally for those in the 70–79-years cohort (59.2 per cent), but more than halves for the oldest cohort (21.5 per cent). This sharp decline coincides with a rapid increase in the importance of transfers, from –6.7 per cent of consumption for the 60–69-years cohort to 36.8 per cent for the 70–79-years cohort, and to 75.9 per cent for the cohort aged 80 years and older.

Analyses of systems of support are clearly hamstrung by reliance on a single set of national-level profiles. For young cohorts, Figure 14 reveals that the overall pattern of support is most similar to that of Africans, but for elderly cohorts it is most similar to those of Whites and Asians. Critically, the characterization of the South African generational economy as one in which assets are the dominant source of financing of consumption among the elderly does not accurately reflect the diverse experiences of the four race groups.

Figure 15 explores the support systems in more detail, focusing on the financing of the lifecycle deficit (as opposed to consumption in Figure 14) for cohorts under 20 years and those over 65 years. Here, the flows of interest are private transfers, public transfers (both net), and asset-based reallocations. These cohorts are characterized by relatively little labour income and, by switching to a focus on the lifecycle deficit, it is possible to split net transfers into its two very different components.

Whereas Figure 14 showed the four races clustered close together at young ages at the transfers vertex, once public and private transfers are separated from each other to focus on the financing of the lifecycle deficit the four groups are more dispersed. Asset-based reallocations remain negligible across all groups, but there is significant variation in the shares of private and public transfers. Overall, private transfers

Figure 15: Financing of the lifecycle deficit among young and elderly cohorts, 2015



Notes: aggregate values calculated for five-year age cohorts under the age of 20, and two-year cohorts starting with 66–67-year-olds and ending with those aged 90 years and above. At each point, the proportions of the lifecycle deficit financed by private transfers, public transfers, and asset-based reallocations sum to 100 per cent. The proportion financed by private transfers is measured using the negatively sloped gridlines, that by public transfers is measured using the positively sloped gridlines, and that by asset-based reallocations using the horizontal gridlines.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

account for a gradually increasing proportion around three-fifths of the deficit among young cohorts. For Africans, this proportion is around two-fifths, compared to around three-quarters for Coloureds, and around 90 per cent and 100 per cent for Asians and Whites respectively. The importance of familial (private) transfers in financing childhood lifecycle deficits therefore varies substantially by race with a

range of approximately 60 percentage points separating the estimates for Africans and Whites. This finding echoes that of Mejía-Guevara (2015) for Mexico in 2004: within the highest SES group, private transfers effectively account for 98 per cent of the lifecycle deficit among those under the age of 20 years, compared with 45.2 per cent for the lowest status group (author's calculations based on Mejía-Guevara 2015: 27).

For post-retirement cohorts, assets are initially very important in financing the lifecycle deficit. For the full cohort aged 66–67 years, asset-based reallocations are equivalent to 1.5 times the lifecycle deficit; this proportion is as high as 211.0 per cent for Whites and just under 90 per cent for both Africans and Coloureds. As age increases, there is a strong reduction in the share of asset-based reallocations, illustrated by the near-vertical paths followed by each of the groups and, at least initially, a relatively rapid increase in the importance of familial transfers. Indeed, all four groups transition from net private transfer outflows in their late sixties to net private transfer inflows by their early seventies or, in the case of Africans, their early eighties. For Coloureds, Asians, and Whites, familial transfers peak among the very oldest cohorts at around one-third of the lifecycle deficit; for Africans the peak occurs at just 14.8 per cent of the deficit.

There is also an increase with age in the importance of public transfers. Among Whites, for example, net public transfer outflows halve in size to 41.5 per cent of the lifecycle deficit between the ages of 66–67 years and 80–81 years, while Asians shift from net outflows to net inflows over the corresponding cohorts. The increase is particularly strong during the eighties: across these cohorts, assets continue to decline in importance but the growth of familial transfers stalls, with all groups moving closer to the public transfers vertex.

The patterns for older cohorts are similar to the results for Mexico. For the Mexican population aged 65 years and above, asset-based reallocations are found to be equivalent to 140 per cent of the lifecycle deficit in the group with the highest SES compared to 54.5 per cent in the lowest group; net public transfer inflows represent 17.1 per cent and 56.7 per cent respectively of the deficit, while net private transfers are negative (outflows) and equivalent to 44.2 per cent and 11.2 per cent respectively of the deficit (author's calculations based on Mejía-Guevara 2015: 27).

The direction of intergenerational flows

The previous section showed how labour income, private and public transfers, and asset-based reallocations vary across the life course in terms of their importance in financing consumption for different age cohorts. In this section, the focus shifts to measuring intergenerational resource flows, using the arrow diagrams first proposed by Lee (1994b). Lee introduces the concept of lifecycle wealth, which includes capital and transfer wealth, the latter defined as 'the present value of expected transfers to be received in the future, minus the expected value of transfers to be made in the future' (Lee and Mason 2011c: 35). Under specific circumstances—stable population, golden rule growth where the discount rate r equals the population growth rate n, no productivity growth—the per capita demand for lifecycle wealth can be expressed as:

$$W = c(A_c - A_{yl}) \tag{8}$$

where W is the per capita demand for lifecycle wealth, c is mean per capita consumption for the population, A_c and A_{yl} refer to the average ages of consumption and labour income for the stable population or 'the average ages at which the average dollar is consumed and earned' (Patxot et al. 2012: 451).

At the individual level, lifecycle wealth varies with age. At young ages lifecycle wealth is negative due to the support they receive from older generations; the support received can be thought of as a debt, which will be paid off when the young grow up and support succeeding generations (Lee and Mason

2011a: 86). Given the forward-looking nature of lifecycle wealth, lifecycle wealth will typically turn positive for older cohorts. Per capita demand for lifecycle wealth, which is averaged across the entire population, may therefore be negative (implying downward transfers to younger cohorts, $A_c < A_{yl}$) or positive (implying upward transfers to older cohorts, $A_c > A_{yl}$). Given the NTA flow identity (Equation 1), this transfer of resources across cohorts can be decomposed into flows that occur through private transfers, public transfers, and asset-based reallocations.

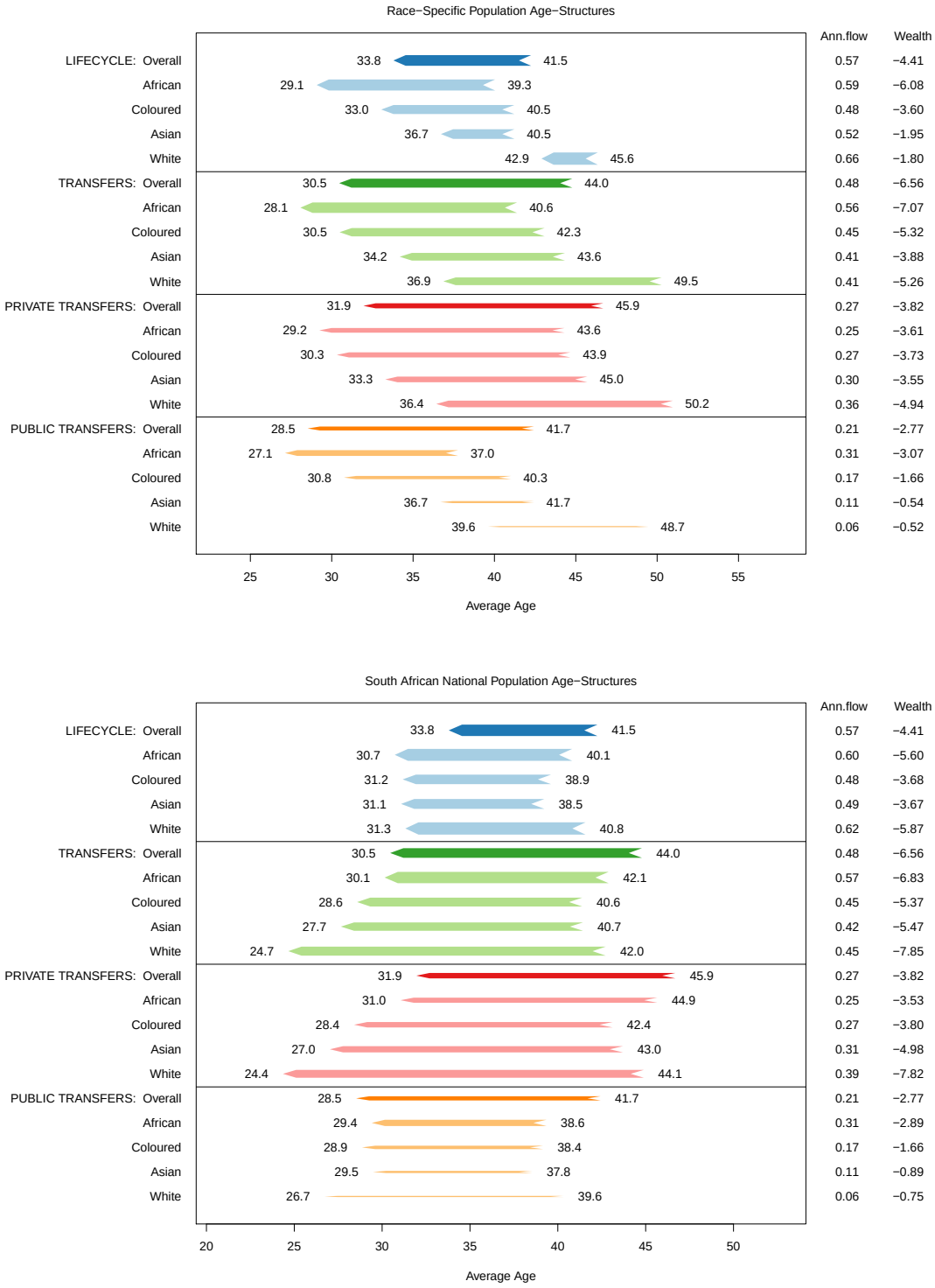
Figure 16 presents estimates of lifecycle and transfer wealth arrows for South Africa and for each of the four race groups. In each case, the tail of the arrow designates the average age of the outflow (labour income, transfer outflows) and the point of the arrow denotes the average age of the inflow (consumption, transfer inflows); the width of the arrow represents the per capita inflow (per capita consumption, per capita transfer inflow), while the area of the arrow indicates lifecycle wealth. Both the per capita inflow and lifecycle wealth are expressed as a proportion of peak labour income (average of labour income for the population aged 30–49 years for each group). The upper panel presents estimates based on group-specific population age structures, while the lower panel uses the national population age structure for each of the groups so that differences between groups are solely due to differences in their NTA age profiles.

For the country as a whole, the average age of consumption is 33.8 years compared to 41.5 years for labour income, implying a downward transfer of output to younger cohorts. Across the full population, per capita consumption averages 57 per cent of peak labour income (the annual flow in the figure), while per capita demand for lifecycle wealth is –4.41 years of labour income. The lifecycle wealth arrow for Whites is located at significantly higher ages and is shorter than those of the other three race groups; conversely, that of Africans is located at younger ages and is substantially longer. This pattern aligns with the cross-country results presented by Lee and Mason (2011a: 88): lower-income countries were found to have longer lifecycle wealth arrows that were generally located at younger ages (at least in terms of the average age of consumption). The African lifecycle wealth arrow is similar to that of the Philippines (average ages of consumption and labour income of 27.8 years and 38.5 years); the arrow for Whites is similar to that of the United States (average ages of consumption and labour income of 41.8 years and 44.0 years) (Lee and Mason 2011a: 88).

Resources flow strongly downwards to younger cohorts through both private and public transfers. For private transfers, there is a 14.0-year difference between the average ages of inflows (31.9 years) and outflows (45.9 years), while the difference for public transfers is 13.2 years with the average ages of inflows and outflows being 28.5 years and 41.7 years. Private transfer wealth is estimated at –3.82 years of labour income, while public transfer wealth is –2.77 years of labour income. Thus, the average South African expects to make future private transfers in excess of future private transfers received equivalent to 3.82 years of labour income; similarly, on a per capita basis, future public transfers made are expected to exceed future public transfers received to the value of 2.77 years of labour income.

While the private transfer arrows are relatively similar across race in terms of average ages of inflows and outflows, the public transfer arrows are quite different. For Africans, the average ages of public transfer inflows and outflows are 27.1 years and 37.0 years, compared with 39.6 years and 48.7 years for Whites. The widths of the arrows (i.e. mean per capita annual inflow) differ across race groups, with private transfer arrows being thickest for Whites and narrowest for Africans and vice versa for the public transfer arrows. Inter-group differences in the widths of public transfer arrows are, though, much larger than for private transfers with the result that mean per capita total transfer inflows are largest for Africans (56 per cent of peak labour income) and narrowest for Whites and Asians (41 per cent).

Figure 16: Lifecycle and transfer wealth arrows, 2015



Notes: the tail of the arrow represents the average age of the outflow and the head of the arrow the average age of the inflow. The width of the arrow indicates the per capita inflow, while its area indicates lifecycle wealth, both of which are expressed relative to peak labour income for each group. The lower panel uses the national population age structure for all groups instead of their own population age structures; this aids with comparisons by removing the effect of demography on the arrows.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

Constructing the arrows using the national population age structure for all groups removes the effect of demography and serves to reduce differences in the timing of each set of arrows. The lifecycle wealth arrows become very similar, with the average ages of inflows within 0.6 years of each other and of outflows within 2.3 years of each other. In fact, per capita lifecycle wealth for Africans and Whites is almost identical at –5.60 and –5.87 years of labour income respectively. The arrows shift significantly for transfers, with the arrows for Whites shifting leftwards and those for Africans rightwards. Removing the effect of the differing population age structures thus reveals the strength of downward transfers among Whites compared with the other groups: the average age of inflows falls from 36.4 years to 24.4 years for private transfers, and from 39.6 years to 26.7 years for public transfers. In contrast, the strength of downward transfers among Africans is muted with the average age of inflows rising by roughly two years for both private and public transfers. This effect is consistent with the patterns of transfer flows shown earlier, specifically relatively large inter- and intra-household transfer outflows at older ages.

4.5 Sub-population estimates and projections

Given the extent of differences in the NTA profiles between South Africa's four race groups, a key question to ask is the extent to which projections using the national profiles may be biased. This is particularly important given the differences in the population age structures for the four groups. While Africans are estimated to account for 80.3 per cent of the population in mid-2015, they represent 86.2 per cent of the 0–4-years cohort compared to 55.1 per cent of the 80+ cohort; conversely, Whites represent more than one-third (34.2 per cent) of the 80+ cohort, compared to just 4.1 per cent of the 0–4-years cohort and 8.3 per cent of the overall population (author's calculations based on Statistics South Africa 2018b).

The estimation of the first demographic dividend is one such projection that may be potentially biased and which is increasingly referenced in policymaking. In terms of NTA, the first demographic dividend is estimated as the rate of change of the (economic) support ratio (*SR*), which is defined as:

$$SR_t = \frac{L(t)}{N(t)} = \frac{\sum_{a=0}^{\bar{\omega}} \gamma(a)P(a,t)}{\sum_{a=0}^{\bar{\omega}} \varphi(a)P(a,t)} \tag{9}$$

where $\gamma(a)$ and $\varphi(a)$ are respectively the per capita labour income and consumption age profiles, and $P(a,t)$ is the population by age in year t. Thus, the support ratio in a given year is the population-weighted labour income profile (or aggregate labour income) in that year divided by the population-weighted consumption profile (or aggregate consumption). Accounting for sub-groups, denoted by j, Equation 9 can be rewritten as:

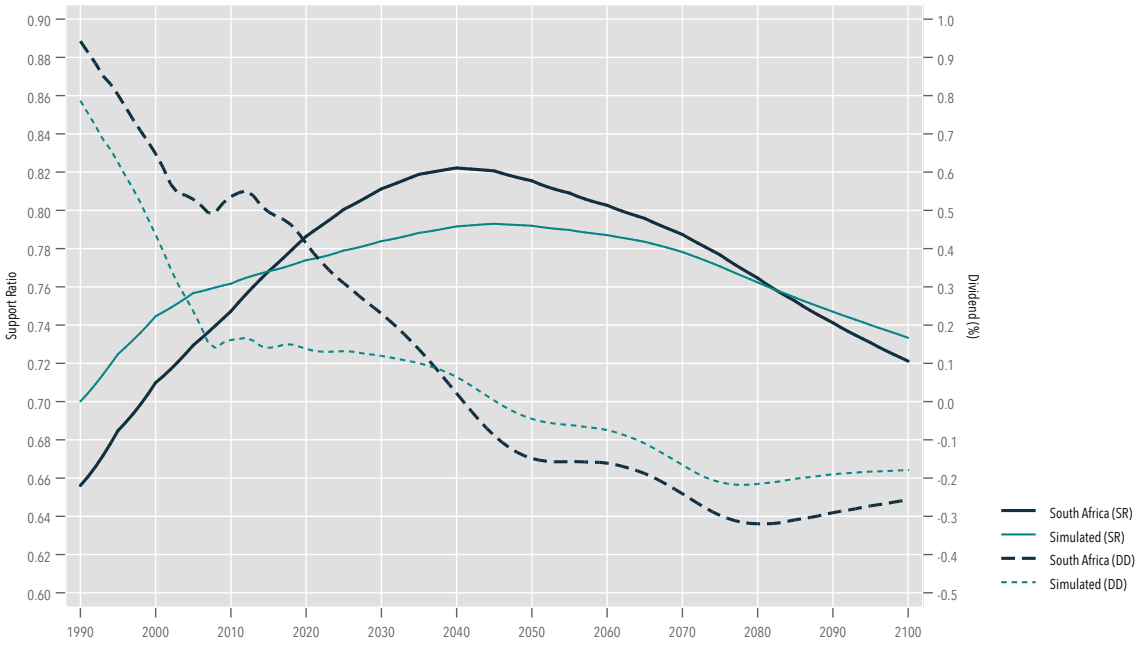
$$SR_t = \frac{L(t)}{N(t)} = \frac{\sum_{j=1}^{J} L(t)}{\sum_{j=1}^{J} N(t)} = \frac{\sum_{j=1}^{J}\sum_{a=0}^{\bar{\omega}} \gamma_j(a)P_j(a,t)}{\sum_{j=1}^{J}\sum_{a=0}^{\bar{\omega}} \varphi_j(a)P_j(a,t)} \tag{10}$$

Unfortunately, Statistics South Africa does not publish longer-term population projections by race and it is therefore not possible to estimate the first demographic dividend more than five years into the future using official statistics. Instead, a demographic dividend is simulated using population data from countries with population age structures similar to those of the four race groups in 2015. To do this, correlation coefficients are calculated of the 2015 population age structures for all of the countries for

which the United Nations (2017) published estimates (excluding South Africa) and the official estimates of the 2015 age structures for each of the four race groups. For Africans the closest match is Botswana; for Coloureds it is Suriname; for Asians it is Trinidad and Tobago; and for Whites it is the Netherlands. For each country in each year between 1990 and 2100, a ratio is calculated of the population in each age cohort to the population in the corresponding cohort in 2015. These ratios are then applied to the 2015 population age structures for the four race groups, with the resulting age cohort totals in each year adjusted multiplicatively to match the United Nations (2017) data. The result is a set of population projections for four groups that are consistent with the UN projections for South Africa and that, in 2015, are very similar to the population age structures of the country's four race groups. Combined with the race-specific labour income and consumption profiles, it is then possible to simulate a support ratio separately for each of the four groups, as well as for the country as a whole.

Figure 17 presents estimates of the support ratio and first demographic dividend for South Africa for the 1990–2100 period, using the national-level population projections and NTA profiles. These baseline estimates are compared to a support ratio and demographic dividend calculated from the race-specific NTA profiles and the set of four population projections described above.

Figure 17: Support ratios and demographic dividends, 1990–2100



Notes: the simulated support ratio and demographic dividend are for illustrative purposes only. Underlying group-specific data for the simulated support ratio and dividend are completely consistent with those underlying the baseline estimates.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

It is clear from the figure that the simulated support ratio and demographic dividend are quite different from the baseline estimates, although they do follow similar trends. The baseline support ratio is lower than the simulated support ratio prior to 2015 and after 2082 and, while the gap is relatively small in absolute terms, it averages 5.0 per cent of the baseline support ratio from 1990 to 2008 and 3.0 per cent from 2020 to 2060. However, from the demographic dividend estimates it is clear that it is possible for the dividend to be over- or underestimated by a significant margin. For example, for the 2005–25 period, the gap between the baseline and simulated dividends averages 0.31 percentage points, or two-thirds of the baseline dividend. Further, given the varying slopes, it may be possible to incorrectly identify the timing of the positive first dividend period substantially, even by decades.

4.6 Summary

The distribution across the four race groups of the aggregate flows described in the set of NTAs for South Africa for 2015 is presented in Table 3. The aggregate flows in rand terms presented in the 'Overall' column correspond with those presented in Table 2. In the final row of the table, the racial composition of the population is provided.

Table 3: Aggregate controls and distribution across race, 2015

Flow		Overall	Proportion (%) attributable to...			
		R billion	African	Coloured	Asian	White
Labour income	**YL**	**2,166.5**	**51.7**	**10.8**	**5.5**	**32.0**
Employment earnings	YLE	1,945.8	52.0	11.3	5.3	31.4
Self-employment earnings	YLS	220.7	49.2	6.9	6.5	37.3
Consumption	**C**	**2,820.5**	**57.9**	**8.6**	**4.1**	**29.4**
Private consumption	CF	1,991.6	47.6	8.8	4.8	38.7
- Education	*CFE*	*69.9*	*50.9*	*9.8*	*5.7*	*33.6*
- Health	*CFH*	*135.0*	*33.7*	*12.2*	*3.5*	*50.6*
- Other	*CFX*	*1,786.7*	*48.6*	*8.5*	*4.9*	*38.0*
Public consumption	CG	828.9	82.4	8.2	2.4	7.0
- Education	*CGE*	*204.6*	*83.8*	*7.8*	*2.0*	*6.4*
- Health	*CGH*	*120.8*	*89.2*	*5.7*	*2.4*	*2.7*
- Other	*CGX*	*503.5*	*80.2*	*8.9*	*2.5*	*8.3*
LIFECYCLE DEFICIT	**LCD**	**654.0**	**78.2**	**1.3**	**–0.4**	**20.9**
REALLOCATIONS	**R**	**654.0**	**78.2**	**1.3**	**–0.4**	**20.9**
Transfers	**T**	**–33.5**	**–960.7**	**33.6**	**79.4**	**947.6**
Private transfers	TF	12.8	126.5	29.4	–7.3	–48.6
- Inflows	*TFI*	*1,346.5*	*51.4*	*10.2*	*5.1*	*33.3*
- Outflows	*TFO*	*1,333.8*	*50.7*	*10.0*	*5.2*	*34.1*
Public transfers	TG	–46.3	–661.1	32.5	55.5	673.1
- Inflows	*TGI*	*1,034.7*	*82.3*	*8.4*	*2.3*	*6.9*
- Outflows	*TGO*	*1,081.0*	*50.5*	*9.5*	*4.6*	*35.4*
Asset-based reallocations	**RA**	**687.6**	**27.5**	**2.9**	**3.5**	**66.1**
Private ABR	RAF	746.9	29.3	3.4	3.6	63.7
- Private asset income	*YAF*	*902.2*	*42.5*	*6.8*	*4.3*	*46.4*
- Private saving	*SF*	*155.3*	*106.0*	*23.1*	*7.8*	*–36.9*
Public ABR	RAG	–59.3	50.4	9.4	4.6	35.5
- Public asset income	*YAG*	*–109.9*	*50.4*	*9.4*	*4.6*	*35.5*
- Public saving	*SG*	*–50.6*	*50.4*	*9.4*	*4.6*	*35.5*
Population		**55.3 mil**	**80.2**	**8.9**	**2.5**	**8.3**

Notes: proportions in rows sum to 100.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

The extent of inequality in South Africa is reflected in the low shares of labour income and consumption—particularly private consumption—accounted for by Africans: while the group accounts for four-fifths of the country's population, it accounts for just over half of total labour income (51.7 per cent) and less than half of private consumption (47.6 per cent). In contrast, Whites account for almost one-third of labour income (32.0 per cent) and almost two-fifths of private consumption (38.7 per cent), while representing just 8.3 per cent of the national population. The equalizing impact of public consumption is clearly evident—82.4 per cent of public consumption accrues to Africans, while 7.0 per cent accrues to Whites—with shares roughly corresponding to population shares. The disaggregation also reveals the extent of inequality in the consumption of health as higher-income groups opt out of the public system. Almost 90 per cent of public consumption of health accrues to Africans compared to 2.7 per cent for Whites; in contrast, Whites account for 50.6 per cent of private consumption of health compared to

Africans' one-third share (33.7 per cent). Both Coloureds and Asians also account for relatively large shares of the private consumption of health, considering their population shares.

Asians are the only group that generate a lifecycle surplus in aggregate terms, although it is admittedly only estimated at R2.5 billion or 0.4 per cent of the aggregate lifecycle deficit. Like Asians, Coloureds are close to having consumption and labour income in balance. The national lifecycle deficit of R654.0 billion is therefore almost entirely attributable to Africans (78.2 per cent) and Whites (20.9 per cent), with the latter group's share roughly 2.5 times their population share.

In aggregate terms, Africans receive net transfer inflows through both public and private mechanisms. While private transfer inflows and outflows are distributed in roughly the same proportions across race groups as labour income, public transfer inflows are distributed similarly to public consumption, with Africans receiving 82.3 per cent of inflows. Public transfer outflows, on the other hand, more closely reflect the labour income distribution with Whites, Asians, and Coloureds each accounting for relatively large shares of the total. Private asset income is even more skewed towards Whites, who account for 46.4 per cent of the total, with Asians accounting for 4.6 per cent of the total, which is almost twice their population share. In contrast, though, Africans account fully for total saving with dissaving among the ageing White population offsetting the saving by Coloureds and Asians.

5 Discussion and conclusion

The purpose of this research has been to answer three key questions. First, to what extent does the economic lifecycle differ across race groups in South Africa? Second, how do the systems of intergenerational flows differ across groups within South Africa, and what are the implications of these differences? Third, what are the implications of these results for the construction of NTAs in high-inequality countries?

The results presented above have clearly demonstrated marked differences in the economic lifecycles of South Africa's four race groups. Depending on the profile, these differences are evident in the levels of the profiles, their shapes, or the transitions between surplus and deficit. The stark inequalities that characterize the South African economy are mirrored in the labour income profile for Whites that peaks at over R300,000 per capita per annum compared to a peak of R70,000 for Africans, and in the fact that the (unweighted) average per capita consumption for cohorts above the age of 20 for Africans is just over one-fifth of that of Whites.

Once sub-population profiles are normalized by own-group peak labour income, differences in the shapes of the profiles are discernible. Thus, for example, the labour income profiles for Asians and Coloureds are skewed slightly towards younger ages compared to the national profile, with declines in labour income occurring at older ages for Whites than for any of the other groups. These normalized profiles were also used in the analysis of private transfers within and between households, revealing the large inter-household transfers relative to peak labour income made by African adults essentially from their forties onwards, as well as the existence throughout adulthood of per capita inter-household transfer inflows of 1.0–2.5 per cent of peak labour income among African cohorts. While intra-household transfer outflows peaked at similar levels relative to own-group peak labour income for all four race groups, the profiles reveal substantially larger per capita outflows among elderly African cohorts compared with their peers in other race groups.

It should not come as a surprise, given what we know about inequality in South Africa, that the patterns of intergenerational support differ markedly by race. Overall, as was illustrated in Figure 16, resources flow strongly downwards in South Africa, with differences between the races in mean ages of inflows

and outflows largely driven by differing population age structures. This downward flow of resources is also observed in terms of both private and public transfers. Transfer wealth is negative for all groups, indicating that the expected value of transfers made in the future is greater than that of transfers received in the future. However, the composition of this transfer wealth differs between race groups: the vast majority of transfer wealth for Whites is in the form of private transfer wealth, while for Africans private transfer wealth accounts for just over half of the total, highlighting the importance of the public sector in facilitating the transfer of resources across ages for poorer groups.

This relative importance of public transfers for Africans in particular is illustrated in Figure 15 for both young and old cohorts. For African children, public transfers finance around three-fifths of the lifecycle deficit compared to around two-fifths for Coloured children and virtually nothing for White children. This is not to say that White children receive nothing at all through public transfers; rather, their public transfer inflows are roughly balanced with their public transfer outflows, largely due to taxes generated on their private consumption. For the elderly, this reliance on government is even more pronounced: public transfers finance the lifecycle deficit among the oldest Africans almost entirely, while accounting for just under three-fifths of the deficit among their Coloured counterparts. These findings provide further evidence for the importance of social assistance—and specifically the old-age grant—in supporting consumption and living standards among the elderly in South Africa.

Relatedly, the estimates highlight the extent to which the balance between private and public consumption varies between race groups and across ages. Public consumption accounts for a relatively large share of per capita consumption for children and the elderly; lower shares for working-age cohorts are the result of both lower absolute levels of public consumption in these ages due to low consumption of education and health driven by differences in access or utilization rates, and higher absolute levels of private consumption. Public consumption accounts for 50–70 per cent of per capita consumption for African children and teenagers and 50–60 per cent for Africans over the age of 75. While this pattern is echoed in the other three race groups, for Whites the ranges are 9–17 per cent for cohorts under 20 years old and 6–per cent for cohorts over 75 years old.

The public sector is clearly a critical component of South Africa's generational economy, serving to mediate large flows of resources across age and, importantly, between groups. The disaggregation of the aggregate controls in Table 3 reveals that, with public transfer inflows and outflows almost balanced in aggregate, Africans receive 82.3 per cent of the inflows and contribute 50.5 per cent of the outflows. There are two points worth making here. First, it should be recognized that Africans are responsible for a sizeable proportion of public transfer outflows, equivalent to almost two-thirds of the public transfer inflows they receive as a group. Second, this balance of flows is entirely to be expected where fiscal tools are used in a progressive manner to address the worst excesses of poverty and inequality.

The financing of the lifecycle deficit among elderly cohorts is important for understanding the potential for realizing the second demographic dividend. As already discussed, wealth may be accumulated in two forms, namely capital and transfer wealth. Reliance on asset-based reallocations implies the accumulation of assets (capital) by working-age cohorts, which may generate income or be liquidated to finance the lifecycle deficit in retirement. These assets may be accumulated domestically or abroad, and will have a positive impact on economic growth through higher labour productivity. The second demographic dividend arises as relatively large cohorts approach retirement, the point at which their assets accumulated for retirement are at their peak, accentuating the labour productivity enhancing effect and potentially raising living standards permanently. Reliance on transfers, whether public or private, to finance the lifecycle deficit in old age generates (positive) transfer wealth. Transfer wealth, however, has no direct positive impact on the economy, instead implying a burden on future generations to fund the consumption of older generations. Controlling for the level of aggregate wealth, societies that finance the old-age lifecycle deficit through the accumulation of transfer wealth—countries with state pensions funded from tax revenue, such as many in Europe, and those where there is strong reliance on younger

family members, such as Taiwan and several other South-east Asian countries (Lee and Mason 2011a: 93-94)—find themselves in a weaker position to harness a second demographic dividend compared with those where the deficit is financed through assets.

At the national level, South Africa's NTA profiles suggest that the country is well-positioned to harness a second demographic dividend: asset-based reallocations are equivalent to nearly 145 per cent of the lifecycle deficit for cohorts aged 60 years and above. However, the evidence suggests that the likelihood of a second dividend may be overstated: the group for which asset-based reallocations are most important relative to the lifecycle deficit (Whites) is also the group with the oldest population age structure, while the group most reliant on transfer wealth (Africans) has the youngest population age structure. In fact, given the age structure of the White population, it seems plausible that Whites are already generating a second dividend.

The findings have raised a number of issues pertinent to the construction and analysis of NTAs in high-inequality settings. The first is that national-level profiles can be distorted by a combination of economic inequality and demographic differences. This is clearly evident in the unconventional shape of South Africa's consumption profile in terms of which per capita consumption increases considerably over the course of adulthood instead of the relatively stable consumption levels observed in other countries. In contrast, race-disaggregated consumption profiles, however, follow the more conventional pattern (see Figure 3), with the national profile the result of a rising proportion of Whites in older cohorts. The result is that, while the national profile may be representative of the national population, it is not necessarily representative of any of the sub-populations of interest. Further, patterns observed nationally may not easily be reconcilable with the evidence due to this phenomenon, as is the case for the national pattern of financing of the lifecycle deficit for elderly cohorts, which is dominated by asset-based reallocations. Relatedly, these national-level patterns may lead to incorrect policy conclusions, such as seems to be the case for South Africa's second demographic dividend.

The same type of compositional effect that causes this distortion in the national consumption profile is relevant when it comes to projections of static national-level NTA profiles into the future. Section 4.5 tried to assess the impact of inequality on the accuracy of projections of the support ratio and first demographic dividend by comparing estimates constructed at the national level to estimates constructed from sub-population profiles and population projections. While longer-term population projections by race are not available, the results presented in Figure 17 are indicative of the potential for distortion. South Africa's first demographic dividend is not particularly large over the period for which estimates are presented; nevertheless, the simulated dividend averaged just one-third of the dividend calculated from the national profiles. There is therefore clear potential to over- or underestimate the magnitude of the demographic dividend, or to incorrectly identify the period during which the country is expected to enjoy the dividend.

In countries characterized by stark inequalities, therefore, the construction of sub-population NTAs would appear to have the potential to add significant value in terms of the interpretation and understanding of the national-level accounts.

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Appendix

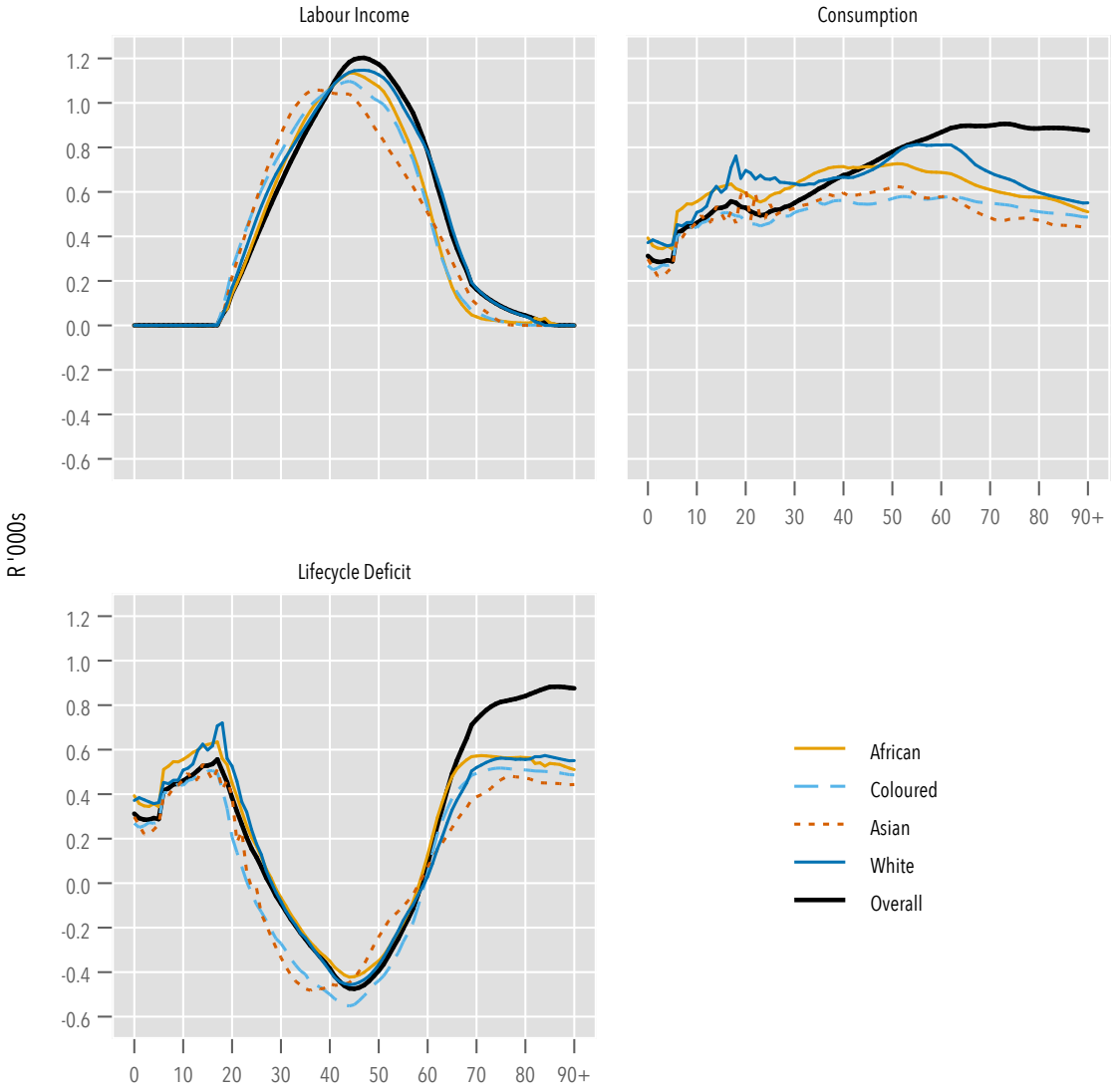
Table A1: Aggregate controls by age, 2015

Flow		Overall R billions	0–18 yrs R billions	19–39 yrs R billions	40–59 yrs R billions	60+ yrs R billions
Labour income	**YL**	**2,166.5**	**4.5**	**978.2**	**1,047.3**	**136.5**
Employment earnings	YLE	1,945.8	1.1	871.8	961.7	111.2
Self-employment earnings	YLS	220.7	3.4	106.4	85.6	25.3
Consumption	**C**	**2,820.5**	**767.4**	**984.5**	**715.3**	**353.3**
Private consumption	CF	1,991.6	395.7	731.2	577.9	286.7
- Education	*CFE*	*69.9*	*42.6*	*24.7*	*2.3*	*0.3*
- Health	*CFH*	*135.0*	*25.9*	*30.6*	*49.6*	*28.9*
- Other	*CFX*	*1,786.7*	*327.3*	*675.9*	*526.0*	*257.5*
Public consumption	CG	828.9	371.6	253.3	137.4	66.6
- Education	*CGE*	*204.6*	*157.7*	*42.4*	*4.4*	*0.1*
- Health	*CGH*	*120.8*	*28.8*	*29.4*	*36.6*	*26.0*
- Other	*CGX*	*503.5*	*185.2*	*181.4*	*96.4*	*40.5*
LIFECYCLE DEFICIT	**LCD**	**654.0**	**762.9**	**6.3**	**–332.0**	**216.8**
REALLOCATIONS	**R**	**654.0**	**762.9**	**6.3**	**–332.0**	**216.8**
Transfers	**T**	**–33.5**	**766.1**	**–88.6**	**–612.5**	**–98.5**
Private transfers	TF	12.8	432.6	–9.8	–358.1	–51.9
- Inflows	*TFI*	*1,346.5*	*438.4*	*449.7*	*285.1*	*173.4*
- Outflows	*TFO*	*1,333.8*	*5.8*	*459.5*	*643.2*	*225.3*
Public transfers	TG	–46.3	333.5	–78.8	–254.5	–46.5
- Inflows	*TGI*	*1,034.7*	*447.2*	*289.8*	*170.8*	*126.9*
- Outflows	*TGO*	*1,081.0*	*113.6*	*368.7*	*425.3*	*173.4*
Asset-based reallocations	**RA**	**687.6**	**–3.2**	**95.0**	**280.5**	**315.3**
Private ABR	RAF	746.9	3.1	115.1	303.8	324.9
- Private asset income	*YAF*	*902.2*	*2.2*	*162.6*	*403.3*	*334.1*
- Private saving	*SF*	*155.3*	*–1.0*	*47.5*	*99.5*	*9.3*
Public ABR	RAG	–59.3	–6.3	–20.1	–23.3	–9.6
- Public asset income	*YAG*	*–109.9*	*–11.7*	*–37.3*	*–43.1*	*–17.8*
- Public saving	*SG*	*–50.6*	*–5.4*	*–17.2*	*–19.8*	*–8.2*

Notes: proportions in rows sum to 100.

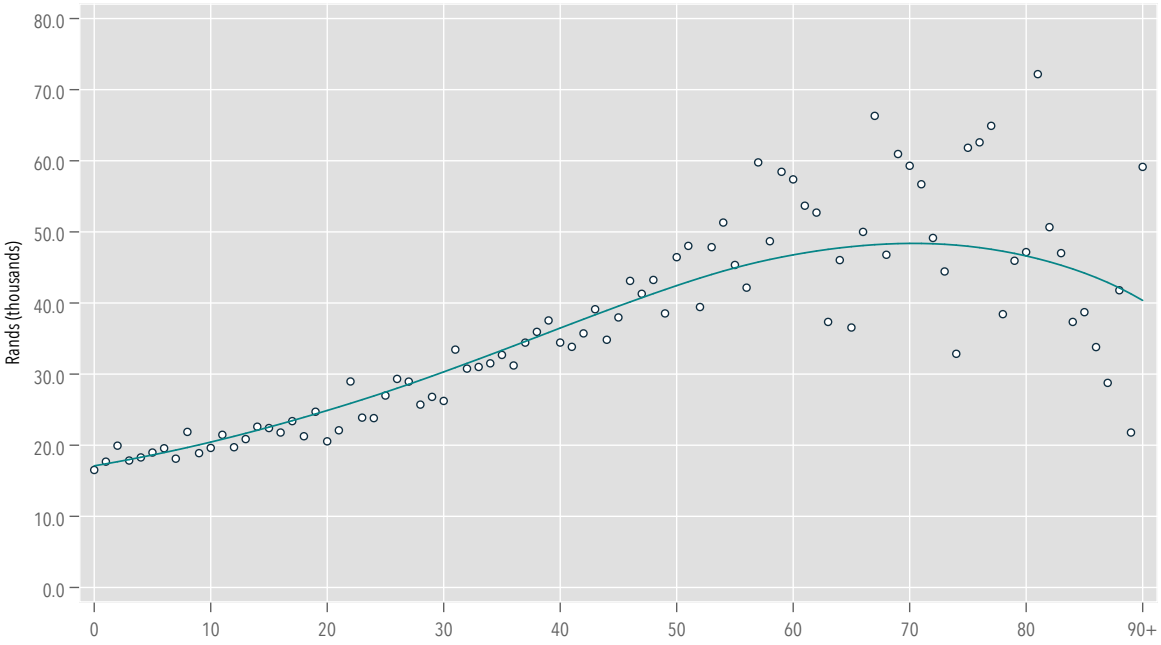
Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

Figure A1: Components of the lifecycle deficit by race (Normalized), 2015



Notes: profiles are normalized by dividing by group-specific mean per capita labour income for 30–49-year-olds.
Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

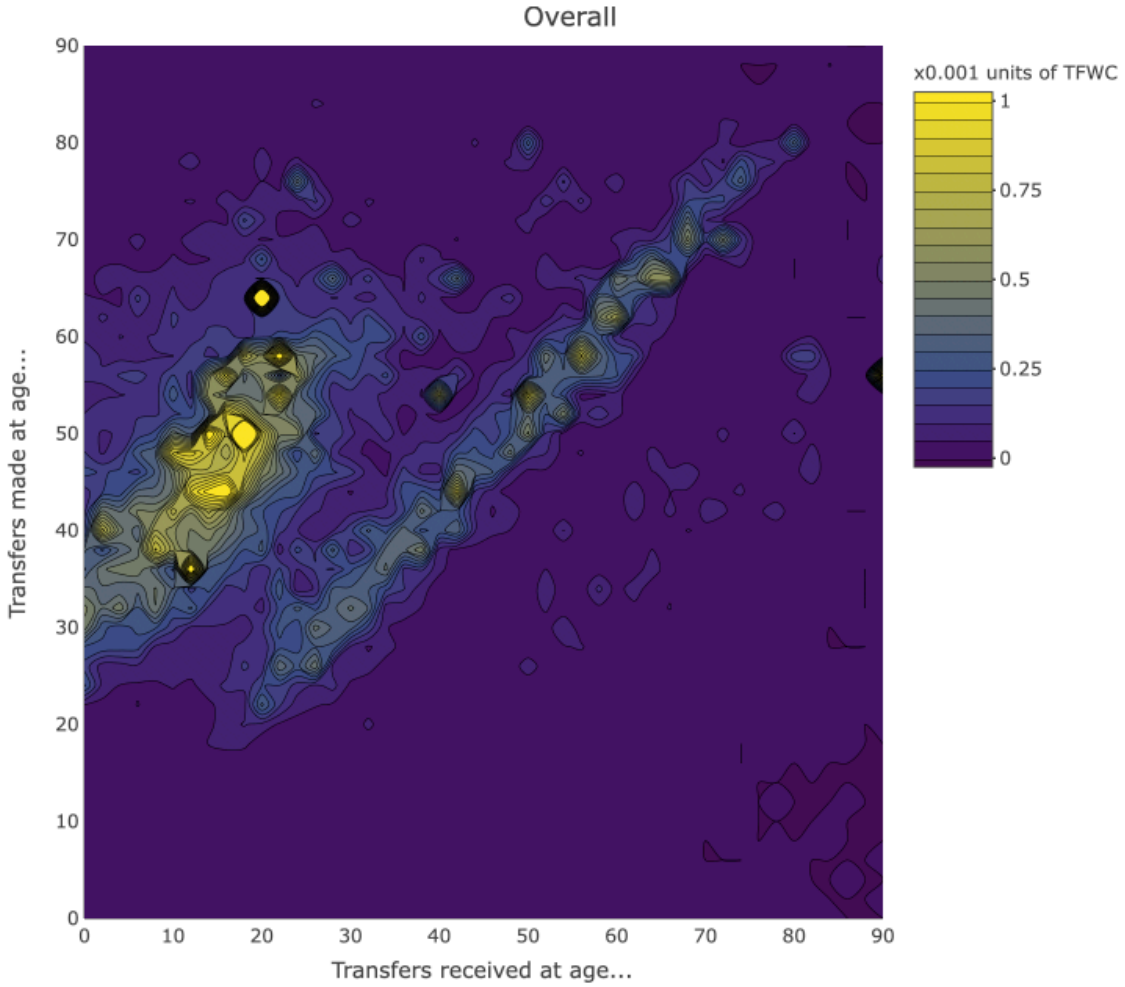
Figure A2: Private other consumption allocated on a per capita basis, 2015



Notes: instead of using the adult equivalence scale, private other consumption is allocated on a per capita basis within households; these values are then averaged across all individuals at each age.

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).

Figure A3: Aggregate intra-household transfers across age, 2015



Notes: flows are aggregated for the population and expressed relative to total consumption-related intra-household transfers (TFWC). Flows are aggregated at two-year intervals (i.e. 46 intervals).

Source: author's calculations based on National Treasury (2014, 2018); South African Reserve Bank (2018); Statistics South Africa (2017a, 2017b, 2017d, 2018b); United Nations (2017); World Bank (2019).