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National Transfer Accounts: the fiscal balance of the Brazilian generational economy

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Abstract

The demographic transition has brought both opportunities and economic challenges to Brazil. This research compiled the National Transfer Accounts 2018 to analyze the relationship between demographics and the National Accounts, given the upsurge in population aging and the end of the demographic bonus. The results showed differences in the economic life cycle of children, working-age people, and the elderly. The public sector financed more consumption by the elderly, while the private sector financed more consumption by children. Public transfers to each elderly person were 3.5 times the public transfers to each child. In the future, public spending is likely to remain under fiscal pressure due to the aging population, especially as the demographic bonus ends. Therefore, this statistical methodology can be a potential tool for tracking the impacts of public policies and population aging on the economy over time, particularly on public accounts.

Keywords: national transfer accounts, demography, generational economics.

JEL: H310, J110, J140.

SUMMARY

Introduction

Economic activities are often analyzed through a country's National Accounts. For Neto and Forte (2016), this information is of interest to macroeconomic policymakers, public and private managers, analysts, researchers, the media, and the general public. On the other hand, the traditional compilation of such statistics does not clearly highlight generational and demographic aspects intrinsic to aggregate accounts.

The System of National Accounts (SNA) synthesizes information about the generation, distribution, and use of income in the country. The origin of the system occurred with the release of the first United Nations manual in 1947 with international standards for the compilation of economic statistics. Subsequently, the organization revised and refined the manual in 1953, 1960, 1964, 1968, 1993, and 2008 to date (UN, 2022).

In Brazil, according to Neto and Forte (2016), the theme of national accounts emerged from the publication of the book "National Income" by Antônio Dias Leite Júnior in 1948. Still in the second half of the 1940s, the Getúlio Vargas Foundation organized a technical team for the construction of national accounts in the country and, in 1986, the Brazilian Institute of Geography and Statistics (IBGE) took over the preparation of the Brazilian system of national accounts. In the most recent SNA Manual of 2008, national accounts are related to government activities and other statistical systems. IBGE (2020) describes the link between National Accounts and Public Finance Statistics in an effort by the National Treasury, the Central Bank and IBGE in conceptual reconciliation for greater consistency between data sets and completeness of national macroeconomic analysis.

However, in a context of demographic transition and continued population aging in the country, the national accounts do not provide information on the age or generational dimension of people in aggregate economic data (UN, 2013). This demographic transition refers to the transition from young countries with high mortality and birth rates to older countries with low mortality and birth rates. This process causes a change in the age structure of the population with economic implications, such as the demographic bonus (ALVES, 2020; MASON, 2005; TURRA, QUEIROZ, 2005a; CARVALHO, WONG, 1995).

In general, the number and proportion of the generations of children, working-aged people and older people in the total population vary over the stages of the demographic transition, which can cause changes in terms of the number of tax payers, recipients of public benefits, number of workers and number of economically dependent people. Specifically in the public sector, this demographic shift is associated with a change in the aggregate levels (and age patterns) of public spending, particularly on health, education, and social security (UN, 2013), which opens up a range of economic opportunities and challenges for public accounts.

The United Nations Population Division recognized the importance of the relationship between the economy and population trends and supported the development of the 2013 National

Transfer Accounts Handbook. The manual was based primarily on a network of academic research on the topic, including Brazil (NTA, 2022; LEE et al, 2008; MASON et al, 2009a; MASON et al, 2009b). The National Transfer Accounts correspond to a coherent, comprehensive and systematic method for the age disaggregation of the main components of the National Accounts (UN, 2013). In other words, the method accounts for economic flows among different age groups or generations in a national population for a given calendar year.

For this, the methodology is based on the economic life cycle, which is on the consumption and income patterns of individuals throughout their lives. In general, the pattern of consumption and income represents a mismatch between material needs and the ability to finance these needs through labor income (UN, 2013). Children and the elderly tend to consume more than they produce, while the working-age population tends to produce more than their consumption. Institutions (households, market, and government) then perform intergenerational reallocation of resources in order to finance the consumption of the total population through asset-based transfers or reallocations.

Currently, Brazil is experiencing the end of the demographic bonus and is preparing for a demographic scenario of a significant proportion of elderly people in the population. In this context, this article measures and analyzes how production, consumption, savings, and the distribution of economic resources occur between generations (children, working-age population, and the elderly) from the compilation of the National Transfer Accounts for Brazil in 2018, according to the United Nations NTA 2013 Manual. The study focuses mainly on the public sector perspective and presents statistics consistent with the aggregate amounts of the National Accounts and the official population estimates. In this way, the article analyzes public spending per generation of people in both quantitative and qualitative terms and how demographics would impact the country's fiscal prospects, especially in education, health, and social security.

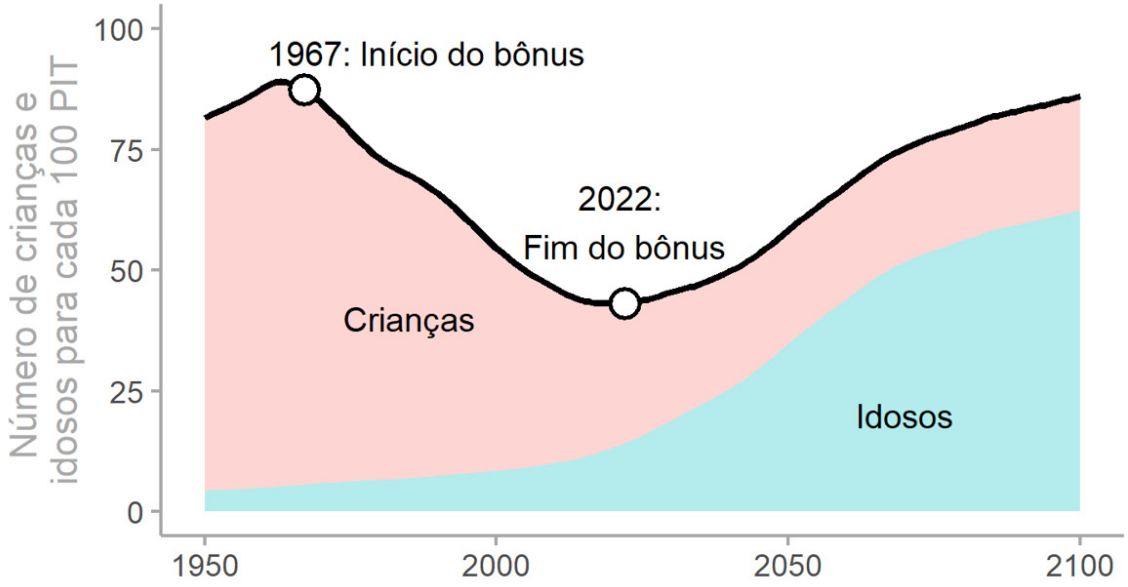
In addition to this introduction, the next section "Demography and generational economics" describes the relationship between the demographic transition and the Brazilian economy from a generational perspective. Next, the "Data and methodology" section presents the data sources and research methodology. The "Results" section shows and analyzes the statistics in more detail, and the "Discussion" section sets out reflections on demographics and economics in the Brazilian scenario. Finally, the "Conclusion" concludes this article.

Demography and the generational economy

The influence of population dynamics on the Brazilian economy has occurred more intensely since the Demographic Transition, which triggered a process of increased life expectancy and relative aging of the population (CARVALHO, WONG, 1995). The beginning of the drop in fertility around 1970 and the consequent change in the age structure of the population generated a period of demographic bonus for the economy (ALVES, 2020; MASON, 2005; TURRA, QUEIROZ, 2005a).

In 1967, the ratio of children and elderly in relation to the working-age population began to fall progressively due to the falling birth rate (GRAPH 1). In 2022, this demographic dependency ratio showed a reversal of trend according to UN population projections[1], which marked the end of the demographic bonus by the demographic dependency ratio criterion[2]. Thereafter, the elderly population is expected to grow substantially in relation to the working-age population.

Graph 1 - Demographic dependency ratio, Brazil, 1950-2100



1 – Number of children and elder for each PIT / 2 – 1967: Bonus Start / 3 – 2022: Bonus End / 4 – Crianças – Children / 5 – Idosos - Elderly

Source: UN - Revision 2022.

The 'first demographic bonus' refers precisely to the increase in the ratio of producers to consumers in the economy due to the greater growth of the working-age population relative to the economically dependent population (especially children and the elderly), which would favor economic growth and development (MASON, 2005). Queiroz, Turra and Perez (2008) estimated that the first bonus explained 29% of the growth of GDP per consumer in Brazil between 1970 and 2000.

The 'second demographic bonus' would follow the first bonus. In theory, a more aged labor force, with expected later retirement and longer life expectancy, would accumulate more resources for the elderly phase, which would promote economic growth via increased savings. In this case, Queiroz, Turra and Perez (2008) estimated that the second bonus explained 26% of GDP growth per consumer

1 The IBGE Population Projections 2018 Revision showed the reversal of the dependency ratio in 2018.

2 For Alves (2020), the demographic bonus will only end completely with the reduction of the ITP in absolute (and not relative) terms, which should occur from 2036 in the UN projections or 2038 in the IBGE projections. However, the author pointed out that the COVID-19 pandemic may hinder the use of the rest of this demographic opportunity, with the worsening of employment and education conditions.

in Brazil between 1970 and 2000.

Demographic bonuses represent an economic opportunity that may or may not be taken advantage of according to the economic conditions of the country, such as the ratio of producers and consumers, the degree of capital deepening and the existence of appropriate economic institutions and policies (TURRA, QUEIROZ, 2009). Queiroz, Turra, and Perez (2008) estimated real economic growth below potential produced by demographic bonus due to lack of investments in human capital and inefficiency of some institutions. Between 1995 and 2000, the growth rate of consumption per effective consumer was 1/3 of the amount predicted by the demographic bonus.

With the demographic bonus ending, the demographic window would then change from an economic opportunity (first positive bonus) to an economic challenge (first negative bonus), since it would favor a decrease in per capita income growth (LEE, MASON, 2006). Mason (2005) estimated an average 48-year window of demographic bonus for Latin America. In Brazil, the end of the demographic bonus occurred in 2018 according to the demographic dependency ratio of IBGE, which would be equivalent to a demographic window of opportunity of 52 years, considering the beginning of the bonus in 1967. Turra and Rios-Neto (2001) also considered a demographic window of opportunity of 10 to 20 years in Brazil as of 2001.

In terms of education, the demographic transition also implied an educational bonus, with the lower growth (or even decrease) of the group of children in the population in relation to the total population, enabling greater per capita educational investment. For Gois (2014), Brazil is experiencing a window of opportunity to increase per capita investment in childhood due to the falling population of children. The number of children aged 0 to 14 years old went from 48 million in 2010 to 44 million in 2018 and is expected to reach 34 million in 2060 (IBGE, 2018).

For Soares (2008), a relative demographic educational bonus means that the school-age population grows at a slower rate than the total population. When the school-age population is actually falling, an absolute demographic education bonus would occur. In the analysis of 11 Latin American countries between 1991 and 2000, Brazil was the only country to have an absolute demographic education bonus, making it a classic case of demographics impacting the universalization of school enrollment (SOARES, 2008). Cuaresma, Lutz, and Sanderson (2014) argued that a substantial portion of the demographic bonus is actually an educational bonus. Therefore, the effects of the demographic bonus would need to be understood in the context of the educational transition.

In terms of health, the demographic transition also implied an epidemiological transition in the country, with a proportional decrease in the prevalence of infectious-contagious diseases - more characteristic among young people - and a proportional increase in the prevalence of chronic-degenerative diseases - more characteristic among older people. This new profile would imply interventions of higher financial cost due to longer duration of treatment and slower and more complicated recovery (SCHRAMM et al, 2004). Vanzella, Nascimento, and Santos (2018) observed a 239.27% growth in cas-

es of hospitalization of the elderly for neoplasms[3] between 1998 and 2005 in the Unified Health System (SUS).

Miller and Castanheira (2013) projected an increase in public health spending from 3.3% of GDP in 2005 to 4.9% in 2050 in a status quo scenario with population aging and to 7.7% in 2050 in a scenario of health spending convergence to patterns of higher income economies. Kilsztajn et al (2002) projected a 25% increase in health care spending relative to GDP between 1998 and 2050 due to population aging and pointed out that chronic degenerative diseases could mean a loss of skilled labor that is difficult to replace, a loss of productive life years and work hours, and early retirement costs due to illness. Schramm et al (2004) also pointed out that, in the Brazilian case, there is an overlap between the stages of the epidemiological transition in such a way that infectious diseases have predominated along with the growth of chronic-degenerative diseases.

Analyzing Brazil's fiscal situation in this scenario of demographic change, Turra (2000) combined the age pattern of public and private transfers and observed that, on the one hand, social transfers to the elderly were quite significant in Brazilian public transfers and, on the other hand, private transfers from families were more significant in transfers to children. Turra and Queiroz (2005b) pointed out that in 2004 the public pension system transferred approximately 12% of the GDP from the working-age population to the elderly, which would be a high amount considering that only 6% of the population was over 65 years of age. Turra, Queiroz and Rios-Neto (2011) highlighted two idiosyncrasies of intergenerational transfers in Brazil: (1) public transfers per capita to the elderly are much higher than those to children and (2) within age groups, public and private transfers are not equally distributed across socioeconomic levels.

Turra and Queiroz (2005c) found that, on the one hand, poor children were more dependent on public transfers than children of higher socioeconomic status and, on the other hand, the elderly relied more heavily on public transfers to finance their consumption, regardless of socioeconomic group. Over time, Turra, Queiroz, and Mason (2015) found that the pattern of intergenerational public transfers-particularly relatively larger transfers to the elderly-was maintained between 1996 and 2011. However, there was also higher per capita investment among the young, mainly in public education and other transfers, which mitigated the unequal distribution of net transfers between children and the elderly.

In summary, the demographic transition has directly impacted the economy in terms of both opportunities and challenges. Each generation (children, ITP, and the elderly) presents different characteristics and demands for public spending, such as education, health, and social security. Consequently, the size (absolute and relative) and growth of each generation impacts on the country's economic statistics. Thus, the National Transfer Accounts attempt to describe this generational view of the Brazilian national accounts in the following sections.

3 For clarification, cancer is a malignant neoplasm.

Data and methodology

The methodology for compiling the statistics followed the rules of the United Nations NTA 2013 National Transfer Accounts Manual using Brazil's official databases (Appendix). The Integrated Economic Accounts (CEI) of the National Accounts 2018 were the reference statistics for aggregate economic balances, while the Household Budget Survey (POF) 2017-2018 provided the per capita age standard for opening balances by age or generation of persons. However, the specifics of the compilation for Brazil still considered the use of administrative records.

In the aggregate accounts, the reference for spending on social security were the expenditures of the General Social Security System with Retirements and Pensions in the Statistical Yearbook of Social Security. For the age pattern of the accounts, we also considered (1) direct public investment in education per student at each level of education from the National Institute of Educational Studies and Research Anísio Teixeira (INEP) and (2) total spending on hospital morbidity in outpatient and inpatient care by age from the Ministry of Health's DATASUS.

In addition, although the estimates from the 2017-2018 POF sample survey have statistical representativeness for the country, the population estimates were adjusted for compatibility with the 2018 Revision Population Projections of the Brazilian Institute of Geography and Statistics (IBGE). The age analysis considered (1) the simple ages from 0 to 90 years of age, with the last age concentrating the population aged 90 years or more or (2) alternatively the generations (children, people of working age, and the elderly) that corresponded respectively to the large age groups of 0 to 14 years, 15 to 64 years, and 65 years or more of age. Unlike the IBGE concept, the working-age population (PIT) in this research corresponded to the population aged 15 to 64 (and not the population aged 14 or over). Moreover, for clarification, the nomenclature 'people of working age' is equivalent to the older nomenclature 'people of working age'.

In the National Transfer Accounts, transfer flows are based on inflows and outflows (UN, 2013). Input flows consist of labor income, capital income, input property income, and input transfers. Outgoing flows consist of consumption, savings, outgoing property income, and outgoing transfers. The aggregate of labor income, capital income, and property income corresponds to primary income (or net national income) at pre-tax prices[4], that is, it is the compensation paid for labor and assets in the production process of the resident population in a period of time. Net disposable national income results from primary income plus net transfers, which is equal to consumption plus savings in the economy.

$$\underbrace{Y^{l} + Y^{k} + Y^{p+} + \tau^{+}}_{Income} = \underbrace{C + S + Y^{p-} + \tau^{-}}_{Outgoing}$$

4 Unlike the National Accounts, the National Transfer Accounts consider aggregate balances prior to the assessment of taxes on products and production.

Y^l = labor income

Y^k = capital income

Y^{p+} = property income revenue

τ^+ = income transfers

C = consumption

S = savings

Y^{p-} = property outgoing revenue

τ^- = outgoing transfers

By conceptual definition, the National Transfer Accounts algebraically reorganize the above equation to highlight the economic life cycle - that is, the difference between consumption and labor income - and consequently the mechanisms for financing this life cycle. In order to analyze the generational economy in greater detail, the balances are further disaggregated by age or generation, by use (education, health, etc.), and by sector[5] of the economy (public or private).

$$\underbrace{\sum_k \sum_n \sum_i C_{k,n,i} - \sum_i Y^l}_{lifecycle\ deficit} = \underbrace{\underbrace{\sum_k \sum_n \sum_i \tau^+_{k,n,i} - \sum_k \sum_n \sum_i \tau^-_{k,n,i}}_{Net\ transfers} + \underbrace{\sum_k \sum_i Y^A_{k,i} - \sum_k \sum_i S_{k,i}}_{Realocation\ based\ in\ assets}}_{Realocation\ by\ age\ groups}$$

where:

i = simple age or generation

n = flow use (education,health,etc)

k = public or private sector

C = consumption

Y^l = work revenue

τ^+ = incoming transfers

τ^- = outgoing transfers

Y^A = asset income (property+capital income)

S = savings

In addition, the National Transfer Accounts also considered Fixed Capital Consumption in aggregate capital income, which was a balancing account between the left and right sides of the above life cycle equation. By assumption, public sector fixed capital consumption was equal to the general government gross operating surplus in the National Accounts. It was also assumed that imputed rent

5 The rest of the world is also a sector and operates through the public and private sectors and the intermediaries that serve them (UN, 2013, p. 32).

for household owned housing was already a proxy for private household capital income net of fixed capital consumption (UN, 2013, p. 141). Thus, by residue, the fixed capital consumption of businesses and non-profit institutions closed the accounting for total fixed capital consumption.

Finally, to calculate the age pattern of taxes, the calculation of ICMS considered a 17% rate on the private consumption of individuals; in other cases (IPVA, IPTU, IPTR, ITBI, IOF, IR, ISS and others), the reference amount was equivalent to the amounts measured in POF 2017-2018. Moreover, the methodology did not include the social security of public servants, as per the traditional compilation of the manual[6] (UN, 2013, p. 119). In some tables or in the text, the monthly amounts correspond to the annual value divided by twelve months to facilitate understanding, and some results may present differences in sums due to rounding.

Results

Primary income (or net national income) in Brazil reached 5.8 trillion Brazilian Reais in the National Transfer Accounts in 2018 (TAB. 1). This estimate was consistent with the total balance in the National Accounts considering consumption of fixed capital. Unlike the traditional National Accounts calculation, the NTCs allowed for analysis in new economic outliers (such as labor income) and generational (such as children, PIT, and the elderly). Thus, primary income was distributed between labor income (71.3%) and asset income (28.7%), with compensation and capital income accounting for most of the balances in these respective accounts.

Table 1 - Primary income in the National Transfer Accounts and the National Accounts, in millions of Brazilian Reais, Brazil, 2018

	Total	Children	PIT	Elderly
National Transfer Accounts				
Income from work	4.147.896	6.893	4.019.710	121.294
Remuneration	3.679.570	6.584	3.587.109	85.877
Income from self-employment	468.325	309	432.601	35.416
Income from Assets	1.668.494	-24.574	680.191	1.012.877
Capital income	1.864.158	326	1.347.383	516.448
Property income	-195.664	-24.900	-667.193	496.429
Total	5.816.390	-17.681	4.699.901	1134.171
Consumption of Fixed Capital	992.991			
Total +CCF	6.809.381			

6 Turra, Queiroz, and Mason (2015) estimated public transfers between 1996 and 2011 in Brazil considering the scenarios with and without civil servant pensions.

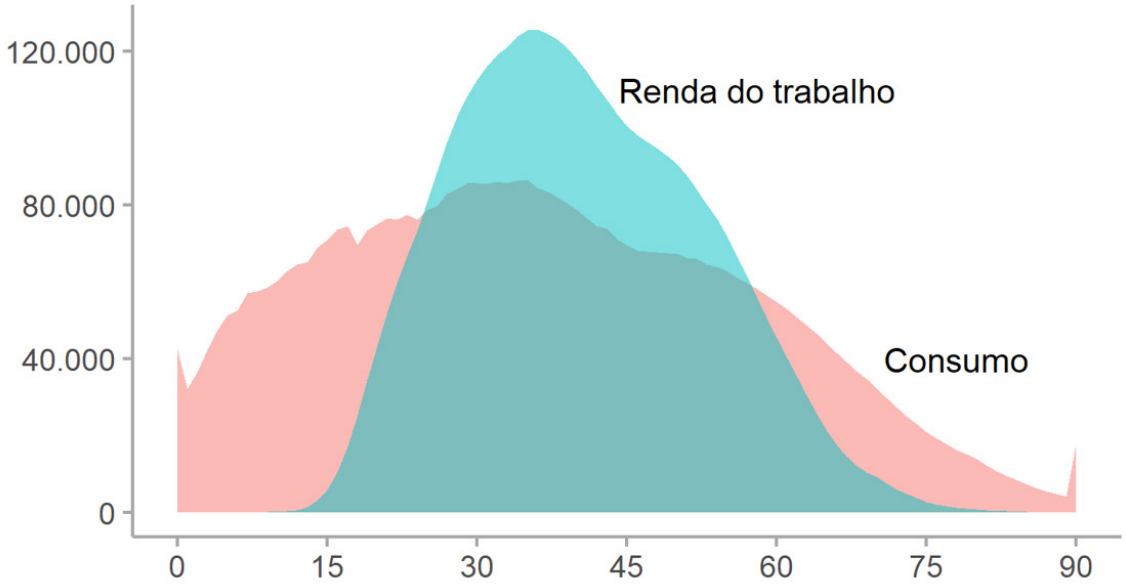
Share of each generation in the total balance				
Income from work	100%	0%	97%	3%
Remuneration	100%	0%	97%	2%
Income from self-employment	100%	0%	92%	8%
Income from Assets	100%	-1%	41%	61%
Capital income	100%	0%	72%	28%
Property income	100%	13%	341%	-254%
Total	100%	0%	81%	19%
National Accounts				
Compensation of employees	3.056.677			
Gross operating surplus	2.287.642			
Gross mixed income	583.568			
Taxes net of subsidies on products and production	1.077.158			
Property income	-195.664			
Total	6.809.381			

Source: own preparation based on IBGE data.

PIT and the elderly were the generations that explained the primary income, as children presented a relative participation close to zero. On the one hand, in terms of labor income, PIT and the elderly generated 97% and 3% of total income, respectively. Although ITP accounted for most of both compensation and self-employment income, the elderly had a larger share in self-employment income (8%) than in compensation (2%). On the other hand, in terms of asset income, the elderly had a higher share than PIT (61% versus 41%). The property income of the elderly was in surplus and partially mitigated the negative impact of PIT's property income. Overall, PIT was more prominent in labor income, while the elderly excelled in asset income.

Chart 2 - Generational economics in terms of population and aggregate and per capita flow of consumption and labor income, by simple age, Brazil, 2018

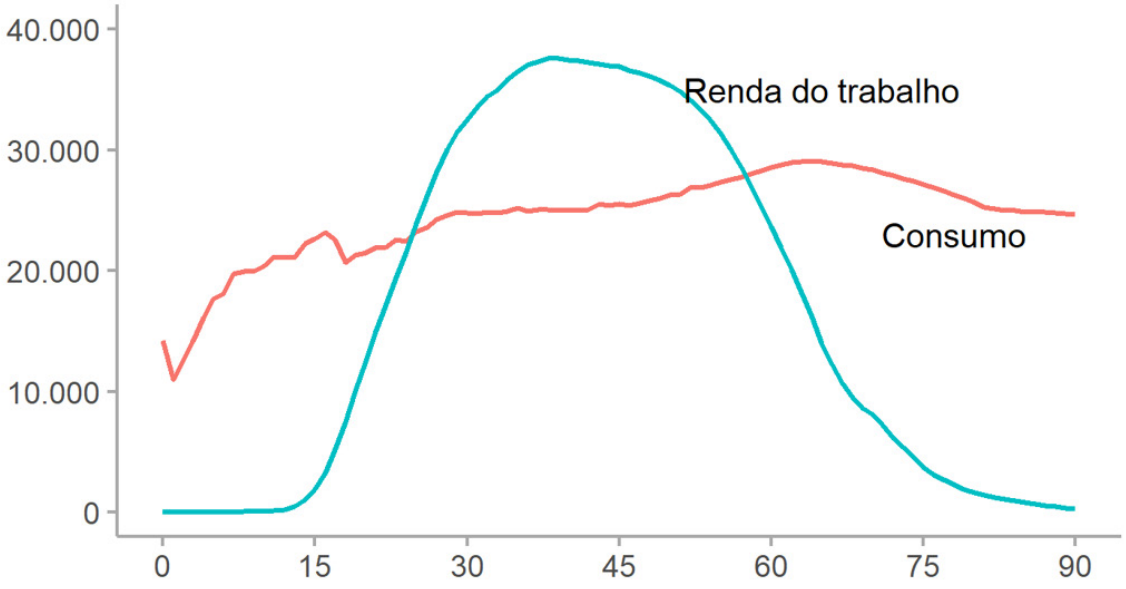
(a) Aggregate flows, in millions of Brazilian Reais



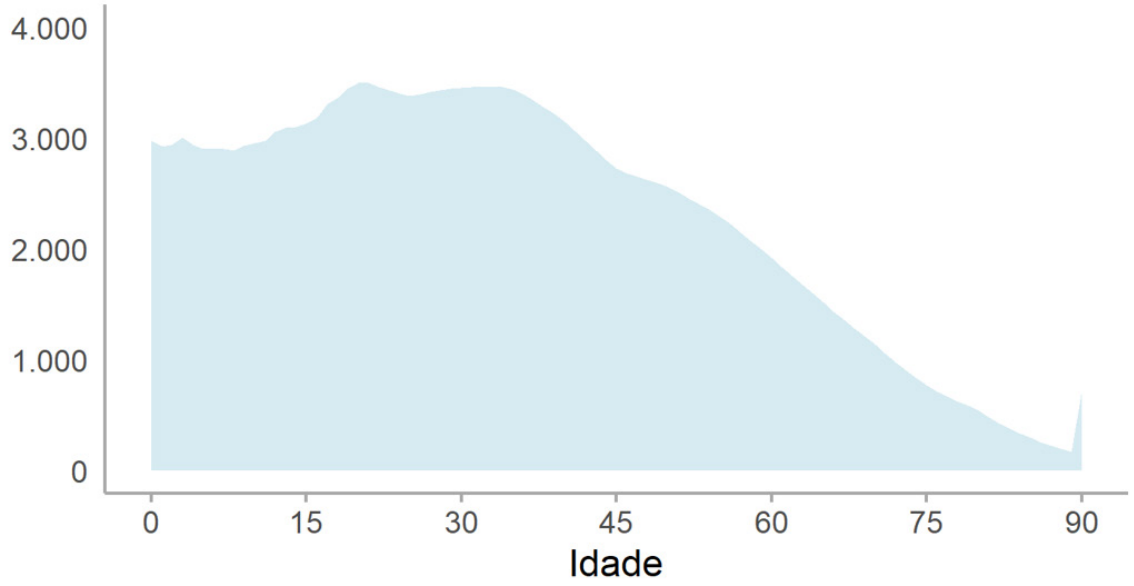
Renda do Trabalho: Labor income

Consumo: Consumption

(b) Flows per capita, in millions of Brazilian Reais



(c) Age distribution of the population, in thousand people



Idade: age

Source: own preparation based on IBGE data.

The National Transfer Accounts differ from the National Accounts by their focus on the economic life cycle, that is, on patterns of consumption[7] and labor income by age or generation. Given that primary income plus net transfers to the rest of the world correspond exactly to a country's consumption plus savings, the difference between consumption and labor income (i.e., the life-cycle deficit) can be described as a function of net transfers, asset rents, and savings. In other words, the economic life cycle (left side of the life cycle equation) could be financed by age reallocations via transfers or asset-based reallocations (right side of the equation).

In the generational economy, consumption occurred throughout the ages in a more homogeneous manner compared to labor income (CHART 1, panel A), although with less expressiveness among older people, adding up to a total consumption of R$ 4.9 trillion. In turn, the labor income balance of R$ 4.1 trillion occurred in early adulthood and, after peaking at age 36, declined mainly at early retirement ages.

In per capita terms, the life-cycle deficit was more evident among older people (CHART 1 panel B), since in aggregate terms this effect was less expressive in the economy due to the smaller proportion of this demographic group in the population (CHART 1 panel C). The beginning and end of the surplus phase occurred at ages 25 and 57 respectively, which would correspond to approximately 40% of the life of a person with this pattern of lifetime consumption and labor income.

7 The balance of consumption in the National Transfer Accounts equals the balance of final consumption expenditure less taxes, net of subsidies, on products in the National Accounts.

In the aggregate balance of the economy, there was a difference of R$ 778 billion between aggregate consumption and aggregate labor income (TAB. 2), which corresponded to the aggregate life cycle deficit in the economy, that is, the portion of consumption that cannot be financed with labor income. Thus, the labor income surplus in the intermediate period of the life cycle (R$ 421 billion) was not enough to finance the income deficit periods at the extremes of the life cycle (R$ 1,199 billion).

Table 2 - National Transfer Accounts, Brazil, 2018

Aggregate amounts, in millions of Brazilian Reais				
	Total	Children	PIT	Elderly
Life Cycle Deficit	778.394	794.265	-421.228	405.358
Consumption	4.926.290	801.157	3.598.482	526.651
Public consumption	1.393.480	396.048	857.606	139.826
Public consumption. Education	335.689	190.217	144.915	558
Public consumption. Health	242.453	31.781	146.596	64.076
Public consumption. Others without Education and Health	815.338	174.050	566.096	75.192
Private Consumption	3.532.810	405.109	2.740.876	386.825
Prisoner consumption. Education	134.182	72.153	61.982	48
Private consumption. Health	233.328	2.753	177.334	53.241
Private consumption. Others without Education and Health	3.165.300	330.203	2.501.559	333.537
Minus: Labor income	4.147.896	6.893	4.019.710	121.294
Remuneration	3.679.570	6.584	3.587.109	85.877
Income from autonomous garlic	468.325	309	432.601	35.416
Per capita amounts, in Brazilian Reais				
	Total	Children	PIT	Elderly
Life Cycle Deficit	3.733	17.846	-2.910	21.082
Consumption	23.628	18.001	24.858	27.390
Public consumption	6.684	8.898	5.924	7.272
Public consumption. Education	1.610	4.274	1.001	29
Public consumption. Health	1.163	714	1.013	3.332
Public consumption. Others without Education and Health	3.911	3.911	3.911	3.911
Private Consumption	16.944	9.102	18.934	20.118

Private consumption. Education	644	1.621	428	2
Private consumption. Health	1.119	62	1.225	2.769
Private consumption. Others without Education and Health	15.182	7.419	17.281	17.347
Minus: Labor income	19.894	155	27.768	6.308
Remuneration	17.648	148	24.780	4.466
Income from autonomous work	2.246	7	2.988	1.842
Population				
Number of people	208.494.900	44.507.410	144.759.658	19.227.832
Percentage of the population	100%	21%	69%	9%

Source: own preparation based on IBGE data.

This age pattern of consumption and labor income highlighted three age groups - or generations - with more similar behavior in the economic life cycle: children, the working-age population, and the elderly. On average, children did not generate income and thus had a life-cycle deficit (R$ 794 billion), requiring the full financing of their consumption. Working-age people on average generated more income than consumption and, therefore, had a life cycle surplus (R$ 421 billion). Finally, the elderly, especially the youngest, had some income from work, but it was not enough to finance most of the consumption in this generation and so had a life cycle deficit of R$ 405 billion.

On average, the age group 15 to 64 years old corresponding to the ITP captured well the period of labor income generation during life, mainly the beginning of the period and the entire surplus period of the life cycle. However, half of the R$ 860 billion surplus in the total economy had to finance a deficit in the next ITP, since people aged 15 to 24 and 58 and older did not generate enough labor income to finance their consumption. Thus, only R$ 421 billion of the ITP surplus could help finance the deficit generations (children and the elderly).

The age range of 0 to 14 years old corresponding to children also captured well the dynamics of this group. Labor income as a proportion of consumption was close to zero at all ages and, therefore, the life cycle deficit of R$ 794 billion was equivalent to practically all of the children's consumption. However, unlike the other generations, there is a stronger and clearer tendency for consumption to grow as children get older[8].

Finally, the age range of 65 years and over corresponding to the elderly comprised a group with total life cycle deficits and relative stability of consumption among individuals. However, there was greater heterogeneity among the elderly with respect to labor income. The elderly with lower age gen-

8 There is also an increase in consumption among children under the age of 1 associated mainly with health consumption (hospitalizations), since there is a high risk of mortality in the first year of life.

erated higher income during a period of the elderly phase and in an amount similar to young entrants to the labor market, which showed that the end of labor income generation occurred in the elderly phase, and not among people of working age. On the other hand, even among the younger elderly, this labor income was not sufficient to fully finance their consumption.

The aggregate consumption of R$ 5 trillion of the economy was distributed between public consumption (R$ 1.4 trillion or 28%) and private consumption (R$ 3.5 trillion or 72%). This distribution varied across generations: children demanded a similar proportion from the public and private sectors (50% from each sector), while PIT and the elderly demanded more than 70% of their consumption from the private sector.

In public consumption, Education (R$ 335 billion) and Health (R$ 242 billion) alone accounted for more than 40% of total consumption, with 48% of public consumption by children associated with Education (R$ 190 billion) and 46% of public consumption by the elderly associated with Health (R$ 64 billion). In private consumption, Education (R$ 134 billion) and Health (R$ 233 billion) accounted for 10% of total private consumption.

The average surplus per working-age person was well below the funding requirement for children and the elderly. However, two demographic effects on the aggregate life cycle balance stood out: (1) the still proportionally lower number of elderly minimized the impact of the higher per capita deficit of the elderly, and (2) the still proportionally higher number of people of working age favored a larger aggregate surplus to finance the life cycle deficit of children and the elderly (CHART 3).

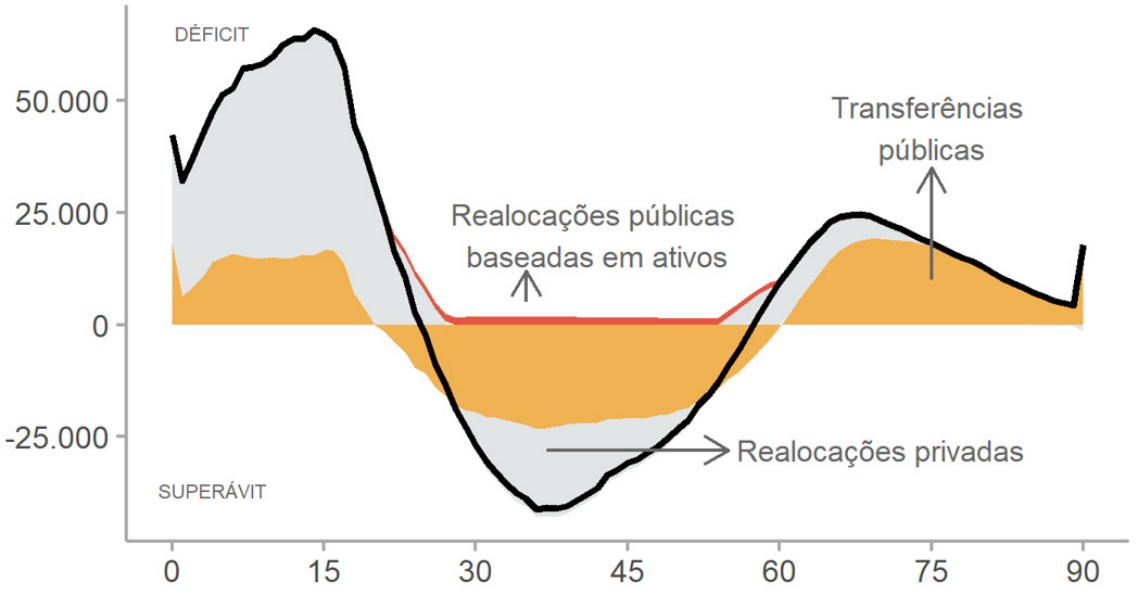
The financing of the life cycle deficit occurred through public or private reallocations between ages or generations (GRAPH 3 and TABLE 3). The relevance of the private sector in financing the consumption of children and the public sector in financing the elderly was highlighted. In the public sector, the reallocation of resources between ages through public transfers was also noteworthy.

However, in the aggregate economy, public transfers to the elderly (R$ 358 billion) were closer to public transfers to children (R$ 209 billion) because of the much higher proportion of children (21%) in the population than of the elderly (9%) and a high proportion of people of earning age (69%). The ITP originated R$ 567 billion in resources for the public sector, which corresponded exactly to the R$ 567 billion transferred to children and the elderly. Thus, public transfers financed 26.2% of the consumption deficit of children and 88.4% of the consumption deficit of the elderly. Even so, public transfers were not enough to meet the aggregate life-cycle deficit, implying negative public savings of R$ 313 billion in 2018[9].

9 This figure is consistent with the National Accounts statistics.

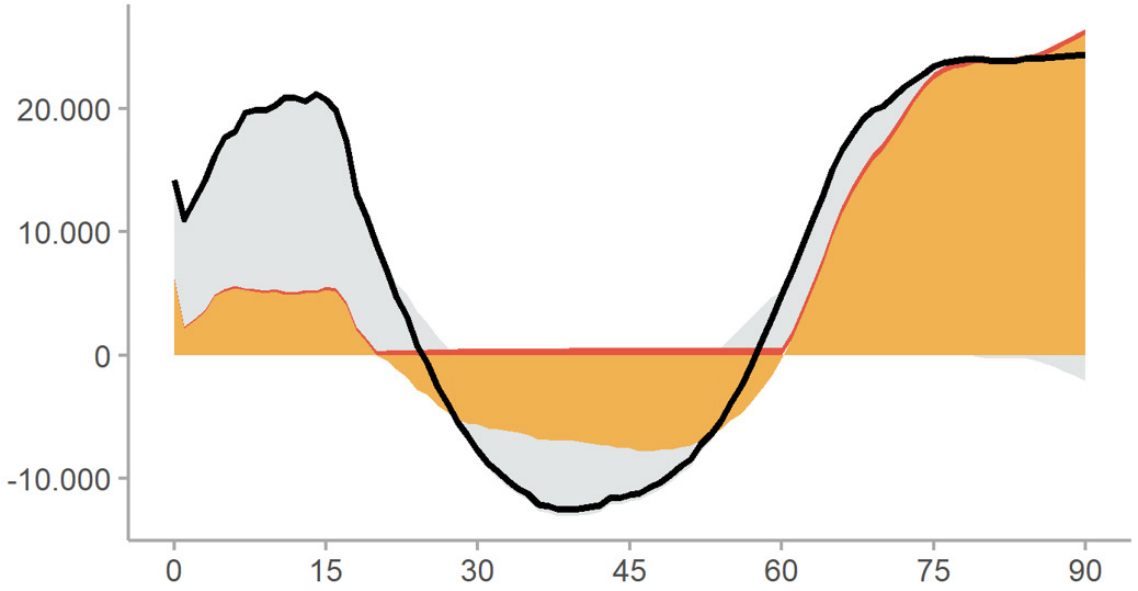
Graph 3 - Aggregate and per capita life cycle and population deficit, by simple age, Brazil, 2018

(a) Aggregate life cycle deficit, in millions of Brazilian Reais

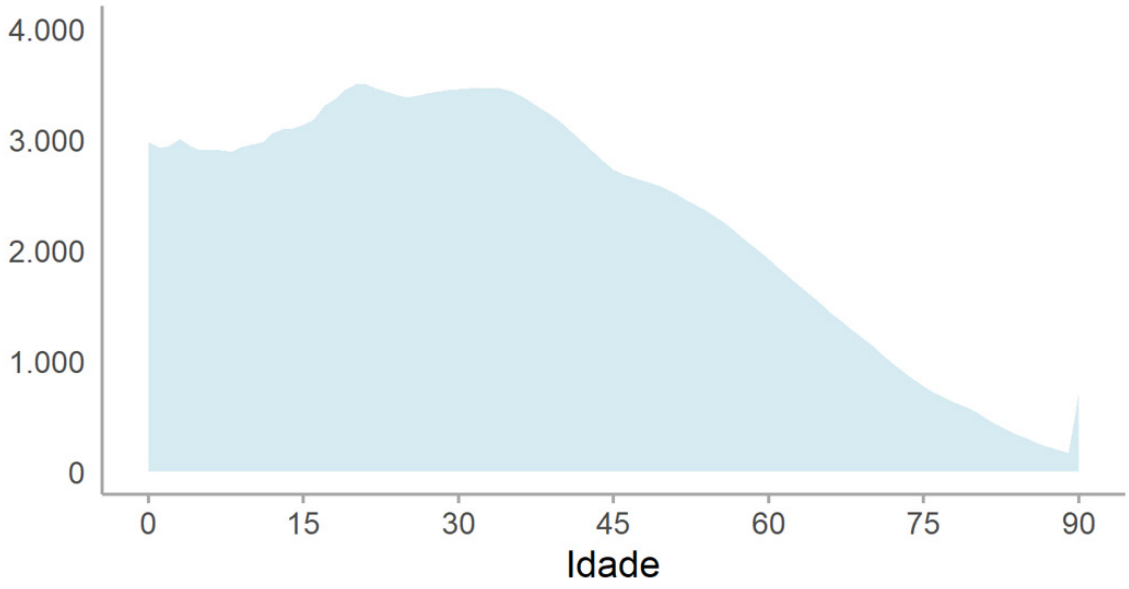


Déficit = Deficit / Realocações públicas baseadas em ativos = Public reallocations based on assets / Trasnferências públicas = Public transfers / Superávit = Surplus / Realocações privadas = Private reallocations

(b) Life cycle deficit per capita, in millions of Brazilian Reais



(c) Age distribution of the population, in thousand people



Idade - Age

Source: own preparation based on IBGE data.

Table 3 - Re allocations of the life cycle deficit across demographic groups. Brazil, 2018

Aggregate amounts, in millions of reais				
	Total	Children	PIT	Elderly
Age Relocations	778.394	794.265	-421.228	405.358
Public age reallocations	89.884	216.853	-495.720	368.751
Public Transfers	750	208.736	-566.670	358.683
Asset-based public reallocations	89.134	8.116	70.950	10.068
Private Age Reallocations	688.510	577.412	74.491	36.607
Population				
Number of people	208.494.900	44.507.410	144.759.658	19.227.832
Percent of the population	100%	21%	69%	9%

Source: own preparation based on IBGE data.

In more detail, public transfers took place through transfers in currency (goods and services) or in cash (money). Of the R$ 2.7 trillion in total spending, 52% of the transfers were in currency and 48% in cash. Among in-kind transfers, Education and Health stood out, as they alone accounted for more than 40% of the balance in 2018. More than 99% of the other in-kind consumption correspond-

ed to collective services of public administration. The total balance of in-kind transfers exactly equaled the balance of public consumption in the life cycle (TAB. 4).

Table 4 - Public transfers, inflows in millions of reais, 2018

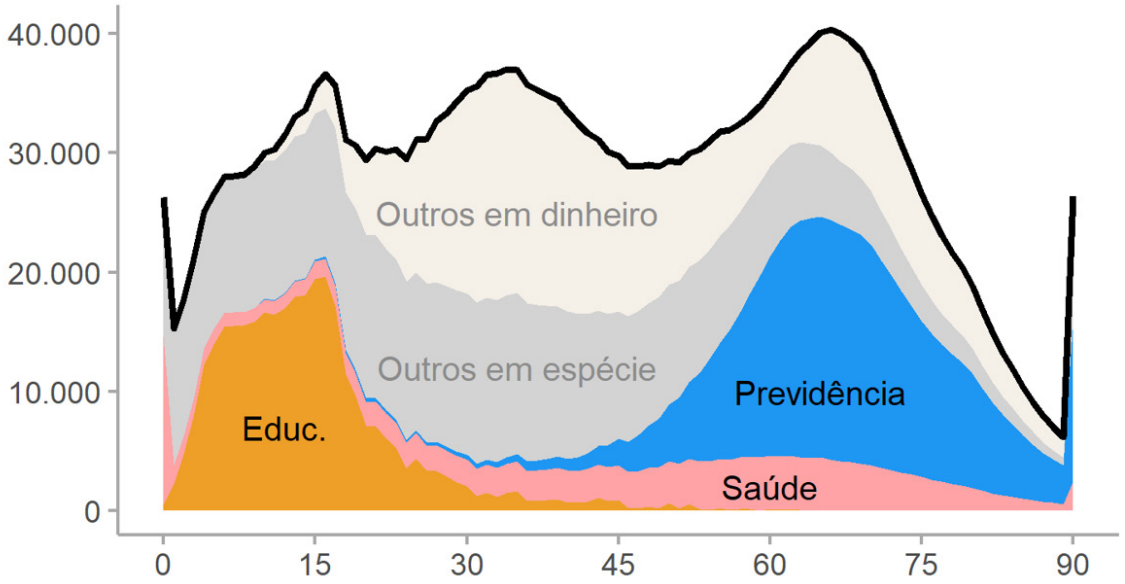
	Total	Children	PIT	Elderly
Education	335.689	190.217	144.915	558
Health	242.453	31.781	146.596	64.076
Welfare	532.408	327	220.807	311.273
Others in currency	815.338	174.050	566.096	75.192
Other cash	742.689	7.185	565.269	170.236
Total	2.668.577	403.560	1.643.682	621.334

Source: own preparation based on IBGE data.

In the analysis by generation, most of the balances were concentrated in the ITP, given its higher proportion in the population. However, the balance was higher for Education for children and for Old Age Pension. Even among PIT, the balance for education was significant, as the youngest working-age people were of college-education age and spending on a college student was as much as 3.6x the spending on a basic education student.

Among the cash transfers, welfare spending (retirement and pensions) stood out with a balance of R$ 532 billion, which represented 42% of the public cash transfers. The ITP and the elderly concentrated the receipt of these resources, with 58% of the social security expenses (R$ 311 billion) going to the elderly and 76% of the other cash expenses (R$ 565 billion) going to the ITP. Also noteworthy in the life cycle is the high public transfer between 0 and 1 year of age associated with health expenditures for children in this age group, since the risk of infant mortality is higher at this stage of the life cycle (GRAPH 4).

Graph 4 - Aggregate public transfers, by age and use, in millions of Brazilian Reais, Brazil, 2018

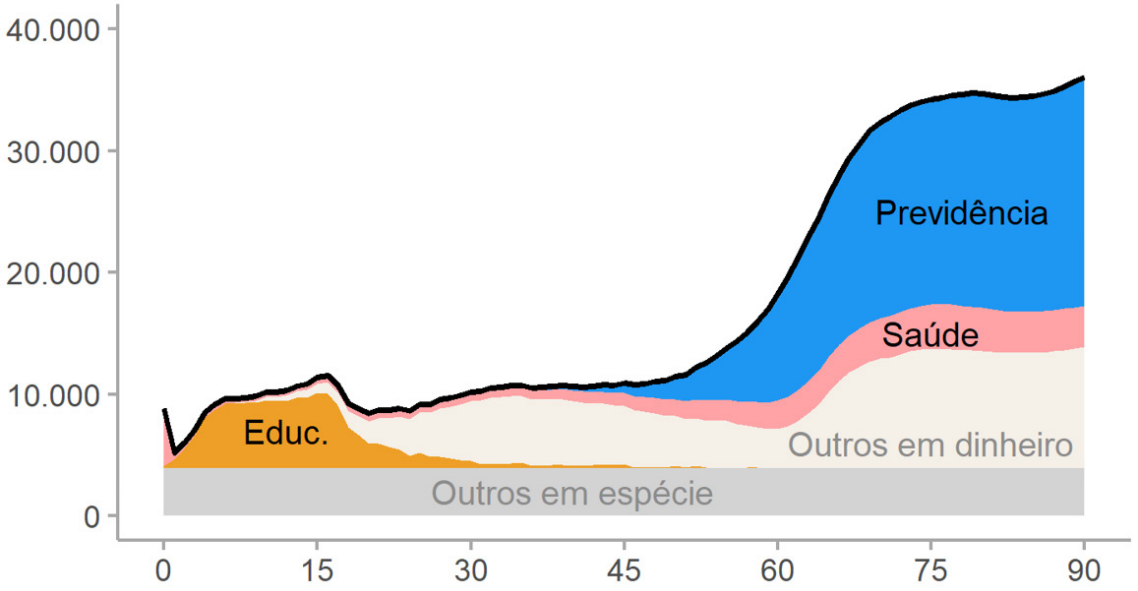


Outros em dinheiro = Others in cash / Outros em espécie = Others in currency / Educ. = Education / Previdência = Social security / Saúde = Health

Source: own preparation based on IBGE data.

In view of the influence of the age structure on the aggregate balances of public transfers, the per capita analysis showed idiosyncrasies between the generations (CHART 5). The much larger public transfer among the elderly was associated mainly with Social Security spending. There was also an increase from about age 65 onwards associated with Other cash transfer receipt.

Graph 5 - Public transfers per capita, inflows, in Brazilian Reais, by age, Brazil, 2018



Outros em dinheiro = Others in cash / Outros em espécie = Others in currency / Educ. = Education /

Previdência = Social security / Saúde = Health

Source: own preparation based on IBGE data.

On average, the public sector spent R$ 1,066.60 Brazilian Reais per month for each person in the country. However, this amount differs quantitatively and qualitatively between generations. The per capita transfer levels for each elderly person (R$ 2,692.86 per month) stand out when compared with each person of working age (R$ 946.21 per month) and each child (R$ 755.60 per month) (TAB. 5). In other words, the per capita public transfers for the elderly was approximately 3.5 times the per capita transfers for children. The distribution of public transfers was also quite heterogeneous.

Among the elderly, half of the transfers to an elderly person were associated with the receipt of social security funds. In addition, 27% of the total amount was in other cash transfers, which showed that 77.5% of public sector spending on an elderly person is through transfers directly in cash. Among the PIT, the public resources received by each person were more distributed among the uses, with the largest proportion in other goods and services or other cash transfers. Finally, more than 90% of public transfers to a child were associated with education (47.1%) or other goods and services (43.1%).

Direct and indirect tax payments to the government made up the outflows that financed the above inflows for each generation. In general, the aggregate outflow for a specific use corresponded to the amount needed for the consumption of that use. For example, in 2018, the government allocated $335 billion to finance Education (input flow) and therefore used that same amount in taxes (output flow). Therefore, the total balance of each use (input flow minus output flow) in the public transfer tends to be close to zero, since the government simply operated as an intermediary of a transaction between individuals, as per the National Transfer Accounts accounting system.

Table 5 - Public transfers, average monthly per capita in reais, Brazil, 2018

An elderly
Received R$ 2,692.86 monthly from the government:
✓ **R$ 1,349.06 in cash pensions (50.1%)**
✓ **R$ 737.80 in other cash transfers (27.4%),**
✓ R$ 277.71 in goods and services for health (10.3%),
✓ R$ 325.88 in other goods and services (12.1%).
A person of working age
Received R$ 946 monthly from the government:
RS 127.11 in cash pensions (13.4%),
✓ R$ 84.39 in goods and services for health (8.9%),

✓ R$ 83.42 in goods and services for education (8.8%),

✓ R$ 325.88 in other goods and services (34.4%),

✓ R$ 325.41 in other cash transfers (34.4%).

A Child

Received R$ 755.60 monthly from the government:

✓ R$ 356.15 in goods and services for education (47.1%),

✓ R$ 59.51 in goods and services for health (7.9%),

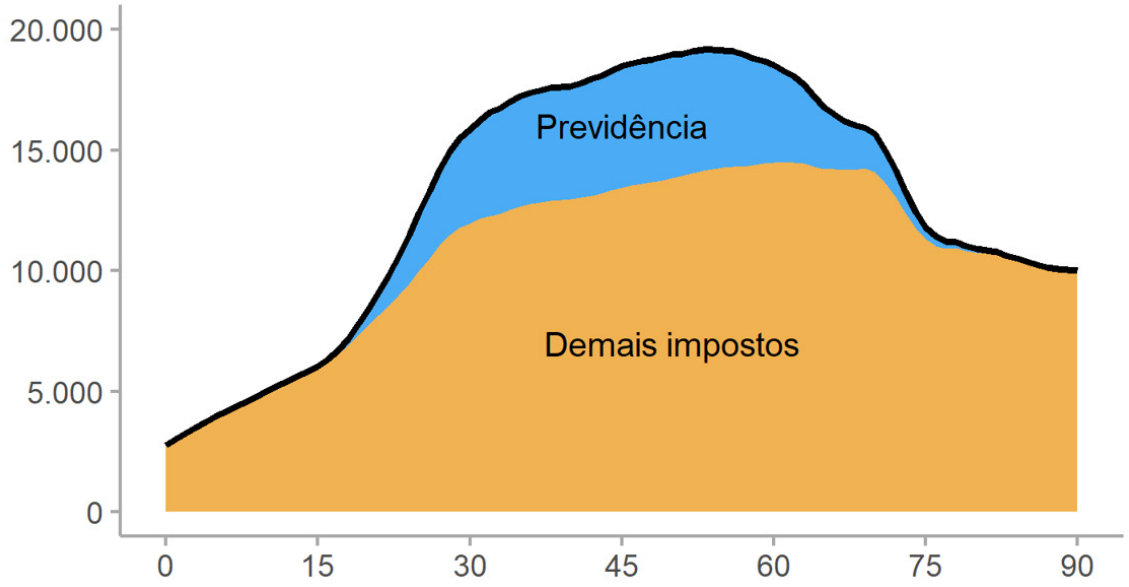
✓ R$ 325.88 in other goods and services (43.1%),

✓ R$ 13.45 in other cash transfers (1.8%).

Source: own preparation based on IBGE data.

However, the age profiles of inflows and outflows (taxes) could differ. On premise, outflows in each use (education, health, other in-kind, and other cash) remained with the same age pattern identified in individual direct and indirect tax payments, including tax payments by children via consumption (GRAPH 6). As an exception, the age profile of the outflow to social security corresponded to the public pension deduction in individual income and, consequently, was concentrated in the working-age population.

Graph 6 - Taxes per capita, outflows in Brazilian Reais, Brazil, 2018



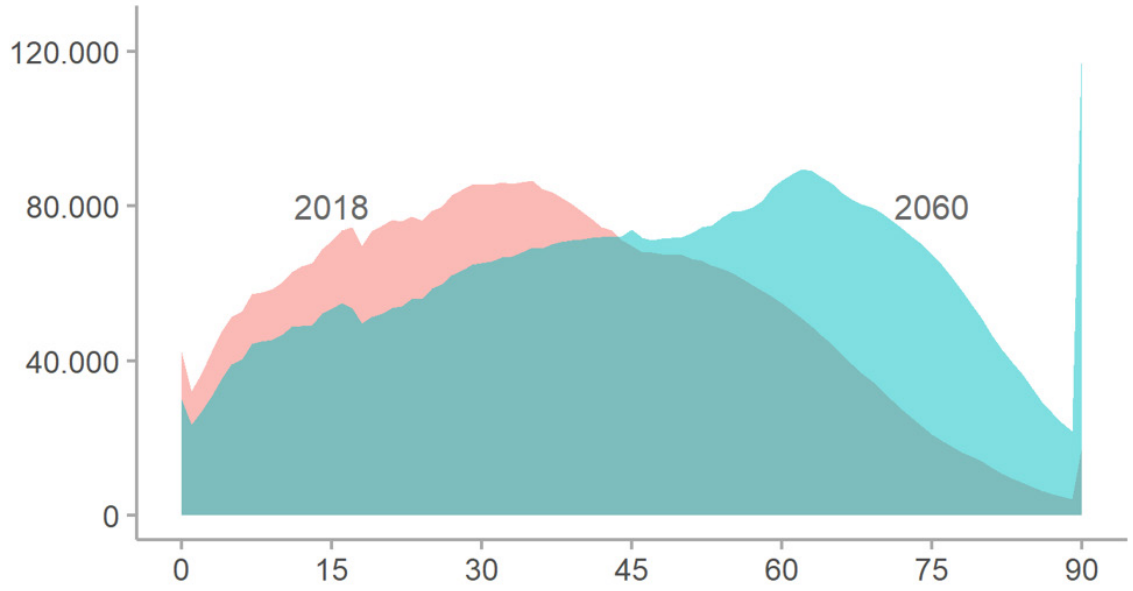
Previdência = Social security / Demais impostos = Other taxes

Source: own preparation based on IBGE data.

In the coming decades, the relative aging of the population will increase the proportion of elderly people from 9 percent in 2018 to 25 percent in 2060. Consequently, the demographic shift would impact the economy even in a scenario of constant consumption and per capita labor income (GRAPH 7). On the one hand, consumption would increase from $4.9 trillion in 2018 to $5.6 trillion in 2060 at constant 2018 prices, mainly due to increased consumption among the elderly. On the other hand, labor income would not change between 2018 and 2060 (R$ 4.1 trillion), showing only a higher aging of the average age in the labor market[10]. With this, the aggregate deficit of the economy would increase from R$ 778 billion in 2018 to R$ 1.5 trillion in 2060 associated with the higher proportion of elderly people in the population. The life-cycle deficit of the elderly would rise from R$ 405 billion in 2018 to R$ 1.3 trillion in 2060.

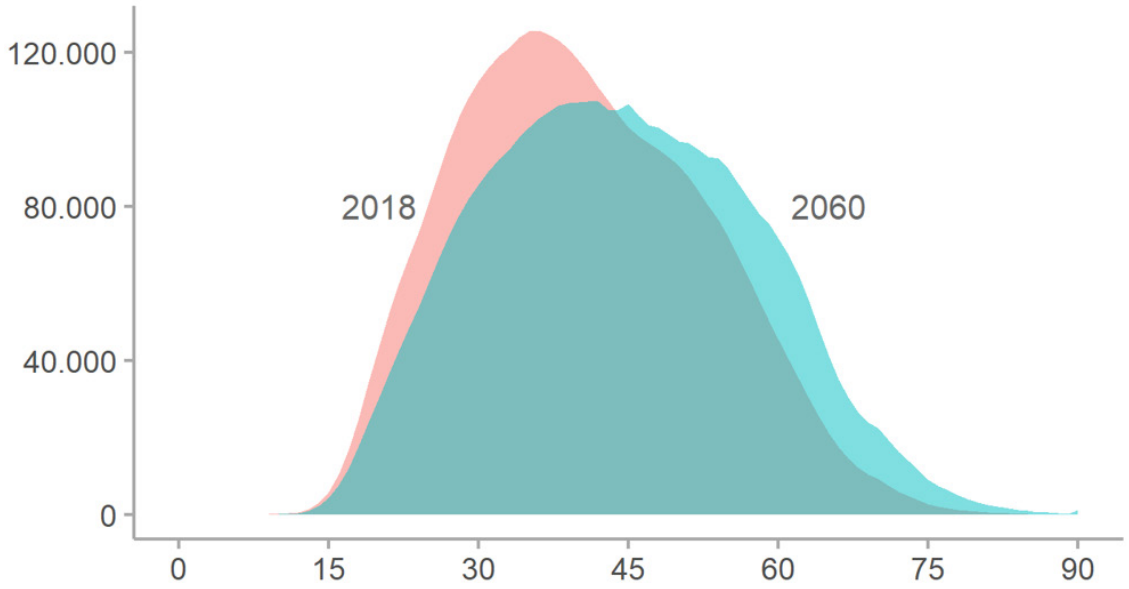
Chart 7 - Fiscal projections in a labor income and consumption scenario per capita and population aging, by age, Brazil, 2018 and 2060

(a) Aggregate consumption flows, in millions of Brazilian Reais

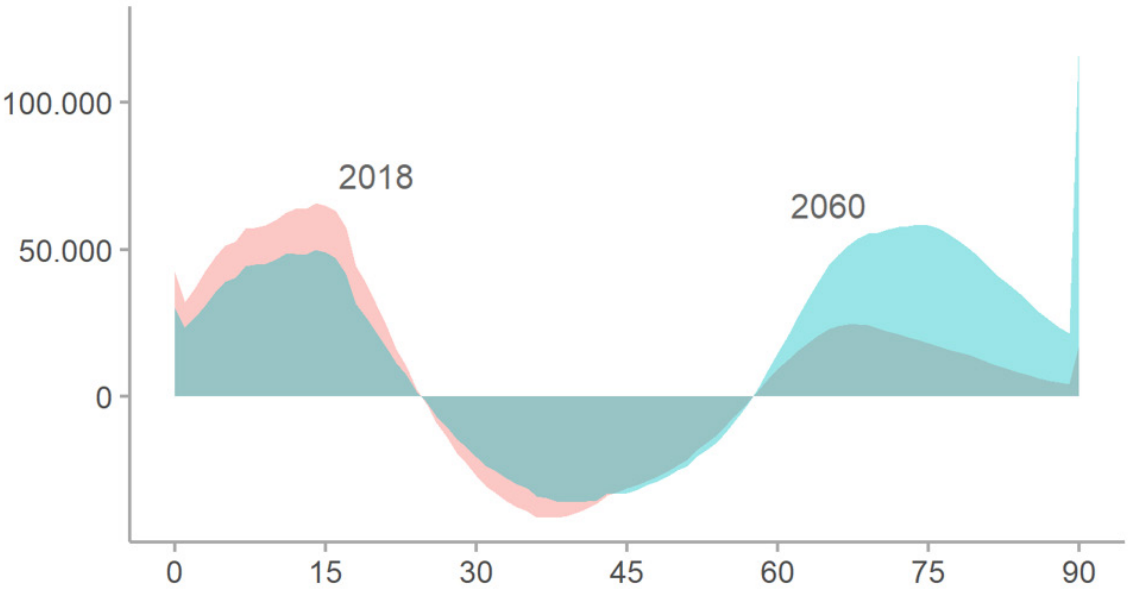


10 This projection exercise does not consider pension reform in 2019.

(b) Aggregate labor income flows, in millions of Brazilian Reais



(c) Aggregate life cycle deficit, in millions of Brazilian Reais



Source: own preparation based on IBGE data.

Discussion

The National Transfer Accounts made it possible to analyze the national accounts in new economic outliers (such as labor income) and generational (children, PIT, and the elderly). The results showed distinct consumption and labor income patterns in the economic life cycle of generations, in both quantitative and qualitative aspects. In a country with an increasing aging population, the analysis of the generational economy revealed its importance in the context of change in the proportion of generations over the coming decades, with the potential reduction of the labor force and a significant

increase in the elderly population. This entire generational scenario has highlighted opportunities and challenges for the national economy and fiscal public policy.

On the one hand, the market for goods and services associated with the elderly is expected to increase in the coming years as life expectancy and the proportion of the elderly increase. This consumption market would rise from R$ 4.9 trillion in 2018 to R$ 5.6 trillion in 2060 as the elderly population grows. The consumption profile in the country should also change in the future. The market should demand more health care and programs and services for the elderly (CELADE, 2013).

In 2018, the vast majority of the elderly did not have labor income, and if they did, it was not enough to pay for their total consumption, which required 77% of the elderly's aggregate consumption to be financed. More than 90% of this aggregate financing demand came from public reallocations, with 88.4% coming from public transfers. In 2018, on average, the government transferred R$ 2,692.86 per month to each elderly person, mostly in the form of welfare payments (R$ 1,349.06) or other cash transfers (R$ 737.80). This public transfer to an elderly person was 3.5 times the public transfer to a child in the country.

In turn, children required the full financing of their consumption due to the absence of labor income at this stage of the life cycle. Unlike the elderly, children's consumption was mainly financed by private transfers, with the government contributing 27.2% of the financing of the life cycle deficit, mainly with public transfers (26.2%). On average, the government transferred R$ 755.60 per month to each child, mainly in the form of public education (R$ 365.15) or other goods and services (R$ 325.88). In the future, the aggregate consumption of children tends to shrink as this population shrinks. The number of children is expected to drop from 44 million in 2018 to 34 million in 2060 (IBGE, 2018). This may represent an educational bonus opportunity (GOIS, 2014; SOARES, 2008), considering that maintaining current spending on education could raise the investment per student and favor the productivity of the future labor force, the dynamics and fiscal sustainability of the generational economy.

The main source of resources for financing the consumption of the population with a life cycle deficit (children and the elderly) came from the working-age population, either through private transfers (mainly to children) or through tax payments that made financing possible through public transfers (mainly to the elderly). Since 1967, Brazil's fiscal scenario had been taking advantage of the higher growth of the working-age population relative to the total population, which generated a demographic bonus for the national economy.

However, in 2018, the demographic dependency ratio showed a reversal of the downward trend in its historical series, which marked the end of the demographic bonus by this criterion, that is, the window of opportunity remained open for approximately 52 years in the country. On the other hand, between 2018 and 2037, there will still be a demographic opportunity for the economy due to the positive growth of PIT. However, Alves (2020) pointed out that the COVID-19 pandemic may hinder this exploitation due to the worsening employment and education conditions of the population.

The fiscal profile of the generational economy in 2018 did not prove sustainable in the long term in a scenario of an upsurge in population aging with no change in economic conditions in the future. Intergenerational reallocations were not enough to finance all the population's consumption, which resulted in negative public savings of R$ 314 billion in the same year. Considering that, on average, public transfers for each elderly person are much higher than for the rest of the population, the increase in the quantity and proportion of elderly people over the next few decades would tend to make it difficult to maintain this fiscal dynamic. Between 2018 and 2060, the elderly population is expected to triple, while the ITP will have a 6% reduction in its size, i.e., there will be 3 times more elderly and a smaller working-age population than in 2018. The life cycle deficit of the elderly would increase from R$ 405 billion in 2018 to R$ 1.3 trillion in 2060. In aggregate terms, Filho, Turra and Neto (2020) estimated that public spending on social security, services (including health care) and other income transfers for the elderly would represent approximately 32% of Brazil's GDP in 2060, in a scenario without public pension reform.

Lee and Mason (2017) pointed out that population aging and lower labor force growth would cause lower GDP growth, more PIT spending to support the elderly, and greater burden on public finances with higher spending pressure for health and welfare for the elderly. Overall, the more the elderly are able to finance their own consumption, the lower the tax costs on younger adults. For the authors, Europe would be an example of a system with heavy reliance on public transfers for consumption by the elderly, while the United States would be an example of a system in which people retire later and rely more on their own assets at older ages. Finally, Latin America would be an intermediate case between the two regions. For Duda-Nyczak (2021), in Latin America and the Caribbean, the total life cycle deficit is expected to grow in the coming decades and hinder the achievement of the Sustainable Development Goals. Turra and Fernandes (2020) described in more detail this relationship between demographic changes, the National Transfer Accounts and the Sustainable Development Goal indicators.

Mason et al (2015) further discuss the challenges and solutions in the face of aging and changing intergenerational transfers. Life cycle reform would be a powerful tool in response to population aging. For the authors, aging would be more manageable if improvements in disability and health resulted in later retirement and reduced spending on younger seniors. For Turra (2018), the new Brazilian intergenerational pact should (a) distribute the costs of adjustment among as many generations as possible, without definitively impacting the consumption of the current elderly, but also without burdening single-generation adults or discouraging the participation of younger people in public transfer systems, and (b) reduce inequalities between subgroups of adults and the elderly by requiring a sacrifice that grows proportionally with income (TURRA, 2018, p. 303).

CELADE (2013) discussed three policy options for the Brazilian case. In order to maintain fiscal balance from 2013 to 2040 in a scenario of population aging, Brazil could increase the average

retirement age by 2 years; reduce the gender income gap via increasing female labor income[11] from 54% to 89% of male income; or increase taxes by 29%. For Alves (2018), pension reform in Brazil was absolutely inevitable. In 2019, Brazil presented a Welfare Reform (Constitutional Amendment 103/2019). However, Arnold (2019) argued that pension reform alone would not be enough for the sustainability of public accounts.

For Turra (2000), investment in young people would be a necessary, though not sufficient, condition for reducing fiscal pressure on public transfer systems. Massive investment in children today would make them more productive to sustain higher costs in the future (TURRA, RIOS-NETO, 2001). Amaral, Rios-Neto, and Potter (2012) estimated that population aging and increased schooling would increase annual average income growth by 2 percent by 2050.

Hammer et al (2016) argued that transfers to the elderly depend on the level of investments in children, although these investments are still neglected in the calculation of benefits. Based on the compilation of Spain's National Transfer Accounts, Abio et al (2017) showed that households with higher education participated more and longer in the labor market, contributing more to the public system with higher contributions and taxes and depending less on public transfers over the life cycle. ECLAC (2011) also highlighted the importance of investment in human capital, stronger financial systems, and mechanisms to encourage an increase in the savings rate.

In sum, Brazilian demography has affected the economy through channels such as the relative aging of the population, the epidemiological transition and the educational transition, which reinforces the importance of the generational perspective, especially in public finances. With the end of the demographic bonus, the future scenario will probably imply more acute economic challenges in terms of fiscal sustainability in an aging population whose life cycle deficit among the elderly is financed mainly by the public sector and whose labor force will show a future downward trend, which tends to imply lower tax revenues. Investing in education for today's children seems to be a good public policy option to increase the productivity of a future population of relatively lower working age.

Finally, this paper presented limitations. The projection exercises of the life cycle deficit did not consider the Social Security Reform in 2019, nor changes in future economic conditions. We also did not consider public servants' pensions in the accounting, given the formal guidelines for compiling the manual. Finally, the demographic bonus here assumes a more simplistic definition based on the demographic dependency ratio rather than the economic dependency ratio.

Thus, the future research agenda on this topic could include economic (producers versus consumers) and fiscal (taxpayers versus benefit recipients) dependency ratio calculations, fiscal projection with economic and demographic scenarios, and the construction of time series of the National Transfer Accounts. In addition, opening and analyzing private transfers could help understand specif-

11 Measures to narrow the gender gap could include (1) investing in female schooling, (2) instituting family leave policies for employed mothers, and (3) fighting gender discrimination in the workplace (CELADE, 2013).

ic mechanisms such as the relationship between high public transfers to the elderly and high private transfers from the elderly to younger generations of the family. Mason et al (2015) have classified Brazil as a poster child for this type of compensatory substitution between public and private transfers.

Conclusion

This research presented the compilation of the National Transfer Accounts for Brazil in 2018, according to the international standards of the United Nations NTA 2013 Manual. The effort enabled the harmonization of the statistics with the National Accounts and the official population estimates. In this way, the results allowed the analysis of the flow of intergenerational transfers and the demographic influence on the economy through statistics compatible with official national statistics. In particular, the compilation allowed the measurement and analysis of public spending on children, the working-age population, and the elderly by resource use (education, health, social security, and others). On the one hand, the end of the demographic bonus and the increase in the proportion of elderly people in the coming decades have revealed economic challenges in the face of the downward trend in the working-age population and the increase in public spending on consumption by the elderly. On the other hand, the decrease in the child population opened the opportunity for an educational bonus that would allow for an increase in educational investment per student, which could increase the productivity of the future labor force and facilitate public transfer policies. In summary, the research highlighted the importance of measuring, analyzing, and tracking fiscal statistics in the generational approach in a potentially older society with a smaller proportion of working-age people and a greater reliance on public transfers for the elderly.

References

ABIO, G.; PATXOT, C.; RENTERÍA, E.; SOUTO, G. Intergenerational transfers in Spain: the role of education. Review of Public Economics, 223-(4/2017): 101-130, 2017.

ALVES, J. E. D. Crise no mercado de trabalho, bônus demográfico e desempoderamento feminino. In: ITABORAI, N. R.; RICOLDI, A. M. (org.). How far did the gender revolution go in Brazil? Belo Horizonte: Abep, 2016.

ALVES, J. E. D. Demographic transition, aging, and welfare reform. Cadernos adenauer XIX, 2018

ALVES, J. E. D. Demographic bonus in Brazil: from late birth to early death by Covid-19. R. bras. Est. Pop. , v.37, 1-18, e0120, 2020.

ALVES, J. E. D.; VASCONCELOS, D. S.; CARVALHO, A. A. Age structure, demographic bonus and economically active population in Brazil: long-term scenarios and their implications for the labor market. Brasília, DF: Cepal/Ipea 2010 (Textos para discussão Cepal-Ipea, 10).

AMARAL, E.F.L.; RIOS-NETO, E.L.G.; POTTER J.E. Long Term Influences of Age-Education Transition on the Brazilian Labor Market. Bull Lat Am Res. 2012 July ; 31(3): 302-319, 2012.

ARNOLD, J. 'Pension reform alone won't be enough,' says OECD economist. CNN, Daniela Fernandes, BBC News Brazil, Paris, January 7, 2019. Available at: https://www.bbc.com/portuguese/brasil-46682456 . Accessed on: 17 September 2022.

BARRETO, M. L.; CARMO, E.H.C. Padrões de adoecimento e de morte da população brasileira: os renovados desafios para o Sistema Único de Saúde. Ciência & Saúde Coletiva, 12(Sup):1779-1790, 2007.

BLOOM, D. E.; WILLIAMSON, J. G. (1998). Demographic transitions and economic miracles in emerging Asia. World Bank Economic Review, 12, 419-455, 1998.

CARVALHO, J.A.M.; WONG, L.R. A window of opportunity: some demographic and socioeconomic implications of the rapid fertility decline in Brazil. Belo Horizonte : UFMG/Cedeplar, 36p, 1995.

CELADE. Brazil's Ageing Future - Turning points and policy options: a look towards 2040 and beyond. Population Division of ECLAC, no. 2, 2013.

CUARESMA, J. C.; LUTZ, W.; SANDERSON, W. Is the demographic bonus an education bonus? Demography, 04 December 2013.

DUDA-NYCZAK, M. Demographic transition and achieving the SDGs in Latin America and the Caribbean: a regional overview of the National Transfer Accounts, Population and Development series, No. 135 (LC/TS.2021/146), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2021.

ECLAC (Economic Commission for Latin America and the Caribbean) Population ageing, intergenerational transfers and social protection in Latin America and the Caribbean, Project Documents collection, Santiago, Chile, United Nations, 2011.

FILHO, F.H.B.; TURRA, C.M.; NETO, A.A.M.F. Brazil's demographic transition and its effect on public spending. Ageing and fiscal challenges across levels of government, OECD, 2020.

GOIS, A. The demographic educational bonus. In: Cairo+20 perspectivas de la agenda de población y desarrollo sostenible después de 2014, Serie investigaciones, n. 15, 2014.

HAMMER, B.; FURNKRANZ-PRSKAWETZ, A.; GÁL, R.I.; VARGHA, L.; ISTENIC, T. Ageing Europe - an application of national transfer accounts for explaining and projecting trends in public finances. 2016.

IBGE (BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS). System of national accounts - reference year 2010, 3rd edition. Serie Relatórios Medologicos, Rio de Janeiro, 2016.

IBGE (BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS). Public Finance Statistics and Intermediate Government Account: Brazil 2019. Technical notes. National Accounts, number 74, Rio de Janeiro, 2020.

IBGE (BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS). Population projections, 2018. Available at: https://www.ibge.gov.br/estatisticas/sociais/populacao/9109-projecao-da-populacao.html?=&t=resultados. Accessed on: September 17, 2022.

KILSZTAJN, S.; ROSSBACH, A.; CAMARA, M.B.; CARMO, M.S.N. Serviços de Saúde, Gastos e Envelhecimento da População Brasileira, XIII Encontro da Associação Brasileira de Estudos Populacionais, held in Ouro Preto, Minas Gerais, 2002.

LEE, R.; MASON, A. What is the demographic bonus? Finance & Development, International Monetary Fund, Volume 43, n. 3, 2006.

LEE, R.; MASON, A. Cost of aging. Finance & Development, March 2017.

LEE, Ronald, Sang-Hyop LEE and Andrew MASON. "Charting the economic lifecycle" in A. Prskawetz, D. E. Bloom and W. Lutz, Population Aging, Human Capital Accumulation, and Productivity Growth, a supplement to Population and Development Review 33. (New York, New York: Population Council), pp. 208-237, 2008.

LEITE JÚNIOR, A. D. Renda Nacional - Teoria (free-doctoral dissertation). Rio de Janeiro: UFRJ, Sept. 1948.

MASON, A. Demographic transition and demographic bonus in developed and developing countries, 2005.

MASON, A.; Lee, R.; DONEHOWER, G.; LEE, S.; MILLER, T.; An-Chi TUNG; CHAWAL, A. National Transfer Accounts Manual, vol. 1.0, NTA Working Papers 09-08, 2009a.

MASON, A. , R. LEE, A. TUNG, M. Sim LAI ; Tim MILLER. "Population aging and intergenerational transfers: introducing age into national income accounts" in David Wise, ed., Developments in the Economics of Aging (Chicago: National Bureau of Economic Research; University of Chicago Press), pp. 89-122, 2009b.

MASON, A.; LEE, R. STOJANOVIC, D.; ABRIGO, M.; AHMED, S.A. Aging and the changing nature of intergenerational flows: policy challenges and responses, NTA Working Paper WP16-02, 2015.

MILLER, T.; CASTANHEIRA, H.C. The fiscal impact f population aging in Brazil: 2005-2050. R. bras. Est. Pop. , Rio de Janeiro, v. 30, Suppl., p. S5-S23, 2013.

NETO, J.H.; FORTE, C.M. The system of national accounts: historical evolution and implementation in Brazil. Revista Econômica, volume 18, number 1, jun.2016.

NTA (NATIONAL TRANSFER ACCOUNTS PROJECT). Country summaries, 2022. Available at: https://www.ntaccounts.org/web/nta/show/Country%20Summaries . Accessed on: September 17, 2022.

UNO (UNITED NATIONS ORGANIZATION). Statistical Commission. System of national accounts 2008. New York. 662 p. Prepared under the auspices of the United Nations, European Commission, International Monetary Fund - IMF, Organisation for Economic Co-operation and Development - OECD and World Bank, 2009.

UNO (UNITED NATIONS ORGANIZATION). National Transfer Accounts Manual: measuring and analyzing the generational economy, United Nations, New York, 2013.

UNO (UNITED NATIONS ORGANIZATION). Historic Versions of the System of National Accounts. Available at: system of national accounts. Accessed September 17, 2022.

QUEIROZ, B.L.; TURRA, C.; PEREZ, E. The Opportunities We Cannot Forgo: Economic Consequences Of Population Changes In Brazil. Icfai's Professional Reference Book: The Demographic Bonus: Economic Consequences, 2008.

SCHRAMM, J.M.A.; OLIVEIRA, A.F.; LEITE, I.C.; VALENTE, J.G.; GADELHA, A.M.J.; PORTELA, M.C.; CAMPOS, M.R. Transição epidemiológica e o estudo de carga de doença no Brasil Ciência & Saúde Coletiva, vol. 9, núm. 4, 2004, pp. 897-908. Brazilian Association of Graduate Studies in Collective Health, Rio de Janeiro, Brazil, 2004.

SOARES, S. S. D. O bônus demográfico relativo e absoluto no acesso à escola, Discussion text, No. 1340, Instituto de Pesquisa Econômica Aplicada (IPEA), Brasília, 2008.

TURRA, C.M. Generational accounting: wealth, transfer systems and consequences of changes in the Brazilian demographic pattern. Master's Thesis in Demography. Belo Horizonte: Cedeplar, 2000.

TURRA, C.M. and RIOS-NETO, E.L.G. Integenerational accounting and economic consequences of aging in Brazil. Paper presented at the General Population Conference, IUSSP, Salvador, Brazil, 2001.

TURRA, C.; QUEIROZ, B. Intergenerational transfers: an international analysis. Revista Brasileira de Estudos de População, 22(1), 2005.

TURRA, C.; QUEIROZ, B.L. Before it's too late: Demographic Transition, Labor Supply and Social Security Problems in Brazil. United nations expert group meeting on social and economic implications of changing population age structures, 2005a.

TURRA, C.; QUEIROZ, B. Before it's too late: demographic transition, labor supply, and social security problems in Brazil. In: United Nations Expert Group Meeting on Social and Economic Implications of Changing Population Age Structures. United Nations, 2005b.

TURRA, C.; QUEIROZ, B. Intergenerational Transfers and Socioeconomic Inequality in Brazil: a first look, Notas de Poblacion, 80, 2005c.

TURRA, C.; QUEIROZ, B.L.; RIOS-NETO, E.L.G. Idiosyncrasies of intergenerational transfers in Brazil, Chapters, in: Ronald Lee & Andrew Mason (ed.), Population Aging and the Generational Economy, chapter 21, Edward Elgar Publishing, 2011.

TURRA, C.M.; QUEIROZ, B.L.; RIOS-NETO, E.L.G. Idiosyncrasies of intergenerational transfers in Brazil. In: Population Aging and the Generational Economy - a Global Perspective, 2011.

TURRA, C.M.; QUEIROZ, B.L.; MASON, A. New estimates of intergenerational public transfers for Brazil: 1996-2011, NTA/World Bank project: Aging and the Changing Nature of Intergenerational Flows in Developing Countries, 2015.

TURRA, C.M. Os ajustes inevitáveis da transição demográfica no Brasil. In: ANDRADE M.V. and ALBUQUERQUE E.M. (ed). Alternativas para uma crise de múltiplas dimensões. Population and Economy Collection. CEDEPLAR/UFMG, 2018.

TURRA, C.M.; FERNANDES, F. Demographic transition - Opportunities and challenges to achieve the sustainable development goals in Latin America and the Caribbean. Project documents. ECLAC - United Nations, 2020.

VANZELLA, E.; Nascimento, J.A.; Santos, S.R. Aging, the epidemiological transition of the Brazilian population and the impact on hospitalizations. REV ELET ESTÁCIO SAÚDE, Volume 7, Number 1, 2018.

Appendix - Data Sources for Compilation

Account Name	Source of Monetary Value	Source of Age Standard Per Capita
Life Cycle Deficit		
Consumption		-
Public consumption	SCN	-
Public consumption. Education	SCN	POF and INEP
Public consumption. Health	SCN	DATASUS
Public consumption. Others without Education and Health	Balancing Account	Uniform distribution
Private Consumption	SCN	-
Private consumption. Education	SCN	POF
Private consumption. Health	SCN	POF
Private consumption. Others without Education and Health	Balancing Account	POF
Minus: Labor income		
Remuneration	SCN	POF
Income from self-employment	SCN	POF
Relocations		
Transfers		
Public Transfers	SCN	
Public transfers, inflows	SCN	
Public transfers, outflows	SCN	
Public transfers. Education		
Public transfers. Education, inflows	SCN	POF and INEP
Public transfers. Education, outflows		POF
Public transfers. Health		
Public transfers. Health, inflows	SCN	DATASUS
Public transfers. Health, outflows		POF
Public transfers, Social Security		
Public transfers. Social Security, inflows	AEPS	POF
Public transfers. Social security, outflows		POF
Public transfers. Others in currency		-
Public transfers, Other in currency, inflows	Balancing Account	Uniform distribution
Public transfers. Others in currency, outflows		POF
Public transfers. Others in cash		-
Public transfers. Others in cash, inflows	Balancing Account	POF
Public transfers. Others in cash, outflows	Balancing Account	POF

Private Transfers	SCN	
Asset-based reallocations	SCN	-
Asset-based relocations	SCN	
Public Income Assets		POF
Minus: Public Savings		POF
Asset-based private relocations	SCN	-
Private Income from Assets	SCN	-
Private capital income companies and non-profit institutions	SCN	POF
Private income from owner-occupied housing	SCN	POF
Private property income	SCN	POF
Minus: Sifted Savings	SCN	Balancing Account

Note: the Consumption of Fixed Capital of companies and ISLSF is a balance account embedded in private capital income

AEPS = Yearbook of Social Security

SCN= National Accounts System

Source: own elaboration based on data from IBGE, MSe INEP.