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Impact of population ageing on sustainability of India's current fiscal policies: A Generational Accounting approach

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Introduction

According to the United Nations (2011), India's elderly population at age 60 and above shows an increase from about 105 million (or about 8% of total population) in 2011 to 376 million (or 22% of total population) in 2051 and to 622 million in 2100 (or 37% of total population). This indicates that India is not and will be an exception to the demographic phenomenon of population ageing.

An important public debate on India's population ageing is related to provisioning of old age income security. Lack of employability, disintegration of joint family system and decline in other built-in family supports are important justifications for old age income security [Planning Commission (2012), Central Statistical Office (2006)].[1] Further, the need for old age income security is strengthened by recent findings of UNFPA (2012): 18.3% of elderly depends on publicly funded-social pensions while 43.3% have no source of income, 78% have no savings, and 84% received no retirement and pension benefits because more than 86% work in informal sector (including self-employment).[2] At the same time, a policy move towards universal provisioning of publicly funded income security programmes (e.g. universal old age pension scheme) for the increasing elderly population may be expected to exert a big fiscal pressure and question the sustainability of India's current fiscal policies because of persisting fiscal difficulties in the form of government deficits and its debt financing.

Studies on sustainability of India's fiscal policy have focused on fiscal stability (i.e. targeted reduction in fiscal deficit as a percentage of GDP) and debt sustainability (i.e. targeted reduction in debt/GDP ratio to an initial level) without reference to population ageing. These studies include Olekalns and Cashin (2000), Pattnaik et al. (2004), IMF (2011) and De (2012). On the other hand, available literature on impact of population ageing on India's public finance is few and includes Narayana (2012). Narayana (2012) integrated the methodology of the National Transfer Accounts and Budget Forecasting Model to forecast the impact of population ageing on India's current public finance from 2005 through 2050. The empirical results showed that increase in tax revenues result in a decline of debt-to-GDP ratio because population ageing would not lower tax buoyancy in the long run; and increasing total budget surplus and fiscal support ratio implied that the long term impact of population ageing would be fiscally sustainable. Nevertheless, fiscal sustainability of current policies or expected policy reforms and their implied intergenerational welfare, especially in the presence of inter-temporal budget constraint of the government, are yet to be explored in the context of population ageing in India.

This paper is a departure from the above existing Indian studies on fiscal sustainability by answering the following new research and policy relevant questions. Are current fiscal policies of India sustainable in view of populating ageing and expected fiscal challenges of a universal old age pension? What does fiscal sustainability imply for intergenerational distribution of welfare? Can the standard method of Generational Accounting (GA) be applied to answer these questions? If so, can we distinguish the nature and magnitude of fiscal sustainability by current policies and expected reforms? Or, can they be distinguished by sources of generational imbalance? Can policy makers be advised to introduce expected reforms without sacrificing fiscal sustainability of current fiscal policies? If not, what policy measures are suggestible to restore and ensure the sustainability or generational imbalance?

To answer the above questions, this paper constructs the standard GA for India for the benchmark year 2004–05, and assesses the long term impact of population ageing on India's fiscal policies by evaluating the sustainability and intergenerational distribution of welfare of current fiscal policies and expected reforms. Sustainability is explored in the context of (a) current fiscal policies and expected cash transfer reform on a universal old age pension scheme; (b) sensitivity of assumptions on growth rate of

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[1] Traditionally, economic dependency of elderly had been largely supported by family members (e.g. son, daughter and spouse) and partially by own asset incomes and savings. This is evident in different rounds of National Sample Survey on socio-economic profiles of aged in 1987–88, 1993–94, 1995–96 and 2004, and UNFPA (2012). Nevertheless, a decline in family support to elderly is recognized by the introduction of Maintenance and Welfare of Parents and Senior Citizens Act, 2007. Every senior citizen (aged 60+)/parent/grandparent, who is unable to maintain himself from his own income, can claim maintenance from his children through the Maintenance Tribunals up to INR10000 per month. In addition, abandonment of a senior citizen is punishable with imprisonment up to 3 months or fine up to INR5000 or both.

[2] The UNFPA report is based on a sample survey of 8329 elderly households (i.e. having at least one elderly member aged 60+) or 9852 elderly individuals in seven states (Himachal Pradesh, Kerala, Maharashtra, Odisha, Punjab, Tamil Nadu and West Bengal) in May-September 2011. These sample states were selected as they had a higher percent of elderly population above the national average.

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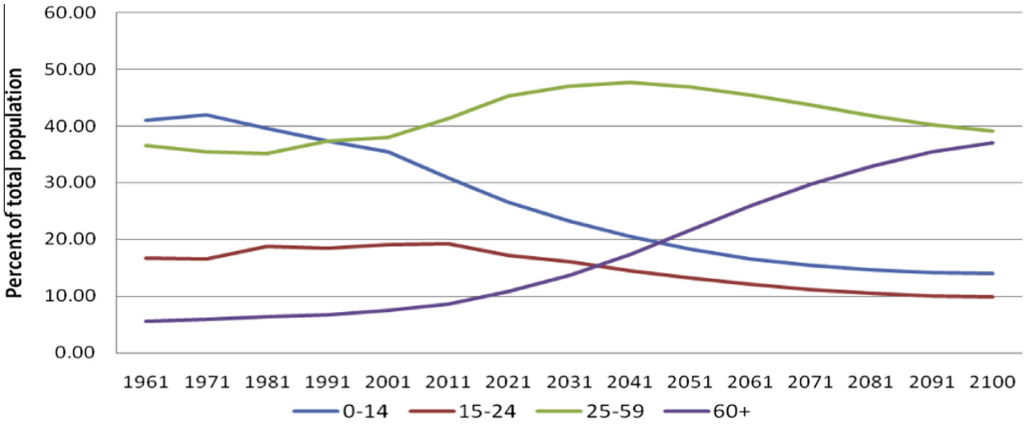

Fig. 1. Age structure transition, India, 1961–2100. Author by using the basic data from Census of India reports and United Nations (2011).

productivity, discount rate, and income elasticity of demand for cash transfers spending including civilian old age pensions; and (c) sources of generational imbalance by net debt and demographic transition effects. Construction of GA is new for Indian economics in general and for analysis of fiscal sustainability in the context of population ageing in particular.[3]

The standard method of GA assumes that age profile of tax payments and transfer receipts do not change over time. These profiles are calculated by using the new methodology of National Transfer Accounts (NTA), developed by Lee and Mason (2011) and Mason and Lee (2011) and used for estimation of net payment (i.e. tax payments minus transfer receipts) of current generation by age. This approach integrates the methodology of NTA with the GA in this paper.

Construction of GA is useful to India in many ways. First, GA, as a forward-looking approach, provides with a framework to explore how the sustainability of current fiscal policy can be affected by expected policy reforms due to population ageing.[4] Second, India's Fiscal Responsibility and Budget Management Act 2003 emphasizes on the responsibility of the Central Government, among others, to ensure inter-generational equity in fiscal management and macroeconomic stability by achieving sufficient revenue surplus, and prudent debt management consistent with fiscal sustainability through limits on borrowings, debt and deficits. Construction and analysis of GA is useful to evaluate the objectives of the Act for the general government and draw implications on intergenerational welfare of current fiscal policies, especially given the inter-temporal budget constraint. Third, GA approach fills in the policy research gap on fiscal effects of population ageing facing a developing country like India.[5] Subject to the comparability of economic and fiscal structures, the lessons from India's GA may be useful for other developing Asian countries to evaluate fiscal sustainability in the context of population ageing.

Rest of the paper is organized as follows. Section "Trends in India's population ageing" describes the trends in India's population ageing from 1961 through 2100. Section "Fiscal indicators of India" presents India's select fiscal indicators relating to public deficit, debt, net wealth and public expenditure on old age pensions. Section "Methodology of generational accounting" presents an overview of the standard GA methodology and details of variables and data descriptions for its construction for India. Section "Baseline results" gives the baseline results and their analyses by current policies. Section "Expected reforms and fiscal sustainability" introduces the expected reform on universal old age pension scheme and its impact on fiscal sustainability. Analyses of sensitivity results are given in Section "Sensitivity analysis". Major conclusions and implications are summarized in Section "Conclusion and implications".

Trends in India's population ageing

Using the age distribution of population by single years from the Census of India from 1961 to 2011 and projected population by single years from the United Nations (2011), Fig. 1 shows the trends in India's age structure transition in general and population ageing in particular. Before 1991, share of young population (0–14) was higher than the working age population (25–59). In 1991, the two curves intersected with share of total population at about 37%. Since 1991, young population shows a continuous and rapid decline as compared to the rising working age population. Thus, the two curves show a scissor's shape. Age structure transition is also characterized by changes in youth and elderly population. Share of the youth population shows a gradual increase from about 17% in 1961 to about 19% in 2011 and a decline from about 17% in 2021 to about 13% in 2051 and to 10% in 2100. On the other hand, share of elderly population shows a gradual increase from about 6% in 1961 to about 7% in 2001 and a rapid increase from about 8% in 2011 to about 22% in 2051 and to 37% in 2100. Further, annual growth rate of projected population between 2011 and 2051 (or between 2051 and 2100) show interesting variations: −0.38 (or −0.62) percent for young, −0.03 (or −0.65) percent for youth, 1.25 (or −0.45) percent for working adults, and 3.27 (or 1.03) percent for elderly. Consequently, total projected population in 2100 is equal to 235 million of young, 166 million of youth, 655 million of working and 622 million of elderly population. An obvious impact of India's projected age structure transition would be on the changing dependency ratios. Fig. 2 shows India's young, youth and old-age dependency transition over the period 1961–2100. The decline in young and youth dependency ratios and a rise in old-age dependency ratio are the remarkable effects of India's demographic transition or interactive effects of fertility and mortality over the period up to 2100.

Fiscal indicators of India

Select fiscal indicators are described to highlight the main sources of India's fiscal difficulties that are carried forward from

[3] Outside India, construction of GA is available for 17 countries in Auerbach et al. (1999) and for South Korea in Auerbach and Chun (2006, 2003).

[4] This is in contrast with the backward-looking approach to fiscal sustainability, generally based on time series properties of variables, such as, primary and non-primary government spending and revenues, interest payments, and public debt stocks. Adams et al. (2010) provide an excellent review of studies on the backward-looking approach and fresh evidence based on a sample of 33 Asian countries including India.

[5] This gap is identified, for instance, as a future direction of research, by the Report on a Technical Policy Seminar on the economic consequences of population ageing [jointly held by UNFPA and the East West Centre on 19–20 September 2011).

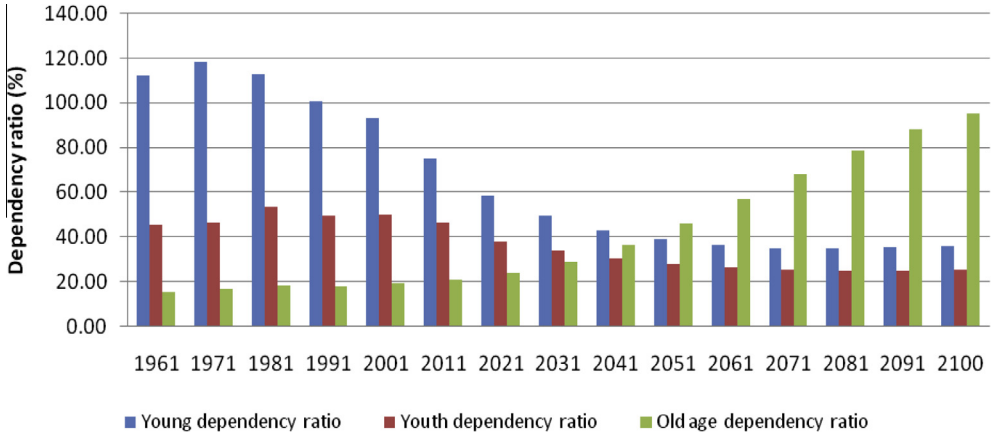

Fig. 2. Dependency transition, India, 1961–2100. Author by using the basic data from Census of India reports and United Nations (2011).

Table 1
Indicators of combined deficit, debt and net wealth of Central and state governments, India, 2000–01 to 2010–11.

Year	Deficit indicators (% of GDP)			Debt indicators			Net wealth indicators	
	Gross fiscal deficit	Gross primary deficit	Revenue deficit	Domestic liabilities as % of GDP	Total liabilities as % of GDP	Domestic liabilities as % of total liabilities	Total liabilities as % of total assets	Explicit debt as % of total assets
2000–01	9.51	3.57	6.60	67.26	76.30	88.16		
2001–02	9.94	3.69	6.99	72.69	81.45	89.24	1.79	1.10
2002–03	9.57	3.09	6.64	77.64	85.62	90.67	1.87	1.17
2003–04	8.51	2.07	5.79	79.17	85.85	92.21	1.91	1.27
2004–05	7.24	1.42	3.62	76.24	82.13	92.82	1.88	1.29
2005–06	6.49	0.96	2.69	73.82	79.07	93.35	1.89	1.34
2006–07	5.37	−0.01	1.29	69.98	74.66	93.73	1.86	1.32
2007–08	4.09	−1.12	0.19	67.23	71.44	94.10	1.70	1.23
2008–09	8.47	3.39	4.31	67.52	72.21	93.50	1.80	1.31
2009–10	9.42	4.55	5.73	66.97	70.83	94.55	0.98	0.72
2010–11	8.08	3.42	3.84	62.44	65.98	94.64	0.98	0.74

Source: Author's calculations based on basic data in the Combined Finance and Revenue Accounts of the Union and State Governments in India – various years – and RBI (2012).

the base year of this paper (2004–05). This is particularly important to examine the issue of fiscal sustainability of India's current fiscal policies and expected reforms in the context of population ageing,

Deficit, debt and net wealth

Table 1 presents the combined deficit, debt and net wealth of the Central and State governments.[6] Deficit is measured by gross fiscal deficit (GFD), gross primary deficit (GPD) and revenue deficit (RD).[7] Persistence of deficit is evident by all deficit indicators.

India's overall combined debt of the Central and State governments are equal to public debt and other liabilities.[8] Public debt is equal to internal or domestic debt and external debt. Overall debt, excluding external debt, is called domestic liabilities (or internal debt plus other liabilities). Table 1 shows that, domestic liabilities as a percentage of GDP had been higher than 62% from 2000–01 to 2010–11. Further, the increasing share of domestic liabilities indicates a declining share of external debt in total public debt. This is also evident by the reducing gap between the total debt and internal debt. Consequently, interest payment on external debt as a percentage of total interest payment on overall debt has declined from 3.53% in 2000–01 to 1.55% in 2005–06 and to 0.88% in 2010–11. Thus, issues in India's overall debt and debt sustainability of fiscal policy centre-around the overall domestic debt.

Net wealth is calculated by the difference between total stock of financial assets or wealth and financial liabilities or explicit debt (i.e. internal and external debt) by the end of fiscal year. Total liabilities include explicit debt. Assets of the government include its capital expenditure on creation of economic and social infrastructure and its loans and advances on assets. Net wealth of the government, both by total liabilities and explicit debt, was negative from 2001 to 02 through 2008–09 and has been positive subsequently. Thus, Table 1 shows that the ratio of total liabilities (or explicit debt) to total assets was greater than unity up to 2008–09 and less than unity subsequently. A higher ratio of liabilities or debt to assets is indicator of inadequacy of their assets back up. For instance, 44.09 (or 9.46) percent of total liabilities (or explicit debt) had ceased to have assets back up in 2001–02, 47.15 (or 25.55) percent in 2005–06 and 44.50 (or 23.66) percent in 2008–09. Subsequently, about 2.38% of total liabilities and 35.44% of explicit debt are backed by the assets.

[6] India is a federal economy and fiscal policy is formulated and implemented by the Federal/Union/Central government [including 6 Union Territories], 28 State governments, Delhi (National Capital Territory) and Poducherry (Union Territory with legislature). As this paper approaches to construction of GA at the national level, the combined fiscal indicators of the Central and State governments (includes Delhi and Poducherry) are used for all the descriptions, calculations and analyses.

[7] GFD is measured by excess of aggregate expenditure (including loans net of recoveries) over revenue receipts and non-debt capital receipts (i.e. receipts from disinvestment in public sector equities and recovery of loans). GPD is GFD less of interest payments. RD is excess of total revenue expenditure over revenue receipts.

[8] Overall debt of the Central Government includes debt and liabilities contracted in the Consolidated Fund of India (called public debt) and liabilities in Public Accounts [Government of India (2012)]. On the other hand, overall debt of the State government includes public debt, ways and means advances and overdrafts from the Reserve Bank of India and other banks, Public Accounts and Contingency Fund [RBI (2013)].

Table 2
Public expenditure on pension and retirement benefits, India, 2000–01 to 2011–12.

Year	Total pension and retirement benefits (INR Billion)	Total pension and retirement benefits as % of		Pension and retirements to government employees as % of total pension and retirement benefits	Expenditure on Indira Gandhi National Old Age Pension Scheme as % of total revenue expenditure
		GDP	Total revenue expenditure		
2000–01	392	1.81	7.58	98.93	0.08
2001–02	408	1.74	7.29	98.86	0.08
2002–03	437	1.73	7.08	98.50	0.11
2003–04	458	1.61	6.76	98.69	0.09
2004–05	565	1.74	7.73	98.17	0.14
2005–06	621	1.68	7.70	98.08	0.15
2006–07	716	1.67	7.67	96.52	0.27
2007–08	805	1.61	7.51	96.41	0.27
2008–09	992	1.78	7.30	95.46	0.33
2009–10	1447	2.24	9.15	96.44	0.33
2010–11	1627	2.12	8.57	98.39	0.14
2011–12	1782	2.01	8.78	96.33	0.32

Source: Author's calculations based on basic data in Government of India (2012) and www.indiastat.com (accessed on 15 May 2013).

Thus, India's fiscal difficulties include persistence of deficits and its debt financing, and negative net wealth of the government. In the context of population ageing, a major fiscal challenge is how to sustain the current policies if old age specific expenditure can be raised (e.g. introduction of a universal old age pension scheme) without accentuating the fiscal difficulties. Before analyzing this issue by using GA methodology, we present a brief description of public expenditure on old age pensions below to contextualize it in India's fiscal policy.

Public expenditure on old age pensions

India's public expenditure on old age pensions is of two types: (a) pension and retirement benefits to government employees and (b) old age pension for civilians under the Indira Gandhi National Old Age Pension Scheme (IGNOAPS).[9] Public expenditure on these old age pension schemes is given in Table 2. Over the period 2001–02 to 2010–11, total pension expenditure as a percent of GDP (or total revenue expenditure) varied from 1.7 to 2.24% (or 8–9%). Of the total pension expenditure, pension and retirement benefits for government employees accounted for more than 95%. Consequently, the share of old age pension expenditure for civilians has been very low (less than 0.4%).

Limited public expenditure on the civilian pension is a narrow view of public transfer payments to elderly population because they do benefit from many public in-kind transfers. These transfer inflows to elderly individuals are captured by the NTA methodology. For instance, Narayana (2011) showed that the total public sector inflows (in kind and cash transfers) to elderly population were equal to INR567 billion (excluding the pension for government employees), about 55 times bigger than total public expenditure on IGNOAPS in 2004–05. This implied that total public sector benefits to elderly population were heavily underestimated if limited to benefits of the IGNOAPS. Thus, as India's elderly population increase, public transfers to the elderly would be bigger and pose a major fiscal problem, especially if a universal old age social security programme is introduced.

Public debates on the needs and amount of civilian old age pension are not new in India. Way back in 2005, the National Commission for Enterprises in the Unorganized Sector (NCEUS) had recommended for the monthly old age pension of INR200 per month to all poor (or Below the Poverty Line households) aged (60+) workers. The Report of the Working Group on Social Security for Twelfth Five Year Plan 2012–2017 [Planning Commission of India (2012)] has reiterated, among others, the need for old age income security as one of the elements of social security arrangement for India's unorganized workers, now accounting for 94% of India's total labour force (about 488 million). Most recently, the Pension Parishad, a non-governmental initiative to ensure universal, publicly funded, non-means related and non-contributory pension to all informal workers in India, has demanded for a uniform amount of INR2000 per person per month to all persons in the pensionable ages: 55 years for men; 50 years for women; and 45 years for specially deprived communities. About 100 million people are expected beneficiaries of this proposed scheme. The number of beneficiaries is reduced to 80 million, if the income-tax payers are excluded and the benefit is extended to all at 60+.[10] Apparently, other things being equal, cost of the proposed pension scheme by the Pension Parishad is ten times bigger than by the NCEUS. However, policy makers are not sure of the current and long term fiscal implications of the above pension proposals. If quantified, such implications are of current policy use and public importance. The rest of this paper does this quantification by using GA methodology and provide with unambiguous implications on sustaining the current fiscal policies.

Methodology of Generational Accounting

Construction of the standard GA as a framework to evaluate the sustainability and intergenerational distribution of welfare of India's current fiscal policies and expected reforms is briefly explained below. The basic model of GA is based on materials in Auerbach and Kotlikoff (1999).

Basic model

GA methodology is based on government's inter-temporal - budget constraint. The constraint requires that the future net tax payments of current and future generations be sufficient, in present value, to cover the present value of future government

[9] This pension scheme was introduced in 1995 as National Old Age Pension Scheme for destitute individuals above age 65 with no means of livelihood and has been renamed as Indira Gandhi National Old Age Pension Scheme since November 2007. At present, the extent of monetary assistance by the Government of India is equal to INR200 per month per elderly individual, and all the elderly individuals who are below the poverty line and above the age of 60 years are eligible for the pension.

[10] For details, see Pension Parishad's website: http://www.facebook.com/PensionParishad (accessed on 14 November 2013).

consumption as well as service the government's initial net debt as given in Eq. (1).

$$\sum_{s=0}^{D} N_{t,t-s} + \sum_{s=t}^{\infty} N_{t,t+s} = \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)} - W_t^g \quad (1)$$

The first summation on the left-hand side of (1) adds together the generational accounts of existing generations. The term $N_{t,t-s}$ stands for the account of the generation born in year $t-s$. The index s in this summation runs from age 0 to age D, the maximum length of life. The second summation on the left-hand side of (1) adds together the present value of remaining net payments of future generations, with s representing the number of years after year t that each future generation is born. The first term on the right-hand side of (1) is the present value of government consumption. In this summation, the values of government consumption, G_s in year s, are discounted by the pre-tax real interest rate, r. The remaining term on the right-hand side, W_t^g, denotes the government's net wealth in year t.

Thus, GA is defined as the present value of net payment (=tax paid minus benefit received from the government) for the remaining lifetime. The account evaluated at the year t for the cohort born at the year k is expressed as Eq. (2).

$$N_{t,k} = \sum_{s=\max(t,k)}^{k+D} T_{s,k} P_{s,k} (1+r)^{-(s-t)} \quad (2)$$

where $T_{s,k}$ stands for the projected average net tax payments to the government made in year s by the generation born in year k. The term $P_{s,k}$ stands for the number of surviving members of the cohort in year s who were born in year k. For the generations who are born in year k, where $k > t$, the summation begins in year k. A set of generational accounts is simply a set of values of $N_{t,k}$, one for each existing and future generation.

Eq. (1) calculated in two steps. First, net payment of current generation is calculated based on the current fiscal policies or expected reforms without being constrained by the inter-temporal budget. Second, given the RHS of (1), net payment of the future generation is calculated as a residual. Thus, inter-temporal budget constraint fully determines the net payment of the future generation.

Eq. (1) indicates a zero sum nature of intergenerational fiscal policy. For instance, holding the RHS of (1) fixed, a reduction in present value of net payment of current generation implies an increase in net payment by future generations.

Using the GA in (1), fiscal sustainability is evaluated by the concept of generational imbalance (GI). It is measured by the difference in present value of net payment of future generation and newborn (or age-0 cohort in the benchmark year) divided by the present value of net payment of the newborn. Current fiscal policies are sustainable if the value of GI is less than zero. This means that the lifetime net payment of future generation is smaller than that of current generation. Thus, to restore the long term budgetary balance, tax burden should be reduced, or transfer benefits should be increased, in future. In addition, fiscal sustainability is indicated by sustainability gap which is a ratio of government gap to sum of present value of GDP after the benchmark year. Government gap is total value of the net payment of the future generation.[11]

Construction of GA involves the following four steps: (a) Projection of aggregates (i.e. aggregate value of taxes, transfers, and government consumption); (b) Computing net payment of current generation; (c) Computing net payment of future generation; and (d) Evaluation of sustainability of fiscal policies. The variables and data descriptions for this construction for India are described below.

Variables and data descriptions

India's GA is constructed for the benchmark year 2004–05. The choice of this benchmark year is based on the availability of survey and administrative data for calculations of age profiles of taxes (i.e. direct, indirect and non-tax revenues), transfers (i.e. education, health and cash including old age pensions) and labour income. All age profiles are based on the NTA methodology [NTA (2013)]. In addition, construction of GA requires data for measurement of rate of productivity growth, inflation rate, Government net wealth, GDP, Government consumption in benchmark year, and projected population. Description and data sources of the parameters, variables and age profiles are given in Tables 3 and 4. Throughout, United Nations' (2011) projected total population (*The 2010 Revision and Medium Variant*) for India by single year age (i.e. from age 0 through 90) from 2005 to 2100 is used.

Baseline results

The baseline (or current fiscal policy) scenario is based on annual labour productivity growth rate (or technical progress) of 3.01%, nominal discount rate of 8.13% and inflation rate of 5%. Aggregate taxes, transfers and consumption are equal to their benchmark values, projected population by age and growth of their per capita values. Per capita values are assumed to grow at the rate of productivity. This implies unitary income elasticity of all projected per capita taxes and transfers.[12] Table 5 gives the results for the current fiscal policies in the benchmark year 2004–05. The GA is presented for the combined generation (i.e. without distinguishing generations by male and female) and at every fifth age, ranging from age 0 to 90. Following the standard reporting practice of GA, per capita value rather than the aggregate net tax payment value for each generation is presented.

The net payment [i.e. present value of all taxes a person of each generation can expect to pay to the general government over his/her lifetime minus transfers that person can expect to receive from the general government from the benchmark year through the future years] is highest or peaks at age 25. The net payment is positive for the current as well as for the future generations. This means that the generations are projected to pay more in taxes than it would receive in transfers over its remaining life time. The higher net payment is strongly driven by (a) low amount of transfers in general and health transfers in particular and (b) high level of corporation income and indirect or consumption taxes. Interestingly, the age pattern of net payment is not characterized by a lifecycle pattern because India's elderly are also net tax payers rather than net beneficiaries of public transfers. This is for three reasons. First, elderly are not beneficiaries of public education transfers. Second, there is no universal elderly-specific public spending, such as, universal old age pension. Third, elderly heavily pays all taxes in general and asset-income based (i.e. corporation tax) in particular.

[11] Government gap is measured by the following: (Net wealth of the government in the benchmark year minus present value of net payment (total) plus government consumption).

[12] Studies on income elasticity of pubic expenditure on health care include Bhat and Jain (2006). Using the state level data and panel data estimation techniques, the estimated elasticity is reported at 0.68. In contrast, no estimate of income elasticity of public expenditure on old age pension is available for India. Using the time series data on combined revenue expenditure on health expenditure (includes medical, sanitation and water supply) at current prices and GDP at market prices from 1995–96 to 2011–12, we estimated log.linear regression model by regressing the health expenditure on GDP. Our estimate of income elasticity of health expenditure is equal to 0.98. In the same way, we regressed the log of old age pension expenditure on log of GDP and obtained the income elasticity of 1.60. These estimates offer empirical support for the presumed unitary income elasticity of public expenditure on health and cash transfers including old age pension.

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Table 3
Description, measurement, and data sources of macroeconomic parameters and age profiles for construction of GA, India, 2004–05.

Parameters and age profiles	Measurement	Data source(s)
1. Construction of macroeconomic parameters for benchmark year		
1.1. Rate of technical progress	Compound average annual growth rate of labour productivity (or gross value added per worker) from 1999–00 to 2004–05	Government of India (2008)
1.2. Inflation rate	Average annual percentage change in the Wholesale Price Index for all commodities over three years: 2002–03 to 2004–05	Government of India (2013)
1.3. Discount rate	Average interest rate as measured by the ratio of interest payment in current year to outstanding liabilities of the previous year	Reserve Bank of India (RBI) (2012)
1.4. Net wealth of Government	Total assets minus total liabilities of the Central and State government in 2004–05	Government of India (2005)
1.5. GDP	Gross domestic product at current market prices in 2004–05	RBI (2012)
1.6. Government consumption	Government consumption includes general public service; defence; public order and safety; social and welfare services; housing and community amenities; recreation, culture and religion; fuel and energy; agriculture, forestry and fishing; mining, manufacturing and construction; and transport and communication. Government Final Consumption Expenditure by Purpose is adjusted for total Final Consumption Expenditure of Administrative Departments to account for local government consumption. All consumption items are measured at current prices in 2004–05	Statement 29 and Statement 36 in Central Statistical Office (2007)
2. Construction of age profiles		
2.1. Age profile of public transfers		
• Education	National Transfer Accounts (NTA) methodology	Table 4 in this paper
• Health	NTA methodology	Table 4 in this paper
• Cash	NTA methodology	Table 4 in this paper
2.2. Age profile of taxes		
• Personal income tax	NTA methodology	Table 4 in this paper
• Corporation tax	NTA methodology	Table 4 in this paper
• Indirect or consumption taxes	NTA methodology	Table 4 in this paper
• Non-tax revenues	NTA methodology	Table 4 in this paper
2.3. Age profile of labour income	NTA methodology	Table 4 in this paper

Source: Author.

The above results of India's GA are different from those available for the developed countries. For instance, Kotlikoff and Leibfritz (1999) provide an international comparison of GA, constructed in 1995 for 17 countries by treating education expenditure as transfers. For all the countries, net payment is negative for elderly age groups except in Thailand. Apparently, India's GA in Table 5 is qualitatively similar to Thailand than rest of the countries. Further, India's Generational Imbalance (109%) is lower than for Japan (338%), Germany (156%), Italy (224%), Netherlands (178%), Norway (4092%), and Brazil (117%). These results are unique for India because of differences in discount rate, productivity growth rate, inflation rate, net worth of the government, nature and construction of age profile of taxes and transfers, and stages of demographic transition.

The generational imbalance between the newborn and future generations is 108.81%. This implies that the future generations must pay, on an average, about 109% more net taxes as newborn generations. Thus, current fiscal policies are not sustainable in the context of India's population ageing over the period 2005–2100. The sustainability gap is 2.25% or the required increase/adjustment in future taxes and/or transfers is about 2% of the present value of future GDP. Further, net payment as a percentage of lifetime income is positive for the current (newborn) and future generations. In particular, the percentage is higher for the current generation (16%) than future generation (11%).

Unsustainability of current fiscal policies implies that it may be necessary to increase taxes and/or reduce transfers to future generations in order to satisfy the inter-temporal budget constraint. Table 5 shows the required adjustments by current generation (as of 2005), future generation and select years (2010, 2020 and 2030). Required tax adjustment shows the percentage increase in tax burden. Tax and transfer adjustments show an increase (or decrease) in tax burden accompanied by the same percentage decrease (or increase) in transfer payments. Adjustment for the current (or future) generation shows the required tax and transfer changes without making adjustments for the future (or current) generation. Adjustment for select years shows the required adjustments in tax burden and transfer payments if those adjustments are made to all cohorts alive in 2010 or 2020 or 2030 and later. The required increase in tax burden for the current (or future) generation is equal to 288 (or 13) percent and the required tax and transfer adjustment is equal to 183 (or 8) percent. If delayed, increase in required tax burden (or increase in tax burden and reduction in transfer payment) is equal to 13 (or 8) percent in 2010 and later.

Expected reforms and fiscal sustainability

Generational Accounting is useful to evaluate the sustainability of current fiscal policy in the context of expected cash transfer reform on universal old age pension scheme (UOAPS). For this purpose, we assume that all elderly individuals at 60 and above are eligible to universal old age pension of INR2000 per month. Eligible elderly individuals are added the difference between the proposed universal old age pension amount and their existing old-age related social security receipts in the form of cash transfers. The aggregate control for this age profile is the sum of total current cash transfers and the net amount added due to the expected reform on universal old age pension scheme.[13]

Table 6 presents the GA results of the above expected reform. These results are obtained under the same assumptions as in the baseline scenario. Thus, except for cash transfer reforms (including

[13] Aggregate public expenditure on cash transfer in the benchmark year is INR2380.11 billion (or 7.34% of GDP). With the introduction of UOAPS, the total value of this aggregate expenditure is increased to INR4023.34 billion. Thus, the net cost introducing UOAPS is equal to INR1643.23 billion or 5.07% of GDP in 2004–05.

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Table 4
Variable and data descriptions for calculation of NTA-based age profiles for public transfers, taxes and labour income, India, 2004–05.

Aggregate controls	Measurement of aggregate controls	Age allocation methods and data sources
1. Public consumption or transfers (in-kind)	Government Final Consumption Expenditure (GFCE)	
1.1. Education	Expenditure on education services under GFCE	Age profile is derived by public formal and informal education. Public formal education age profile is based on computed per student public education consumption by levels of education. This computation is based on the following enrolment rates and public expenditure by level of education. First, using estimated attendance data from the 61st Round of National Sample Survey Organization (July 2004 June 2005) on Status of Education and Vocational Training in India 2004–05, share of attendance in public institutions by levels of education is computed. This share is applied on total enrolment data in the Government of India's Education Statistics 2004–05 to obtain attendance in public institutions (i.e. government and local body institutions). Second, using Indian Public Finance Statistics 2006–07, revenue expenditure on education by all levels of governments (including non-education departments) is obtained. Public education consumption is presumed to be proportional to revenue expenditure by levels of education. Per student public education consumption is obtained by using the computed enrolment data in public institutions. Public informal education consumption is equal to expenditure on adult education and training and allocated on per capita basis for age group 30–60
1.2. Health	Expenditure on health and other services under GFCE	Age profile is drawn using the individual level data on utilization of public health facilities in the 60th Round of National Sample Survey on Healthcare, Morbidity and Conditions of aged in India in 2004, Public health facilities refers to health services provided by public hospitals and dispensaries (including Primary Health Centres, Sub-centres and Community Health Centres). Utilization is proxied by expenditure incurred on treatment for hospitalized or in-patient (during 365 days prior to the survey), non-hospitalised or out-patient (during 15 days prior to the survey) and other expenditure (e.g. transport expenses to and from the hospital visits)
2. Public cash transfers	Sum of other current transfers from the general government and social benefits not in-kind	In India's National Account Statistics (NAS) and System of National Accounts (SNA), cash transfers are distinguishable between other current transfers from the general government and social benefits not in kind. Other current transfers from the general government include grants in aid to institutions in education, health and other social sectors. These transfers are considered non-age specific and allocated on per capita basis. Social benefits not in kind mainly include social assistance programmes on National Old Age Pension Scheme, Widow Pension Scheme, National Maternity Benefit Scheme, National Disability Pension Scheme and Annapurna Scheme. These programmes, among others, are age-specific cash transfers. Using the age profile of beneficiaries of all the programmes together in the India Human Development Survey 2004–05 [Desai et al. (2008)], age profile of social benefits not in-kind is derived
3. Taxes		
3.1. Personal income tax	Non-corporation taxes in Statement 43 of Central Statistical Office (2007)	Age profile is calculated by assuming that the tax paid is proportional to total labour income of individuals. Labour income by age is calculated as detailed in item (4) below. It is important to mention that personal income tax is levied above an exemption limit with differential rates by income slabs. To incorporate these features into the tax profile, we need a household survey that includes income tax payments to tabulate the taxes directly from the survey and then scale them with the appropriate macro control. Such data would be interesting to calculate the (a) age profile for income below and above the exemption limit; and (b) tax age profiles separately for each income range that conforms to the tax schedule and to obtain age-specific tax rate. At present, no national sample surveys of households on consumption expenditure and employment in India include information on the tax payment details
3.2. Corporation tax	Corporation tax in Statement 43 of Central Statistical Office (2007)	Age profile is calculated by assuming that the tax paid is proportional to total asset income of individuals (e.g. rent and dividends) of individuals. Source: India Human Development Survey 2005 [Desai et al. (2008)]
3.3. Indirect or consumption tax	Total indirect taxes in Statement 43 of Central Statistical Office (2007)	Age profile is derived by applying the age profile of private other (i.e. non-education and non-health) consumption Private consumption other includes food and beverages, clothing and footwear; fuel and power; furniture, furnishing, appliances; transport and communication; and recreation and cultural services. Age profile is derived by using Equivalence Scale. The equivalence scale is equal to 1 for adults aged twenty or older, declines linearly from age 20 to 0.4 at age 4, and is constant at 0.4 for those age 4 or younger. That is, $\lambda(a) = (1–0.6)$, $(a \leqslant 4)$; $\lambda(a) = 1–[0.6.(20–a)/16]$, $(4 < a < 20)$; and $\lambda(a) = 1$, $(a \geqslant 20)$. Using the above formula, intra-household allocation of private other consumption $[CFX_{ij}]$ is equal to $[CFX_j.\lambda(x)/\Sigma\lambda(a)\cdot M_j(a)]$, where x is the age of the i-th member in j-th household and $M(a)$ is number of household members in each age group Aggregate control for private consumption other is Private Final Consumption Expenditure (PFCE), excluding the expenditure on education and health services. This expenditure is net of indirect taxes where indirect taxes are assumed to equal to share of PFCE other in aggregate PFCE
3.4. Non-tax revenues	Total non-tax revenues [Government of India (2012)]	Age profile is calculated by using the combined tax profiles of the personal income tax, corporation tax and indirect tax
4. Labour income	Compensation of employees + (2/3) of mixed income + net compensation of employees from rest-of-world	Age profile is based on the combined age profile of income from salaries and wages and self-employment, using the individual income from wage and salary and household income from self-employment (i.e. farm income and non-farm business

(*continued on next page*)

Table 4 (*continued*)

Aggregate controls	Measurement of aggregate controls	Age allocation methods and data sources
		income) in India Human Development Survey 2005 [Desai et al. (2008)]. Self-employment income of household is allocated to individual in a household who reported as self-employed, using the age profile of mean earnings of employees. Accordingly, self-employment income accruing to *i*th individual in household *j* [$YLS_{ij}(x)$] is equal to $YLSj \cdot \gamma(x)$ and $\gamma(x) = w(x) \cdot SE_j(x)] / \Sigma\, w(a) \cdot SE_j(a)$, where x is the age of *i*th household; $SE_j(a)$ is number of people in household j who are self-employed or unpaid workers of age a; $w(a)$ is average earnings of employees. This means that $\gamma(x)$ is the share of total household self-employment labour income allocated to each self-employed who is at age x. Summing across all households, total self-employment labour income is computed at age x

Note: Except for public education and public health, age allocation rule for all other aggregate controls variables follows the NTA general methodology [NTA (2013) and United Nations (2013)].
Source: Author.

Table 5
Generational Accounts and its composition by current fiscal policies, India.

Generation's age in 2004–05	Net payments (INR in '000)	Composition (INR in '000)						
		Transfers			Payments			
		Education	Health	Cash	Income tax	Corporation tax	Indirect taxes	Non-tax revenues
0 (New born)	130.59	−24.33	−16.34	−162.66	32.09	62.23	239.40	0.19
5	132.09	−24.91	−15.93	−162.48	32.88	65.78	236.54	0.21
10	133.69	−22.20	−15.34	−160.37	33.31	68.79	229.20	0.30
15	134.09	−17.09	−14.52	−157.73	33.53	71.79	217.70	0.40
20	133.21	−9.48	−13.59	−155.29	33.38	75.20	202.39	0.60
25	137.40	−0.06	−12.48	−145.18	32.30	78.39	183.75	0.68
30	128.07	−0.05	−11.45	−137.55	29.90	80.35	166.13	0.73
35	118.51	−0.04	−10.25	−128.28	26.48	79.98	149.87	0.75
40	108.70	−0.03	−9.06	−117.55	22.48	77.49	134.51	0.87
45	97.53	−0.02	−7.82	−105.93	17.92	74.31	118.19	0.88
50	85.29	−0.02	−6.63	−93.47	13.13	70.83	100.56	0.88
55	71.46	−0.01	−5.60	−85.38	8.40	68.52	84.48	1.04
60	56.19	0.00	−4.63	−77.49	4.14	63.42	69.79	0.97
65	42.11	0.00	−3.87	−70.65	2.51	54.99	58.03	1.10
70	30.20	0.00	−3.28	−63.92	1.66	46.46	48.37	0.92
75	25.01	0.00	−2.87	−58.12	1.10	42.39	41.45	1.06
80	5.69	0.00	−0.50	−9.86	0.16	7.59	7.10	1.20
85	3.07	0.00	−0.96	−19.24	0.19	9.15	13.06	0.87
90	2.18	0.00	−0.22	−3.23	0.02	1.75	2.99	0.87
Future generation	272.69							
Generational imbalance (%)	108.81							
Sustainability gap (%)	2.25							
Net payments as % of lifetime income								
1.1. Current (newborn) generation	11.30							
1.2. Future generation	15.80							
Required adjustments by tax burden and transfer payments								
Generations	Tax adjustment (%)	Tax and transfer adjustment (%)						
Current generation	287.53	182.51						
Future generation	13.36	8.41						
• 2010	12.87	8.10						
• 2020	12.99	8.17						
• 2030	13.11	8.25						

Note: All figures refer to per capita except stated otherwise.
Source: Author's calculations.

UOAPS) and net payments, the nature and magnitude of composition of GA by taxes and transfers are identical between the expected reform and baseline scenario. At the outset, three general conclusions are relevant. First, the nature but not the magnitude of generational implications is neutral across ages, between current and future generations and between the current fiscal policies and expected reform. Second, net payment of future generation is higher under the expected reform than under the Baseline case. Third, sustainability of current fiscal policies is worsened under the expected reform because, the value of generational imbalance is positive and bigger under the expected reform than under the baseline case. This conclusion is not supportive to justify the sustainability of the current fiscal policies in the context of the expected reform on UOAPS.[14] Thus, net payment as a percentage of lifetime income is higher for the current (newborn) and lowers for the future generation under the expected form. Further, the required tax and transfer adjustment is equal to 557.4% for the current

[14] Previous studies on the impact of population ageing on fiscal sustainability, such as, Narayana (2012) attributed the sustainability for low public health care expenditure and lack of universal old age related social security programmes. On the contrary, this paper finds that India's current fiscal policies are not sustainable, among other, if the expected reform is introduced and income elasticity of public expenditure on cash transfers with old age pension is unitary. However, these comparisons of results are not strictly valid because the Budget Forecasting Model in Narayana (2012) and Generational Accounting in this paper are completely different economic models with distinct definition of fiscal sustainability.

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Table 6
Generational Accounts and its composition by the expected reform on universal old age pension scheme, India.

Generation's age in 2004–05	Net payments (INR in '000)	Composition (INR in '000)						
		Transfers			Payments			
		Education	Health	Cash	Income tax	Corporation tax	Indirect taxes	Non-tax revenues
0 (New born)	53.60	−24.33	−16.34	−239.65	32.09	62.23	239.40	0.19
5	50.34	−24.91	−15.93	−244.22	32.88	65.78	236.54	0.21
10	46.91	−22.20	−15.34	−247.14	33.31	68.79	229.20	0.30
15	42.23	−17.09	−14.52	−249.58	33.53	71.79	217.70	0.40
20	38.50	−9.48	−13.59	−249.99	33.38	75.20	202.39	0.60
25	38.88	−0.06	−12.48	−243.69	32.30	78.39	183.75	0.68
30	38.40	−0.05	−11.45	−227.22	29.90	80.35	166.13	0.73
35	44.09	−0.04	−10.25	−202.70	26.48	79.98	149.87	0.75
40	52.75	−0.03	−9.06	−173.50	22.48	77.49	134.51	0.87
45	64.06	−0.02	−7.82	−139.41	17.92	74.31	118.19	0.88
50	75.80	−0.02	−6.63	−102.96	13.13	70.83	100.56	0.88
55	90.51	−0.01	−5.60	−66.33	8.40	68.52	84.48	1.04
60	101.09	0.00	−4.63	−32.59	4.14	63.42	69.79	0.97
65	101.59	0.00	−4.49	−28.60	3.64	62.45	67.58	1.02
70	92.96	0.00	−3.87	−19.80	2.51	54.99	58.03	1.10
75	81.01	0.00	−3.28	−13.11	1.66	46.46	48.37	0.92
80	74.36	0.00	−2.87	−8.77	1.10	42.39	41.45	1.06
85	14.25	0.00	−0.50	−1.30	0.16	7.59	7.10	1.20
90	20.76	0.00	−0.96	−1.55	0.19	9.15	13.06	0.87
Future generation	272.88							
Generational imbalance (%)	409.12							
Sustainability gap (%)	7.90							
Net payments as % of lifetime income								
1.1. Current (newborn) generation	4.70							
1.2. Future generation	17.99							
Required adjustments by tax burden and transfer payments								
Generations	Tax adjustment (%)	Tax and transfer adjustment (%)						
Current generation	1009.02	557.35						
Future generation	46.90	24.37						
• 2010	45.17	23.53						
• 2020	45.57	23.74						
• 2030	46.02	23.97						

Note: All figures refer to per capita except stated otherwise.
Source: Author's calculations.

generation and 24.4% for the future generation. All these required adjustments are remarkably higher than in the baseline scenario.

Sensitivity analysis

Sensitivity of GA under the current fiscal policies and the expected reform is examined below by changes in (a) productivity growth and discount rates, (b) income elasticity of public old age pension expenditure, (c) sources of generational imbalance, and (d) required adjustments by tax burden and transfer payments.

Sensitivity for productivity growth and discount rates

The GA is sensitive to key assumptions on the productivity growth rate, discount rate and inflation rate. We assume that the inflation rate is fixed at benchmark year (5%) and calculate the sensitivity of the GA in the baseline and expected reform scenarios for alternative values of productivity growth rate (3.01%, 4% and 4.5%) rate and discount rate (10%, 12% and 14%). The results for the current fiscal policies and the expected are presented in Table 7. For a given productivity growth rate, a higher discount rate reduces the net payment of both current and future generations. On the other hand, for a given discount rate, a higher productivity growth rate increases the net payment of the current generation as well as the future generation. Thus, the results show the nature of sensitivity of GA to productivity growth rate and discount rate do not depend on the generation in question. Nevertheless, India's current fiscal policy is not sustainable in all the sensitivity cases.

Sensitivity for income elasticity of public old age pension expenditure

Unitary income elasticity of demand for public expenditure on cash transfers was assumed in the baseline and expected reform scenarios to emphasize on the generosity of the programme. Initially, we simulated the GA under different values of income elasticity of demand for public expenditure on cash transfers including IGOAPS in the baseline scenario and UOAPS in the expected reform scenario. These elasticities are denoted by $e1$ and $e2$ respectively. We found that current fiscal policies are sustainable and generational balance is restorable if $e1$ is reduced to 0.60 and $e2$ to 0.45.[15] That is, other things being the same, if $e1 = 0.60$ (or $e2 = 0.45$), the net payment equals to INR246.36 (or 249.17) for the current generation and INR246.04 (or 247.36) for the future generation. Thus, the generational imbalance is equal to −0.13 (or −0.72) and sustainability gap equals to -6.35 (or −6.46).

Results of the sensitivity of $e1$ and $e2$ to different values of productivity growth and discount rates are given in Table 8. Current fiscal policies and expected reform are sustainable in all the sensitivity cases except when $g = 3.01$ and $r = 14\%$. This result is in

[15] We simulated a change in the mix of $e1$ and $e2$. Our findings suggest that India's current fiscal policies are sustainable (Generational Imbalance = −0.29), if $e1 = 0.80$ and $e2 = 0.65$. This indicated that policy makers may have little flexibility in increasing $e2$ for attainment of fiscal sustainability of current policies.

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Table 7
Sensitivity of GA for productivity growth and discount rates under the baseline and expected reform scenarios, India.

Indicators and generations	$g = 3.01$			$g = 4.0$			$g = 4.5$		
	$r = 10$	$r = 12$	$r = 14$	$r = 10$	$r = 12$	$r = 14$	$r = 10$	$r = 12$	$r = 14$
1. Net tax payment (INR'000) – per capita									
1.1. Current (newborn) generation	59.01	28.34	15.28	89.02	40.55	20.75	110.44	49.03	24.43
	(19.20)	(11.99)	(10.78)	(31.19)	(14.43)	(11.16)	(42.04)	(16.22)	(11.51)
1.2. Future generation	117.38	82.45	75.31	168.98	94.32	77.27	219.29	104.43	79.54
	(168.53)	(154.33)	(155.82)	(199.93)	(157.93)	(154.26)	(235.04)	(162.33)	(154.07)
2. Generational imbalance (%)	98.93	190.91	392.78	89.94	132.61	272.45	98.46	113.01	225.57
	(777.63)	(1187.65)	(1344.97)	(541.08)	(1016.75)	(1281.88)	(459.08)	(901.05)	(1238.22)
3. Sustainability gap	2.34	2.92	3.62	2.21	2.60	3.25	2.23	2.46	3.07
	(7.56)	(8.14)	(8.92)	(7.58)	(7.81)	(8.51)	(7.08)	(7.68)	(8.31)

Notes: g = productivity growth rate (%) and r = discount rate (%). Figures in parentheses refer to the expected reform on universal old age pension scheme.
Source: Author's calculations.

Table 8
Sensitivity of GA for productivity growth and discount rates and income elasticity of public old age pension expenditure under the baseline and expected reform scenarios, India.

Indicators and generations	$e1 = 0.60$ ($e2 = 0.45$)			$e1 = 0.60$ ($e2 = 0.45$)			$e1 = 0.60$ ($e2 = 0.45$)		
	$g = 3.01$			$g = 4.0$			$g = 4.5$		
	$r = 10$	$r = 12$	$r = 14$	$r = 10$	$r = 12$	$r = 14$	$r = 10$	$r = 12$	$r = 14$
1. Net tax payment (INR'000) – per capita									
1.1. Current (newborn) generation	105.81	49.21	26.07	167.00	73.07	36.60	212.09	53.15	43.77
	(110.45)	(55.22)	(32.60)	(172.40)	(79.43)	(43.40)	(218.07)	(96.57)	(50.73)
1.2. Future generation	70.13	39.14	38.17	123.27	45.25	34.09	180.14	89.96	33.32
	(90.87)	(71.83)	(78.92)	(133.44)	(70.46)	(68.57)	(186.00)	(74.52)	(64.59)
2. Generational imbalance (%)	−33.72	−20.46	46.41	−26.18	−38.07	−6.86	−15.07	−40.93	−23.87
	(−17.73)	(30.10)	(142.11)	(−22.02)	(−11.30)	(58.01)	(−14.71)	(−22.84)	(27.33)
3. Sustainability gap	−3.05	−1.04	0.47	−4.72	−2.20	−0.49	−5.77	−2.83	−1.00
	(−2.23)	(0.56)	(2.68)	(−4.39)	(−1.09)	(1.27)	(−5.67)	(−1.95)	(0.54)

Notes: g = productivity growth rate (%); r is discount rate (%), $e1$ (or $e2$) is income elasticity of public expenditure on cash transfers with old age pension in the baseline (or expected reform) scenario. Throughout, inflation rate is fixed at benchmark year (5%). Figures in parentheses refer to the expected reform scenario.
Source: Author's calculations.

Table 9
Sensitivity of GA for sources of generational imbalance and income elasticity of public old age pension expenditure under baseline and expected reform scenarios, India.

Indicators	Baseline		Expected reform	
	Zero net debt	No demographic transition	Zero net debt	No demographic transition
1. Net tax payment (INR'000) – per capita				
1.1. Current (newborn) generation	130.59	69.15	53.60	8.06
1.2. Future generation	271.74	114.09	271.93	117.48
2. Generational imbalance (%)	108.08	64.99	407.35	1356.98
3. Sustainability gap	2.22	2.74	7.87	8.56
	$e1 = 0.60$		$e2 = 0.45$	
1. Net tax payment (INR'000) – per capita				
1.1. Current (newborn) generation	246.36	122.44	249.17	125.51
1.2. Future generation	245.09	106.30	246.41	107.42
2. Generational imbalance (%)	−0.52	−13.18	−1.11	−14.42
3. Sustainability gap	−6.38	−5.63	−6.49	−5.71

Note: $e1$ (or $e2$) refers to income elasticity of public expenditure on cash transfers with old age pension in the baseline (or expected reform) scenario.
Source: Author's calculations.

contrast with the results in Table 7 and is essentially due to $e1$ and $e2$ being less than one. Thus, the policy choice of $e1$ and $e2$ does matter for restoration of sustainability of current fiscal policies and expected reform.

Sensitivity for sources of generational imbalance

Net debt (or net wealth) and demographic transition are important sources of generational imbalance (GI). We calculate these sources by asking the counter-factual question: What is the nature and magnitude of changes in the GI in the baseline scenario if India were to experience zero net debt or no change in demographic transition in size and age-sex composition over time? The answers to this question are summarized in Table 9. Three indicators are calculated (GI, sustainability gap and average net payment by current (newborn) and future generation) for zero net debt and no demographic transition under two policy scenarios (Baseline and Expected reform). These results are distinguished by assuming $e1 = 0.60$ and $e2 = 0.45$.

No demographic transition effect shows a remarkable difference in GI and other indicators under the baseline and the expected reform. No net debt effect of the GI indicators is comparable with the baseline and the expected reform. However, fiscal policies are unsustainable in both zero net debt and no demographic transition cases. These results are strongly different if $e1 = e2 < 1$. That is, sustainability of current fiscal policies and the expected reform are restorable in the presence of zero net debt or no demographic transition cases if $e1 \leqslant 0.60$ or $e2 \leqslant 0.45$.

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Table 10
Required adjustment for fiscal sustainability by tax burden and transfer payments under alternative scenarios.

Required adjustment	Required adjustments under alternative scenarios								
	$g = 3.01$			$g = 4.00$			$g = 4.50$		
	$r = 10$	$r = 12$	$r = 14$	$r = 10$	$r = 12$	$r = 14$	$r = 10$	$r = 12$	$r = 14$
Tax adjustment (%): Baseline scenario (e1 = 0.60)									
Current generation	−37.67	−9.00	NA	−93.16	−21.77	−3.92	−199.42	−30.87	−8.30
Future generation	−36.84	−21.53	NA	−40.02	−35.26	−12.60	−39.71	−39.31	−22.92
• 2010	−21.36	−8.46	NA	−29.90	−16.60	−4.30	−34.20	−20.53	−8.41
• 2020	−24.86	−11.53	NA	−32.21	−20.86	−6.33	−35.47	−24.79	−11.88
• 2030	−29.31	−16.05	NA	−34.94	−26.68	−9.55	−36.93	−30.39	−17.16
Tax and transfer adjustments (%): Baseline scenario (e1 = 0.60)									
Current generation	−27.97	−6.46	NA	−71.32	−16.05	−2.80	−155.09	−23.08	−6.00
Future generation	−29.90	−16.13	NA	−34.21	−27.72	−9.22	−34.77	−31.66	−17.14
• 2010	−17.12	−6.45	NA	−25.19	−13.08	−3.26	−29.65	−16.47	−6.47
• 2020	−20.46	−9.14	NA	−27.57	−17.01	−5.03	−31.03	−20.51	−9.54
• 2030	−24.64	−13.13	NA	−30.29	−22.34	−7.84	−32.52	−25.74	−14.23
Tax adjustment (%): Expected reform scenario (e2 = 0.45)									
Current generation	−27.49	NA	NA	−86.79	−10.78	NA	−196.08	−21.29	NA
Future generation	−26.88	NA	NA	−37.28	−17.45	NA	−39.05	−27.11	NA
• 2010	−15.58	NA	NA	−27.86	−8.22	NA	−33.62	−14.16	NA
• 2020	−18.14	NA	NA	−30.00	−10.33	NA	−34.87	−17.10	NA
• 2030	−21.39	NA	NA	−32.55	−13.21	NA	−36.31	−20.96	NA
Tax and transfer adjustments (%): Expected reform scenario (e2 = 0.45)									
Current generation	−18.66	NA	NA	−61.85	−7.23	NA	−143.20	−14.61	NA
Future generation	−22.15	NA	NA	−32.19	−14.06	NA	−34.44	−22.29	NA
• 2010	−12.26	NA	NA	−23.35	−6.33	NA	−29.17	−11.17	NA
• 2020	−14.85	NA	NA	−25.74	−8.37	NA	−30.63	−14.11	NA
• 2030	−18.03	NA	NA	−28.39	−11.10	NA	−32.17	−17.84	NA
Required adjustment in tax burden and transfer payments by sources of generational imbalance									
	Baseline scenario ($e1$=0.60)				Expected reform scenario ($e2$=0.45)				
	Zero debt case		No demographic transition		Zero debt case		No demographic transition		
	Tax	Tax and transfer	Tax	Tax and transfer	Tax	Tax and transfer	Tax	Tax and transfer	
Current generation	−814.66	−627.58	−844.15	−619.70	−829.00	−598.39	−856.95	−564.17	
Future generation	−37.87	−33.43	−32.68	−27.56	−38.53	−34.30	−33.17	−28.22	
• 2010	−36.47	−32.08	−31.79	−26.75	−37.11	−32.85	−32.27	−27.30	
• 2020	−36.79	−32.45	−32.12	−27.09	−37.44	−33.26	−32.61	−27.69	
• 2030	−37.16	−32.83	−32.45	−27.42	−37.81	−33.68	−32.95	−28.05	

Notes: NA refers to not applicable for lack of fiscal sustainability or GI > 0. $e1$ (or $e2$) refers to income elasticity of public expenditure on cash transfers with old age pension in the baseline (or expected reform) scenario.
Source: Author.

Required adjustment for fiscal sustainability by taxes and transfers

Results in Tables 5, 6, 8 and 9 show that current fiscal policies are sustainable under different scenarios and assumptions. The required tax and transfer adjustments to establishing these fiscal sustainability cases are presented in Table 10. Four major conclusions from these analyses are as follows. First, required adjustments need the highest reduction in tax burden for the current generation. Second, the magnitude of required adjustments is different between the current and future generations as productivity growth rate increases in the baseline and expected reform scenarios. Third, the required adjustments in the magnitude of tax burden and transfer payments declines as the required adjustments are delayed from 2010 through 2030. Fourth, required adjustments by sources of generational imbalances are strikingly different between the scenarios in terms of reduction in tax burden. However, required reduction in tax burden is bigger in no demographic transition than zero debt under both the scenarios.

Conclusions and implications

Using the standard GA framework, this paper has analyzed the sustainability of India's current fiscal policies in the context of population ageing for the benchmark year, 2004–05. Sustainability is determined under the current policies (Baseline scenario), current policies under alternative assumptions on productivity growth and discount rates, expected policy reform on Universal Old Age Pension Scheme, income elasticity of public expenditure on cash transfers with old age pensions and by sources of generational imbalance.

The main conclusion of the analyses is that India's current fiscal policies are sustainable in the context of population ageing if the income elasticity of public expenditure with old age pension is at 0.60 in the baseline scenario and 0.45 in the expected reform scenario. This result seems to be robust because sustainability is preserved by changes in productivity growth rates (3–4.5%) and discount rates (10–14%) or by sources of generational imbalance. This conclusion provides the policy makers with flexibility to choose between reduction in taxes or/and increase in transfers to future generations in order to satisfy the inter-temporal budget constraint. For instance, a lower discount rate and higher growth rate of productivity would make the biggest impact on reduction in tax burden of current and future generation under the baseline (or expected reform) scenario in order to sustain the current fiscal policies in the context of population ageing. This conclusion supports for implementation of UOAPS without sacrificing the sustainability of current fiscal policies if policy makers can set the income elasticity at suggested levels.

Policy makers are not sure of the current and long term fiscal implications of proposals for public-funded universal old age pension schemes. If quantified, these implications are of current policy

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use and public importance. This paper does this by using the GA methodology and offers unambiguous quantitative implications on sustaining the current fiscal policies in the context of population ageing and expected reform on universal old age pension scheme in India. These implications on generational and welfare effects of the pension proposal on the current fiscal policies are contributory to clear the policy makers' hesitations to introducing the expected reform as it is related to sustainability of current fiscal policies.

Sources of generational imbalance can be traced to net debt and demographic transition. The evidence in this paper shows that the current fiscal policy as well as the expected reform is sustainable in both zero net debt and demographic transition cases, if the income elasticity can be adjusted to be below the suggested levels. This implies that India's sustainability of current fiscal policies can be unique to a particular source of generational imbalance or particular to expected reform.

Overall, the results, conclusions and implications of this paper show that population ageing cannot be neglected or ignored in the context of fiscal sustainability and intergenerational distribution of welfare in India. In this context, Generational Accounting methodology is particularly useful tool because of its ability to capture the generational effects of current fiscal policies and expected reform associated with population ageing.

The results of this paper are obtained at the national level of aggregation for fiscal policies of the combined Central and State governments. In India's federal structure, the State governments have considerable autonomy in fiscal policy formulations and sustainability is a major current policy debate at the state level as well. Given that India's demographic transition and population ageing are distinguishable by States, sustainability of State level fiscal policies is an important extension of this paper. To our knowledge, GA methodology is not applied to determine fiscal sustainability in other Asian economies or elsewhere in South East Asia and Far East except for Japan, South Korea and Thailand. Subject to the comparability of economic structure, the application of the standard GA methodology in this paper may offer useful lessons to other countries for exploring the fiscal sustainability options in the context of population ageing.

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