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Is Government a Good Investment? Public Transfers for Filipino Generations Born in 1950 to 2020

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Abstract

We present a new comprehensive and consistent set of public transfer accounts disaggregated by age and by major government programs that spans from 1950 to 2020. Based on these public transfer accounts, we find that except for some programs, particularly social health insurance and old-age pensions, the Philippines' public transfer system as a whole is fiscally sustainable with cumulative lifetime net contributions due to government across cohorts. The implied rates of return from key social protection programs also approximate market interest rates, especially when these programs are taken together, which suggests that the country's public transfer system closely mimics competitive market outcomes.

Keywords: public sector, demographic change, National Transfer Account, intergenerational transfers, intergenerational equity, fiscal sustainability

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Is Government a Good Investment? Public Transfers for Filipino Generations Born in 1950 to 2020

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and Kean Norbie F. Alicante^{2,3}*

1. Introduction

The public sector plays various important roles in the economy. One of these functions includes addressing issues that arise from missing or inefficient markets that could otherwise result in suboptimal economic decisions and thus poorer welfare outcomes. This notion is evident in the case of education and old-age pensions.

The inconsistency between the timing of peak labor productivity and income on one hand and the need for child investments and old-age consumption on the other requires a mechanism to reallocate resources across an individual's lifetime or among generations. In a first-best setting, there exists a capital market from which children may borrow that permits them to invest on their human capital and consequently raises their future labor productivity. These loans are eventually paid off at efficient market interest rates when these children enter the labor force during their prime-age. With perfect foresight, these now-prime-age adults can then also optimally invest or save for their old-age consumption.

But reality is much more complex. Capital markets are not likely to loan to children for many different reasons, including the uncertainty in future returns to human capital spending. Adults, on the other hand, may invest or save below their future requirements due to information failures or other economic biases.

One suggestion to deal with this time inconsistency and missing capital markets issue is to institute a two-armed welfare state program where prime-age adults pay for the education of children, and these children, during their prime-age, eventually contributes to the old-age pension of then-prime-now-elderly cohorts. This argument dates at least as far back as Pogue and Sgontz (1977) but argued more popularly by Becker and Murphy (1988), and later formalized in Boldrin and Montes (2002).

Surely, there are alternatives to this mechanism that do not necessarily require government, such as those by Kotlikoff and Spivak (1981), which involves risk pooling within households. However, the state may be in a particular position to enforce such inter-generational arrangements, which may not be as straightforward in the case of households. Further, there may be other considerations for adopting these different social protection programs (e.g. Cutler and Johnson, 2004), but, as argued by Boldrin and Montes (2002), regardless of the reasons, designing such intergenerational arrangements may actually mimic first-best outcomes.

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In this paper, we employ a new comprehensive and consistent set of macroeconomic accounts that spans seven decades to capture the incidence of public transfer flows across and within age groups. Estimation of these accounts follows the National Transfer Accounts (NTA) framework, which is in line with the United Nations System of National Accounts. Using these historical accounts, we characterize public transfer reallocations in the Philippines. We also employed a simple projection exercise to assess the fiscal sustainability and generational equity implications of the country's public transfer system.

Over the last seventy years, public transfers in the Philippines has grown by leaps and bounds, increasing by about 6 percent per year on average since 1950. While some government programs, particularly old-age pensions and social health insurance, are not fiscally sustainable as a result of cumulative lifetime net deficits for government, the country's public transfer program as a whole is. In addition, the implied returns to these public transfer programs closely approximate market interest rates, particularly for some bundles of social protection initiatives, which suggests that transfers-based public reallocations in the country is efficient.

The Philippines is an interesting case. Over our study period, the government introduced key social protection programs that has ultimately evolved into today's institutions. In the aftermath of World War (WW) II, the American colonial government transferred control over a centralized public school system created in the early 1900s to the new Philippine government. Separate old-age pension systems for private and public sector employees were instituted in the 1950s. In the 1970s, social health insurance was introduced. The estimates we present here allows us to track these and other public transfer reforms through the age schedule of taxes and contributions paid and public benefits received by different population cohorts.

There are ultimately winners and losers in any public transfer system. Based on our estimates of lifetime public transfer flows, the millennial generation, i.e., those born in the 1980s and 1990s, appears to be somewhat disadvantaged, while the generation Z, i.e., those born in the 2000s and 2010s, emerges to be clear winners or at least not worse off compared with other generations. These results are largely in line with results by Bommier, et al. (2010), in the case of US population, and Sanchez-Romero, et al. (2019), in the case of the Austrian, Spanish and French populations, who find that net contributions of some generations are greater than others, especially among post-WWII generations.

The rest of the study is organized as follows. In the next section, we provide a general description of the data and our estimation procedure in coming up with public transfer accounts for the Philippines based on NTA. This is then followed by a discussion of NTA period estimates spanning 1950 to 2020. In Section 4, we focused on public transfer flows to different cohorts. Finally, we conclude with a summary and some policy implications in the last section.

2. Data and estimation

Historical data on aggregate public transfer flows were collected from a variety of sources, including: the Philippine Statistics Authority's (formerly National Statistical Coordination Board's) Philippine Statistical Yearbook; the Department of Budget and Management's National Expenditure Program, Budget of Expenditures and Sources of Financing, and Fiscal Statistics Handbook; the Department of Finance's Revenue Collection Statistics and Local Government Finance Statistics; the Congress' annual General Appropriations Act;

Commission on Audit's annual audit reports; and the annual financial reports of government corporations, including the Social Security System (SSS), the Government Service Insurance System (GSIS), and the Philippine Health Insurance Corporation (PhilHealth), among others.

These aggregate statistics are combined with the PSA's Consolidated, and Income and Outlay Accounts to compile a detailed set of public transfers accounts that is consistent with the National Transfer Account (NTA). The NTA is an accounting framework that measures financial flows within and among generations, represented by different age groups or cohorts, in an economy in a manner aligned with the United Nations (UN) System of National Accounts (UN, 2013). Unlike in the UN SNA that reckons transactions among government, households and private corporations as primary economic agents, the NTA records flows of resources across population age groups with the public and private sectors only mediating these flows.

NTAs has been estimated in more than 80 countries and territories by country teams around the world with estimates for about 40 additional countries compiled based on international data (Mason, et al., 2017). Historical NTA estimates for the Philippines are presented in Abrigo, et al. (2020), which has been used in recent analyses of social health insurance (Abrigo, 2020), and education and health financing (Abrigo, et al., forthcoming; Abrigo, 2021), among others.

The age-specific incidence of public transfers is calculated directly from administrative data whenever available, but are otherwise estimated from nationally representative surveys, particularly the matched Labor Force Survey (LFS) and Family Income and Expenditure Survey (FIES) and the National Demographic and Health Survey (NDHS). For example, the social health insurance benefits per capita age schedules are calculated directly from special tabulations by the PhilHealth, while per capita public in-kind health benefits are estimated from public health facility utilization by age from the NDHS. Education spending by school level, on the other hand, is allocated equally among public school students estimated from the matched LFS-FIES. Taxes due to returns to capital or its ownership are assigned to household heads who we assume to own these properties following standard NTA practice.

In many instances, especially for earlier years, details of aggregate public accounts are either not available or readily comparable with other historical estimates. In such cases, we harmonize, fill-in, or back-cast these accounts based on simple assignment rules, such as using only the public transfer records available for larger government departments or using ratios relative to known quantities. Similarly, for missing per capita age profiles, we linearly interpolate between years with available estimates, or keep the shape of the most recent available age profile estimate as has been done elsewhere (e.g. Bommier, et al., 2010). In each of these subaccounts, the resulting per capita age profiles are adjusted using subaccount- and year-specific constant multiplicative factors to achieve aggregate consistency. Details of the estimation procedures are outlined in the NTA Manual (UN, 2013).

As may be obvious from the description above, the public transfer accounts that we compiled from government data suffer from a variety of limitations and shortcomings that need to be recognized and considered intently in interpreting our results.

First, the estimates are not exact and with quality that depends intrinsically on the different data points and imputation techniques utilized. While we strive to compile the public transfer accounts from the most authoritative data sources, many records are not available or are categorized differently across years that required expert judgment on what records to consider or which imputation techniques to employ. Further, the National Accounts on which the NTA

is based also employs varying extent of imputation (UN, 2009), which may differ across years depending on available information. In any case, we followed the guidance in the NTA Manual (UN, 2013) whenever applicable to limit researchers' degrees of freedom.

Second, we only consider current transfers and exclude capital expenses or benefits, resulting in estimates representing a smaller subset of the whole government operations. We also exclude other current transfers not directly attributable between government and other sectors to limit the influence of evolving protocols in the SNA adopted by the Philippine government. On average, our estimates capture 66.7 percent of total government current expenses and 84.4 percent of total public revenues recorded in the Philippine SNA across years. Relative to aggregate public transfers, these accounts represent 92.3- and 95.2-percent of total government inflows and outflows, respectively. When combined, these result in generally positive public sector primary balance, which are higher when compared with official statistics, such as those presented in Debuque-Gonzales, et al. (2022).

Third, the public transfer accounts only capture direct financial flows arising from government transactions. It excludes, for instance, the potential productivity benefits from public education or from capital spending, or the possible foregone private opportunities from taxation, which may be important in a holistic cost-benefit assessment of government operations.

Notwithstanding these limitations, we provide a comprehensive and consistent historical public transfer accounts series spanning from 1950, in the immediate post-world war Philippines, to 2020, in the early years of the fourth industrial revolution. Separate estimates are available for education, health, and old-age pension benefits, and public taxes and contributions by broad classes, which vary quite significantly across the economic lifecycle.

3. Public transfers in the Philippines, 1950-2020

The decades during and following the post-WWII reconstruction in the Philippines had seen the rise of important social protection programs that have persisted and ultimately evolved into the country's present-day institutions.

In the early 1900s, the American colonial government introduced a centralized public school system that it had relinquished to the new Philippine government after WWII. Basic education in the public school system is generally provided for free or at minimal tuition expense when available, but it was not until in 1987 that primary education was made compulsory. Major reforms had been introduced over the last decade, including making preschool education mandatory, and expanding the basic education cycle from ten years of basic education to include one year of preschool education, six years of primary level education, and six years of secondary level education. Free public tertiary education was eventually introduced in 2017.

At the public health front, the national government had virtually universal control over the provision of government health services until 1991, when several government functions, including primary care and some hospital services, were devolved to local governments. Social health insurance (SHI) was introduced in 1969, however, only the program covering employees in the formal sector flourished. The country's SHI was reorganized in 1995 into what is now the PhilHealth that was tasked to achieve universal coverage within 15 years of its creation. But this goal was not achieved until more recently with the mandated national government-funded fully subsidized SHI coverage for the poor, the elderly and other select sectors

successively introduced in the early 2010s, and the mandated immediate eligibility of all Filipinos under the Universal Health Care Law in 2019.

The current pay-as-you-go (PAYGO) old-age pension systems were initiated in the early 1950s. The pension fund for government employees was established in 1951 with the GSIS service expansion, which originally only included a life insurance program in 1937 but later also disability and survivorship benefits. The establishment of an old-age pension system for those employed in the private sector soon followed in 1954. In 2010, Congress legislated a means-tested non-contributory social pension program for the indigent elderly population funded as part of the national government budget through general taxation.

Contributions to these PAYGO systems, including that for SHI, developed with the demand for these services. These reforms often include increasing the contribution rates or the contribution ceilings to meet the rising pension benefits requirement. The tax system has also undergone important changes over the years, including recent reforms that lowered income tax rates, simplified taxes on labor and employment, expanded the value-added tax base, and increased taxes on selected products, among others.

These significant developments in the country's public transfer system are captured in Figure 1, which presents per capita public transfer benefits received, and taxes and contributions paid by single-year age groups for three representative periods, namely, 1950, 1985 and 2020. The figure shows the expansion of public transfer benefits received, particularly for education, health and old-age pension, by different population cohorts in these particular cross-sections (Panel B). Alongside these are developments in the social contributions and the different taxes paid to the government (Panel C).

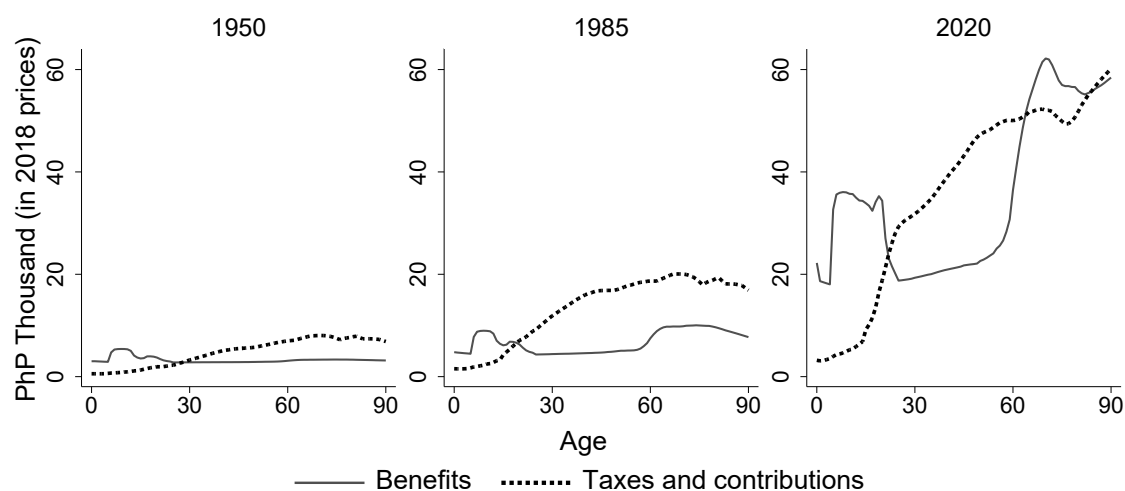
Over the last seven decades, per capita benefits received by the elderly have surpassed those by younger generations primarily due to the expansion in old-age pension and social health insurance programs, together with the contributions for these entitlements. Taxes paid per person also increased considerably across all age groups since the 1950s.

These developments in public sector finance have happened in a period when the Philippines is also undergoing dramatic demographic shifts in size and in age composition. The Philippine population in 1948 was only 19 million. This has more than tripled to 60.7 million in 1990, breached 100 million in 2015, and then further increased to almost 110 million by 2020. Over this period, the country's total fertility rate has gone down from about seven children per woman in the 1950s to about five in the 1980s then inched closer to three in the early 2010s before finally settling to below replacement fertility by 2022. Together with increasing longevity, this has resulted in a slow but steady demographic transition.

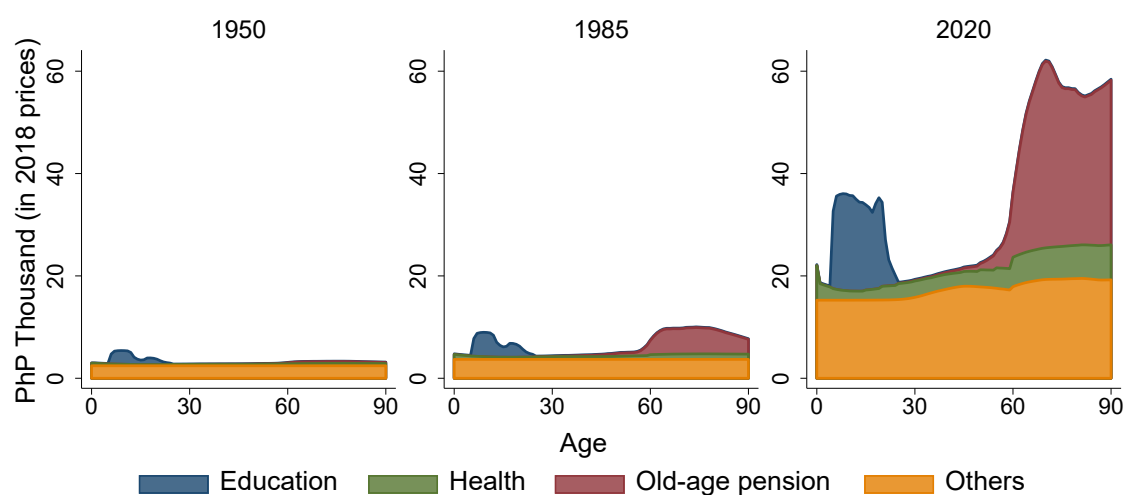
The interaction between the country's demography and its public transfer system is evident in Figure 2, which shows the aggregate benefits received, and taxes and contributions paid by Filipinos over the last seventy years. Despite the large per capita old-age benefits received by the elderly relative to public education benefits received by the younger population in more recent years, for example, the sheer size of younger cohorts means that aggregate public education spending dwarfs total spending on old-age pension during this period. Indeed, the flow of public transfers in the last seven decades has generally been to younger cohorts, with the average age of public transfer inflow ranging from around 20 years in the 1950s to the 1990s then moving closer to 30 years by 2020, while the average age of public transfer outflows hovering around 35 to 40 years since the 1950s.

Figure 1. Per capita public transfers by age and selected calendar year

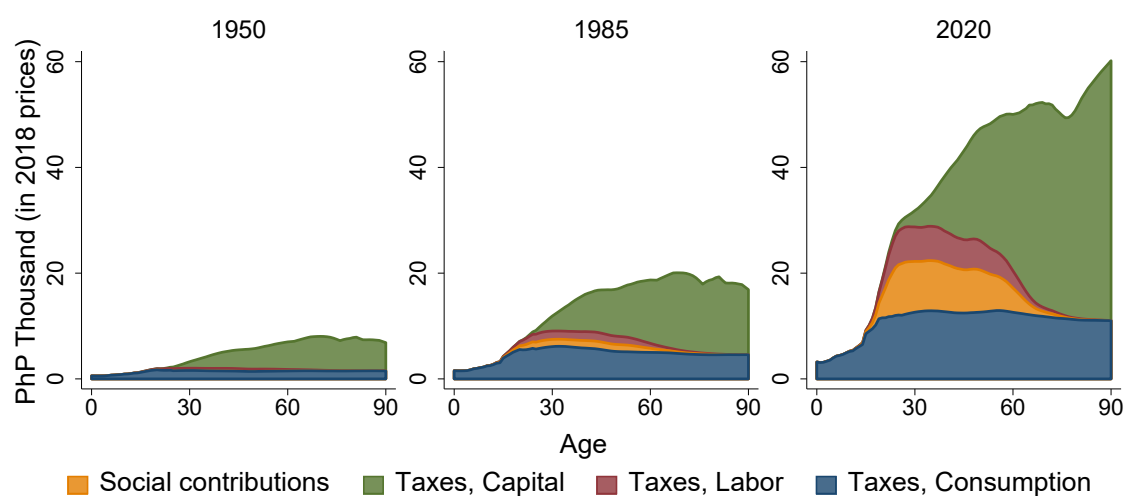
A. All taxes paid and benefits received



B. Taxes paid by broad classes



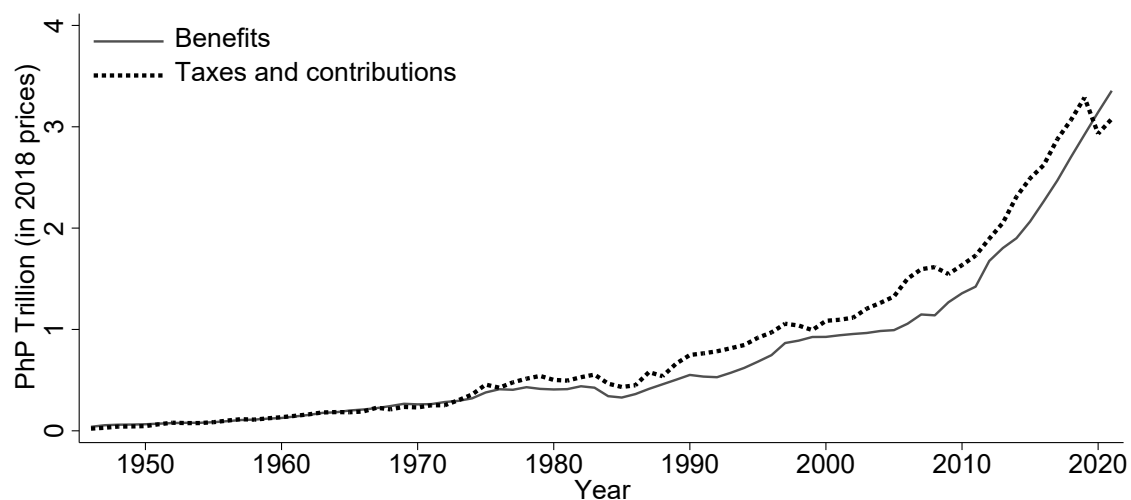
C. Benefits received by broad classes



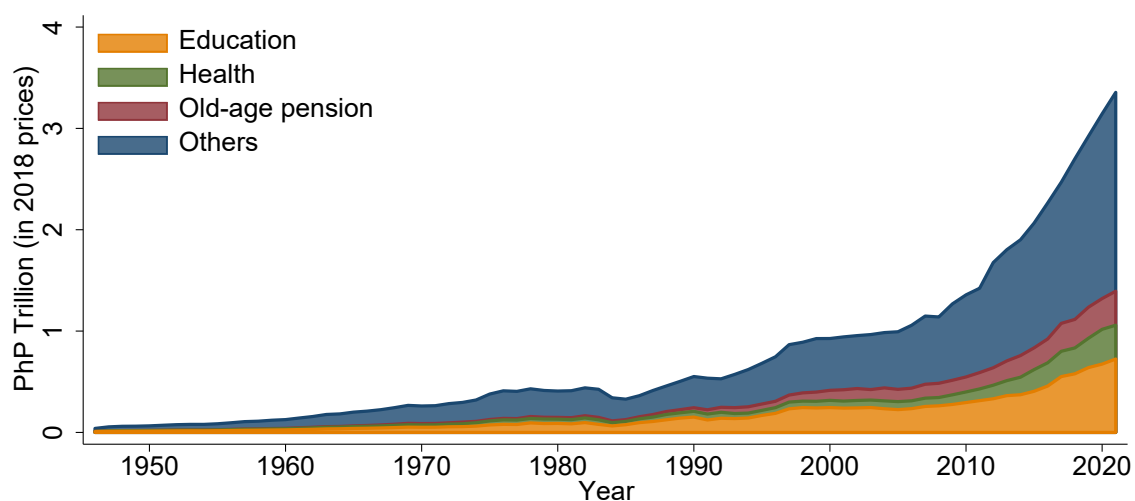
Source: Authors' calculations.

Figure 2. Aggregate public transfers: Philippines, 1950-2020

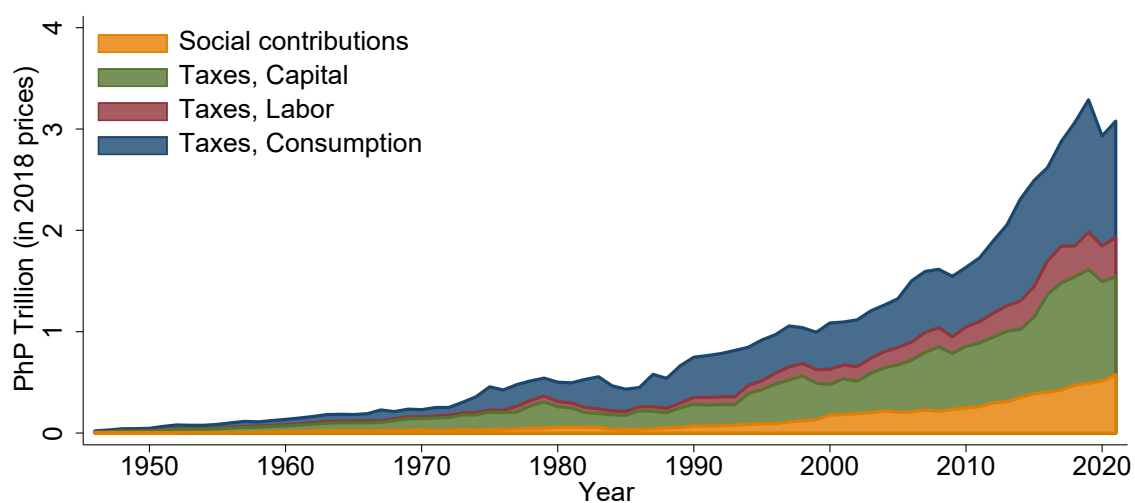
A. All taxes paid and benefits received



B. Taxes paid by broad classes



C. Benefits received by broad classes



Source: Authors' calculations.

Table 1. Aggregate public transfers as share of GDP (%), 1950-2010

	1950	1960	1970	1980	1990	2000	2010	2020
Benefits	8.1	8.7	9.8	9.6	10.9	12.6	11.4	18.4
Education	1.6	1.7	1.9	2.1	3.0	3.3	2.5	3.9
Health	0.8	0.8	0.9	1.0	1.1	1.0	0.9	2.0
Old-age pension	0.1	0.2	0.5	0.4	0.7	1.3	1.2	1.8
Others	5.6	5.9	6.5	6.1	6.1	6.9	6.8	10.6
Taxes and contributions	5.8	9.2	8.6	11.8	14.8	14.7	13.7	17.1
Taxes and fees	5.8	8.3	7.5	10.5	13.5	12.3	11.6	14.1
Social contributions	0.0	1.0	1.1	1.3	1.4	2.4	2.1	3.0

Source: Authors' calculations.

The public transfer system has become a more prominent feature of the economy since WWII as shown in Table 1. In 1950, aggregate benefits, and taxes and contributions by Filipinos respectively represented only 8.1- and 5.8-percent of the country's Gross Domestic Product (GDP). These shares have more than doubled to 18.4 percent for benefits and 17.1 percent for taxes and contributions by 2020. Interestingly, the Philippine's public education and health spending as shares of GDP are below recommended international thresholds,⁴ although it must be emphasized that the figures we present exclude capital spending.

The annual growth in the aggregate taxes and contributions collected and the aggregate benefits paid by government had slowed down in the 1990s compared with earlier years, but has picked up in the last decade. Between 2010 and 2020, annual growth in total taxes and contributions paid increased by about 6 percent while that for total benefits received by about 8- to 9-percent. In contrast, the annual growth in both these aggregate accounts had been only at 4 percent between 1980 and 2010 from around 8 percent for total taxes and contributions paid and around 6 percent for total benefits received between 1950 and 1980.

The sources of these growth vary across period and by broad classes of these public transfer flows, which we summarize in Table 2.⁵ Population growth has been an important contributor in aggregate public transfer flows over the last seven decades, but its prominence has been waning through the years. In the 1950s, for example, population growth contributed upwards of two-fifths of public transfers growth, reaching as much as two-thirds for some subaccounts, but comprised only less than a third in the 2010s.

During the same period, changing per capita levels, i.e., rate effect, potentially in response not only to policy but also to prevailing economic conditions, generally dominates over other sources of aggregate growth in the public transfer system. The demographic transition, characterized by changes in the population age distribution, on the other hand, is estimated to have had sizeable but only secondary role in explaining the annual growth in these public transfer accounts for the periods we covered.

⁴ The Incheon Declaration recommends government education spending to be around 4% to 6% of GDP, while McIntyre, et al. (2017) recommends government health spending to be at least 5% of GDP based on several health sector targets.

⁵ We employed a Kitagawa-Oaxaca-Blinder decomposition to separate the contribution of changing population size, population age distribution, and per capita levels in annual growth of aggregate taxes and contributions paid and of aggregate benefits received across decades since 1950.

Table 2. Aggregate labor income and public transfers growth decomposition, 1950-2010

	1950s	1960s	1970s	1980s	1990s	2000s	2010s
A. Overall growth (%)							
Labor income	5.6	6.1	4.9	1.6	4.4	4.6	3.7
Public transfer inflows							
Education	6.7	7.2	5.7	5.5	5.0	1.9	8.6
Health	6.7	7.2	5.9	3.1	2.3	3.9	12.6
Old-age pension	...	14.3	3.2	7.3	10.7	4.1	7.5
Others	6.7	7.2	4.1	1.7	5.2	4.7	8.4
Public transfer outflows							
Taxes and fees	5.3	2.5	5.5	1.8	0.5	2.3	3.9
Social contributions	...	4.4	4.2	-0.5	7.4	1.4	5.7
B. Population growth (%)	4.4	2.8	2.6	2.4	2.4	2.0	1.7
C. Per capita growth - Rate effect (%)							
Labor income	2.0	3.1	1.5	-1.4	1.3	1.9	1.3
Public transfer inflows							
Education	1.5	4.1	3.6	3.2	2.9	0.5	7.6
Health	2.2	4.5	3.2	0.7	-0.2	1.8	10.4
Old-age pension	...	10.2	-1.0	4.7	6.8	0.7	3.5
Others	2.2	4.4	1.5	-0.7	2.8	2.7	6.6
Public transfer outflows							
Taxes and fees	6.5	2.2	4.8	1.5	0.0	1.6	3.2
Social contributions	...	4.3	3.4	-1.0	6.8	0.9	5.1
D. Per capita growth - Age distribution effect (%)							
Labor income	-0.9	0.1	0.8	0.6	0.7	0.6	0.6
Inflows							
Education	0.7	0.3	-0.6	-0.2	-0.4	-0.5	-0.8
Health	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.3
Old-age pension	...	0.9	1.6	0.1	1.2	1.4	1.9
Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Outflows							
Taxes and fees	-1.0	0.3	0.7	0.4	0.6	0.6	0.8
Social contributions	...	0.1	0.8	0.5	0.6	0.5	0.5

Source: Authors' calculations. The decomposition method used is due to Kitagawa (1955), which was later independently reintroduced by Oaxaca (1973) and Blinder (1973).

4. Who wins?

Comparing returns to public transfer programs across different cohorts pose several conceptual and empirical issues. First, public transfers, by its nature, do not involve explicit *quid pro quo* arrangements between government and households for specific services to be provided by government in return for household contributions to the state. However, it may not be unreasonable to assume some implicit exchange between taxes and contributions paid and the kind and level of benefits households expect to receive. Second, calculating returns to public

transfer programs necessarily requires long a time-series of economic flows across cohorts who are yet to live the rest of their lifetime or whose histories are generally not known. Earlier studies, such as those by Bommier, et al. (2010) and Sanchez-Romero, et al. (2019), back- and fore-cast these values based on some reasonable assumptions or economic models that were carefully calibrated against historical values or official forecasts. Finally, identifying winners and losers necessarily entails selecting a measure on which to assess performance.

In the following analysis we compare the returns to public transfer programs across cohorts born between 1950 and 2020. We assume that the per capita schedules of public transfers by age in 2020 and beyond grow by 1.5 percent annually, which is below the historical average but provides a reasonable baseline for future analyses. We look at two measures, namely, fiscal sustainability and generational equity. We say that a public transfer program for a specific cohort is fiscally sustainable when the survival-adjusted lifetime net public transfers that the cohort receives is at most zero, which implies that contributions paid at least fully covers the benefits received across a representative lifetime. We say that the program is generationally equitable when the returns to these transfer programs approximates market interest rates, following the argument by Boldrin and Montes (2002) that capital markets when present may be a more efficient alternative form of the intergenerational reallocation mechanism that public transfer systems should aim to emulate.

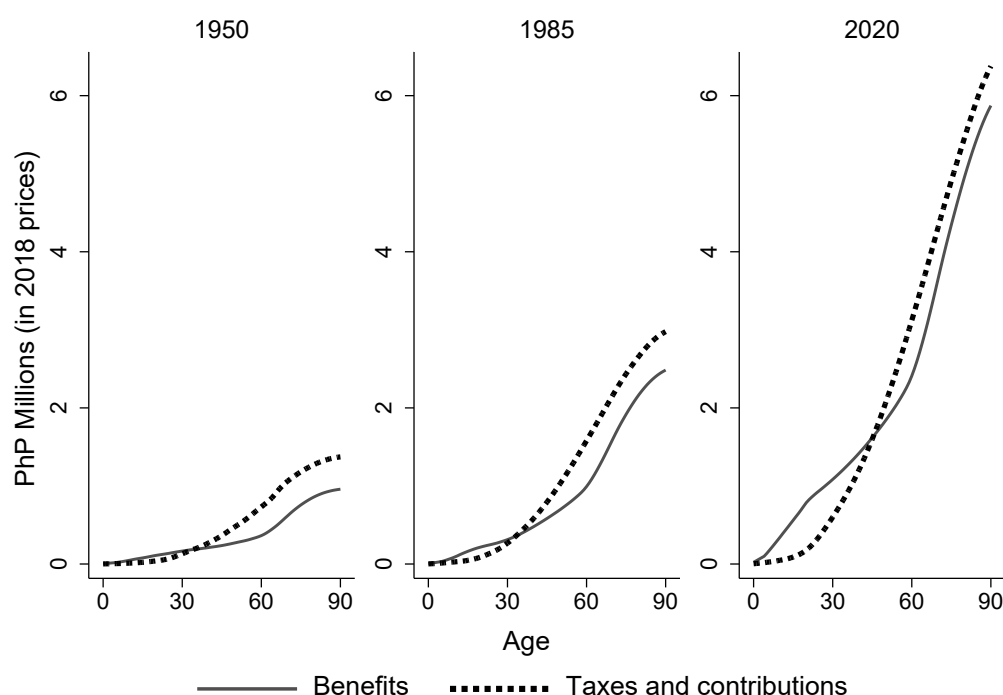
4.2. Fiscal sustainability

Figure 3 shows the survival-adjusted cumulative per capita benefits received and taxes and contributions paid by cohorts born in 1950, 1985 and 2020. Several observations are worth noting. First, lifetime flows have been increasing across cohorts. More specifically, younger cohorts are paying more to government, but are also receiving greater level of benefits. Second, the age of transition to being net contributors from being net beneficiaries has been shifting to the right, implying that younger cohorts enjoy net beneficiary status longer compared with older cohorts. Third, the survival-adjusted cumulative taxes and contributions paid by the end of the lifecycle is higher relative to the cumulative benefits received across these three birth cohorts, which indicates that the public transfer system is fiscally sustainable. However, fourth, the gap appears to be not constant across cohorts, suggesting that the net contribution per person of some cohorts are smaller or larger than others.

Table 3 disaggregates these survival-weighted lifetime net flows by selected social protection program, i.e., education, social health insurance, in-kind health service provision and old-age pension, averaged by decade of birth across cohorts. In addition to undiscounted net flows, we provide two sets of estimates using 3- and 6-percent as discount factors to respectively account for the opportunity of cost of time based on an estimated marginal rate of time preference⁶ and on prevailing market interest rates. We also provide values normalized relative to survival-weighted and discounted lifetime labor income per capita, which we assume to also grow by 1.5 percent per annum. For in-kind government-provided education and health services, we assumed that period expenses are fully funded through non-earmarked tax collections.

⁶ The marginal rate of time preference is calculated using the Ramsey formula (1928): $r = \rho + \theta g$, where ρ is a utility discount rate that reflects pure time preference, assumed to be 1.5% following Evans and Sezer (2004), and θ is the marginal utility of consumption, assumed to be 1 following Blundell et al. (1993) and Banks, et al. (1994). Per capita consumption growth g is assumed to be 1.5% annually, following recent per capita labor income growth in Table 2.

Figure 3. Cumulative per capita public transfers by age and selected birth cohorts



Source: Authors' calculations. Note: Estimates are adjusted by survival probability by age.

The net present values of public transfers as a whole and by program presented in Table 3 vary quite widely depending on the applied discount rate. For smaller discount factors, those born in the 1980s and 1990s, who are usually referred to as the millennial generation, are relatively disadvantaged compared with other cohorts. For higher discount rates, those born in the 2000s and 2010s, or more colloquially the generation Z, appear to be clear winners.

Based on undiscounted flows, in-kind programs for education and health create lifetime fiscal surplus, while the PAYGO social health insurance and old-age pension systems generate positive surplus for the different cohorts. These distinctions are less clear when using positive discount rates, where some birth cohorts are lifetime net contributors while others are lifetime net beneficiaries depending on the program.

These net benefits or contributions are quite substantial when normalized relative to the survival-weighted lifetime labor income across cohorts. With a six percent discount rate, each cohort expects to gain at least the equivalent of 2.4 percent of lifetime labor income, reaching upwards of 10 percent for generation Z cohorts, from the public transfer system. Under our maintained modest growth assumption, the generation Z cohorts are the apparent overall winners of the public transfer system when net flows are normalized against expected lifetime labor income regardless of the discount factor we apply.

Table 3. Cumulative discounted lifetime net benefit by cohort and program

	1950s	1960s	1970s	1980s	1990s	2000s	2010s
A. Level (PhP Thousands, 2018 prices)							
d = 0%							
All taxes and benefits	-237.7	-279.8	-363.7	-417.3	-524.0	-478.4	-450.9
Education	-121.1	-170.5	-240.7	-276.7	-341.9	-291.6	-254.6
Health, social insurance	9.9	12.7	13.4	10.1	9.1	8.7	10.1
Health, in-kind	-14.4	-17.0	-21.8	-21.7	-21.6	-14.8	-4.5
Old-age pension	101.4	134.0	182.0	226.2	328.3	465.0	668.4
d = 3%							
All taxes and benefits	-33.6	-41.3	-62.6	-70.2	-76.4	-0.2	96.4
Education	-13.2	-19.0	-28.0	-26.4	-29.5	23.7	82.1
Health, social insurance	0.8	0.9	0.4	-1.7	-3.2	-3.0	-0.9
Health, in-kind	-0.2	0.8	1.0	1.3	1.7	5.0	12.4
Old-age pension	3.5	2.2	-5.2	-16.0	-28.7	-28.2	-23.2
d = 6%							
All taxes and benefits	13.8	18.2	15.3	17.6	34.4	100.6	199.2
Education	4.7	6.2	7.8	14.9	21.6	60.6	108.1
Health, social insurance	-0.1	-0.1	-0.1	-1.1	-1.6	-0.8	2.3
Health, in-kind	2.3	3.8	4.8	5.0	5.1	6.9	12.7
Old-age pension	-3.4	-5.2	-11.1	-18.8	-30.5	-36.3	-42.4
B. Normalized (% of lifetime labor income)							
d = 0%							
All taxes and benefits	-5.6	-5.6	-5.7	-5.5	-5.6	-4.4	-3.5
Education	-2.9	-3.4	-3.8	-3.7	-3.7	-2.7	-2.0
Health, social insurance	0.2	0.3	0.2	0.1	0.1	0.1	0.1
Health, in-kind	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1	0.0
Old-age pension	2.4	2.7	2.9	3.0	3.5	4.3	5.1
d = 3%							
All taxes and benefits	-2.7	-2.9	-3.5	-3.3	-3.0	-0.1	2.7
Education	-1.1	-1.3	-1.6	-1.2	-1.1	0.8	2.3
Health, social insurance	0.1	0.1	0.0	-0.1	-0.1	-0.1	0.0
Health, in-kind	0.0	0.1	0.1	0.1	0.1	0.2	0.3
Old-age pension	0.3	0.2	-0.3	-0.7	-1.1	-0.9	-0.7
d = 6%							
All taxes and benefits	3.1	3.8	2.5	2.4	3.9	10.0	16.9
Education	1.0	1.3	1.3	2.0	2.4	6.0	9.2
Health, social insurance	0.0	0.0	0.0	-0.1	-0.2	-0.1	0.2
Health, in-kind	0.5	0.8	0.8	0.7	0.6	0.7	1.1
Old-age pension	-0.8	-1.1	-1.8	-2.6	-3.4	-3.6	-3.6

Source: Authors' calculations. Note: Relevant per capita age profiles are assumed to grow at an exogenous rate of 1.5% per year beyond 2020. All values are discounted by cohort- and age-specific survival rates based on life tables by the United Nations (2022).

4.2. Generational equity

We calculate implied internal rates of return to the public transfer program as a whole and by program for each cohort in our study. In case of multiple implied rates of return, we select the relevant rate based on Hartman and Schafrick's (2004) decision rule that depends on the timing of positive and negative cash flows and the slope of the net present value function with respect to interest rate. We then compare these implied rates of return with market interest rates following Boldrin and Montes (2002). An efficient public transfer reallocation program is expected to result in rates of return that approximate market interest rates.

Figure 4 plots the implied internal rates of return for each selected social protection program (Panel A) and for bundles of these programs (Panel B) by birth cohort. For program bundles, we combine education and old-age pensions following Becker and Murphy (1988) and Boldrin and Montes (2002), and education, social health insurance and old-age pensions following Bommier et al. (2010). In these calculations, the implied borrowing rate is computed based on discounted values of public education services received and of contributions made for old-age pension (and social health insurance), while the implied lending rate is based on discounted taxes paid to cover education services and the amount of old-age pension (and social health insurance) received.

In these estimates, the rates of return from the public transfer system and its programs are all positive. However, within-program rates of return are generally below the market interest rates, and are declining in birth cohort for most programs, except for old-age pension (Panel A). Combining programs, on the other hand, results in implied borrowing rates that are much closer to market interest rates (Panel B). The implied lending rates, on the other hand, are increasing in birth cohort that approximate market rates only among recently born generations.

These results suggest that the Philippines' public transfer system and its programs, particularly for some bundles, are not very far off from efficient competitive market allocations. That is, these transfer programs approximate Pareto efficiency, and therefore generationally fair.

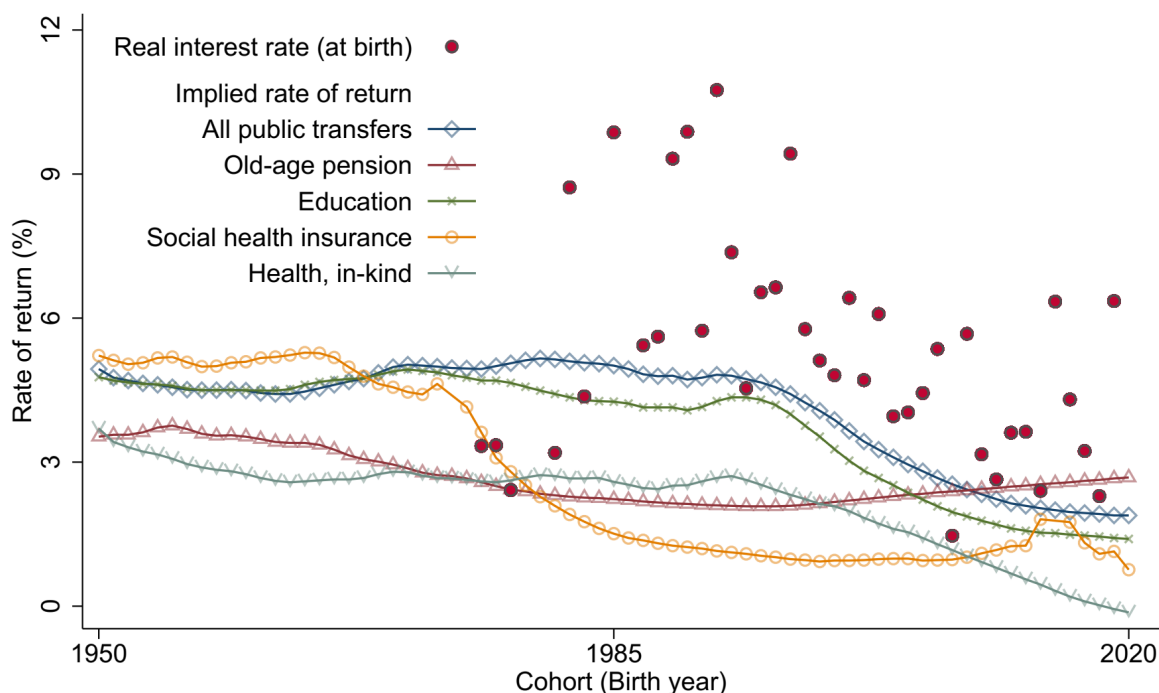
5. Conclusions

The analysis we present show that the Philippine government transfer system appears to be a good investment overall with rates of return that closely match market interest rates for some government program bundles. Even with subpar returns for individual programs when considered separately, government has allowed intertemporal resource reallocation across generations that may not have been possible otherwise.

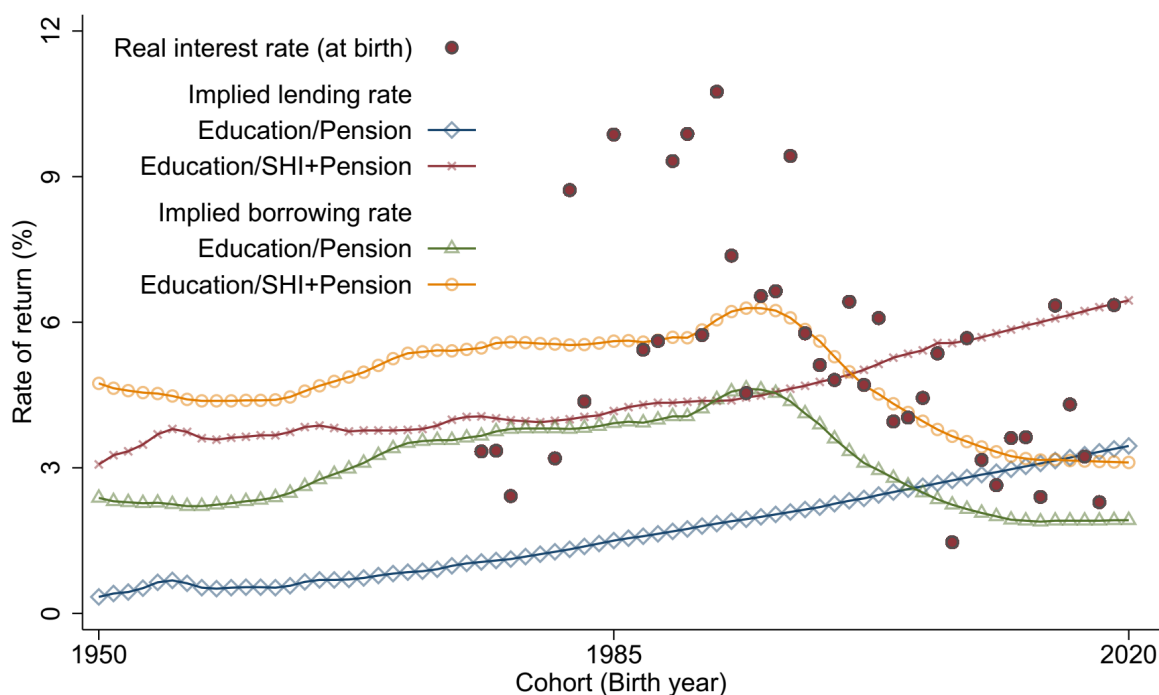
The country's public transfer system experience over the last seven decades has highlighted the important role of demographic forces on public finance. While its importance appears to have waned in favor of other economic forces in more recent years, the declining population growth and the slow ageing of the population suggest that economic managers and policy makers should look for future growth elsewhere. The public transfer system of previous decades had benefited from tailwinds arising from favorable demography that may no longer be present in the near future. Will productivity growth from more intensive human capital be enough to counter fiscal risks from the imminent ageing of the Filipino population?

Figure 4. Implied rate of return of selected public transfer programs

A. Within-program rate of return



B. Cross-program rate of return



Source: Rates of returns are authors' calculations. Market real interest rates are from World Bank's (2022) World Development Indicators. Note: We used Hartman and Schafrick's (2004) decision rule in identifying the relevant internal rate of return (IRR) in case of multiple implied rates. Implied lending rates for Education/SHI+Pension for population cohorts born starting in 2008 (Panel B) exclude positive net inflows when young that make IRR calculations infeasible. The presented results for these cohorts are therefore lower bound estimates.

That current generations are contributing more than what they receive in benefits bode well for the sustainability of the country's public transfer program overall, however lifetime fiscal deficits in key programs, particularly social health insurance and old-age pension, indicate that these losses need to be funded from other sources eventually. Identifying an optimal path that respects fiscal sustainability and generational fairness concerns in a dynamic social, economic and demographic environment should be an explicit government priority.

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