

This article was downloaded by: [M. R. Narayana]

On: 14 August 2012, At: 20:04

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Asian Population Studies

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/raps20>

IMPACT OF POPULATION AGEING ON INDIA'S PUBLIC FINANCE

M. R. Narayana

Version of record first published: 13 Aug 2012

To cite this article: M. R. Narayana (2012): IMPACT OF POPULATION AGEING ON INDIA'S PUBLIC FINANCE, Asian Population Studies, DOI: 10.1080/17441730.2012.714670

To link to this article: <http://dx.doi.org/10.1080/17441730.2012.714670>



PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

IMPACT OF POPULATION AGEING ON INDIA'S PUBLIC FINANCE

New evidence and implications

M. R. Narayana

This paper integrates the methodology of the National Transfer Accounts and Budget Forecasting Model to compute and forecast the impact of population ageing on India's public finance from 2005 through 2050, based on the fiscal structure in 2004–2005. The empirical results are new and have useful policy implications. The forecasted increase in the share of total public expenditure on elderly individuals is largely accounted for by expenditure on civilian pensions and other cash transfers, government services, and poverty and other social protection. Elderly individuals are found to be not very expensive in terms of public health expenditure. Tax revenues increase and result in a decline of debt-to-GDP ratio because population ageing does not lower tax buoyancy in the long run. Overall, the increasing total budget surplus and fiscal support ratio implies that the long-term impact of population ageing may be fiscally sustainable.

KEYWORDS: National Transfer Accounts; Budget Forecasting Model; population ageing

Introduction

The United Nations-projected age structure transition of India from 2007 through 2050 (United Nations 2007a) indicates a rising share of the aged (age 60 and above) from 8.1 per cent to 20.7 per cent of the total population, and a rising value of the Ageing Index (or number of persons aged 60 and above per 100 persons under age 15) from 26.1 to 113. By the percentage of the population aged 60 and above (or Ageing Index), India ranked 90th (or 94th) among 192 countries in 2007. India's old age dependency ratio shows an increase from 8.6 per cent in 2007 to 12 per cent in 2025 and 22.2 per cent in 2050. Thus, population ageing will matter for India, especially if policy reforms are aimed at universal social security and healthcare systems that create large-scale public transfers to the elderly individuals. Such policy reforms may pose serious challenges to managing and sustaining fiscal resources, once they have begun to mature for the projected total elderly population of 330 million in 2050. This implies that population ageing may have important long-term implications on the public finance of India.

Studies on India's age structure transition (Chakraborti 2004; Rajan & Aliyar 2008; Rajan & Mathew 2008; Rajan & Prasad 2008; Rajan *et al.* 1999) have focused on descriptions of: (a) age structure and dependency transitions using descriptive statistics such as median age, index of ageing and dependency ratio; and (b) living conditions, and the limited public policies and programmes for social security, of the elderly individuals. These descriptions have led to a major conclusion that India's population ageing will be a

problem in the future and that the provision of universal social security is challenging. In addition, these studies have shown that public support of elderly individuals is negligible and limited to benefits under the National Old Age Pension Scheme. Mohan (2004) analyses the fiscal pressures and challenges of population ageing including in India. Population ageing increases fiscal pressures because of higher public expenditures on social security, healthcare and other welfare programmes for elderly individuals, accompanied by lower tax buoyancy as a consequence of a falling proportion in the productive labour force. Further, Mohan (2004) recognises fiscal sustainability as a key challenge, given the increasing pressure to raise contribution levels to public pensions or to reduce social safety benefits, and argues that the public pension reforms for government employees and health insurance would play a key role in alleviating the fiscal burden. Heller (2006) recognises that demographics do pose important long-term government expenditure and social policy issues for the government, although India does not have a Beveridgean social insurance policy in place. In general, these studies leave an important gap with regard to explaining and quantifying the long-term impacts of population ageing on India's public finance. This research gap is filled in this paper by using a plausible fiscal policy framework with age specificity of public expenditures and long-term sustainability of existing fiscal structures.

At a global level, the economic impacts of age structure transition with special reference to ageing are analysed by Mason (2005), United Nations (2007b) and Heller (2007). In particular, the long-term fiscal impacts of population ageing on public finances have been studied for countries in North America, Europe and South America. These studies include Jackson and Matier (2002) for Canada, Kluge (2011) for Germany, OECD (2003) for 15 EU countries, Visco (2001) for 29 OECD countries, Miller *et al.* (2011) for 10 Latin American countries, and Miller and Castanheira (2011) for Brazil. These studies are based on budget projection or forecast models under different assumptions of fiscal sustainability and fiscal scenario in terms of government revenues and programme spending over the period to 2050. The basic result of these studies shows that: (a) population ageing has the potential to impact key categories of programme spending and revenue in Canada; (b) budgetary pressures from ageing populations could add, on average, some seven percentage points, as a share of the gross domestic product (GDP), to government outlays on the aged in OECD countries; (c) the four pillars of the social security system, viz. health, pensions, unemployment and long-term care, would face an unbalanced budget as social contributions are likely to decrease due to a lower number of persons of working ages in Germany; (d) population ageing would lead to an increase in projected public spending of between three and seven percentage points of GDP, mainly driven by spending on pension, healthcare and long-term healthcare, with a relatively small potential offsetting savings in terms of public spending on education and unemployment benefits in EU countries; (e) population ageing would increase public spending by about seven percentage points of GDP through 2050 in the Latin American countries, similar to the forecast for OECD above; and (f) substantial additional fiscal pressures on publicly financed healthcare and pensions, along with substantial reductions in publicly financed education in Brazil. These results at the global level are important for singling out what is common and unique between India and the rest of the world, and for drawing useful policy lessons as they are related to the public finance implications of population ageing.

This paper integrates the methodology of the National Transfer Accounts (NTA) by Mason *et al.* (2006) and the Budget Forecasting Model of Miller (2006), in order to compute and forecast the impact of population ageing on India's public finances from 2005 through 2050 based on the fiscal structure in the period 2004–2005. The NTA-based age profiles of labour earnings and public expenditures are the bases for the long-term budget forecasting of population ageing. Age profiles of public expenditure are distinguished by education, health, civilian pensions and other cash transfers, poverty and other social protection, and general government services. The impact is distinguished by distinct policy scenarios, i.e. unsustainable, baseline and rapid growth in health, and is determined by the simulation of different mixes of fiscal policy instruments, i.e. public expenditure, taxes and debt. This analysis is fiscally sustainable, if the debt-to-GDP ratio does not begin to increase beyond 80 per cent in the period 2004–2005. However, the application of the NTA and the Budget Forecasting Model are new to answering the nature and magnitude of the long-term impact of population ageing on India's public finance and the sustainability of India's fiscal policy.

The main result of this paper is that population ageing does matter for the long-term public finance of India. On the expenditure side, the impact of population ageing is evident from the increasing share of public expenditure on civilian pensions and other cash transfers, and poverty and other social protection, devoted to elderly individuals. Unlike in other ageing economies of North America and Europe, elderly individuals may not be expensive in terms of public health expenditure. On the revenue side, population ageing does not lower tax buoyancy in the long run because it does not entail the consequence of a falling proportion in the productive labour force. Consequently, tax revenues will increase, and debt-to-GDP ratio will decline, over the period 2005 to 2050. Interestingly, population ageing has a larger effect on increasing the revenues than on expenditure, although the growth rate of expenditure for the elderly population is higher than for all ages. Hence, the total budgetary surplus increases, especially under the assumptions of the baseline and rapid growth in health scenarios. This leads to a major conclusion of this paper that population ageing may not have an unsustainable and adverse impact on India's public finance in the long run.

The rest of this paper is organised as follows. The next section presents a brief description of public support for elderly individuals in India. The section after next outlines the empirical framework of the NTA methodology and the Budget Forecasting Model. Data and variable descriptions are described thereafter, following which simulation results will be analysed. The major conclusions and implications are summarised in the last section.

Public Support for Elderly Individuals

India's public support for elderly individuals at the national level of aggregation and in the period 2004–2005 is briefly described below as a general background and factual basis for the empirical issues and analyses in this paper.

In India's National Accounts Statistics (NAS), the public sector includes administrative departments, departmental and non-departmental enterprises, and quasi-government bodies. Throughout this paper, by public sector, we mean the general government comprising the administrative departments at national and sub-national levels, and

quasi-government bodies. This definition and composition of public sector is consistent with the NTA methodology and the IMF definition of public sector. This definition of public sector is especially relevant for this paper because social sectors, such as education, health and social security, including welfare programmes for elderly individuals, are included in the Concurrent List of the Indian Constitution, and are the joint responsibility of the national and sub-national governments.

India's public support for elderly individuals takes several forms and is as follows:¹

- Pension payments for retired government employees in the central and state governments including defence personnel.
- Contribution to social security schemes of employees in public sector enterprises and the unorganised sector.
- Expenditure on social security and welfare, which includes old-age pension for civilians and programmes of affirmative action for the socially disadvantaged and economically weaker sections of the society. For instance, the Social Assistance Programme includes the National Old Age Pension Scheme (NOAPS), the National Family Benefit Scheme and the National Maternity Benefit Scheme. The NOAPS was introduced in 1995 for destitute individuals above age 65 with no means of livelihood and renamed as the Indira Gandhi National Old Age Pension Scheme since November 2007. At present, the extent of monetary assistance is equivalent to INR200 per month per beneficiary, and the assistance is extended to all who are below the poverty line and above the age of 60 years. Eligible older persons not covered by this pension scheme are provided with 10 kg of food grains per month, supplied free of cost, under the Annapurna Scheme since 1999. The National Family Benefit Scheme provides insurance coverage against the death of a prime household earning member in the age group of 18–65, and the lump sum family benefit is equivalent to INR10,000. The National Maternity Benefit Scheme is for pregnant household women below the poverty line and above 19 years of age. The benefit is equivalent to a lump sum amount of INR500 per beneficiary.
- Non-age-specific public expenditure programmes, e.g. poverty alleviation schemes and affirmative actions, in which the beneficiaries include elderly individuals.
- Welfare programmes by specific departments for senior citizens, e.g. special income tax rebates, higher rates of interest on savings schemes, concessions in bus/train fares and special interest rate on bank deposits.

Interestingly, the share of the National Social Assistance Programme in the combined revenue expenditure of the central and state governments was about 0.17 per cent in the period 2004–2005. The total coverage of the beneficiaries of the programme was about 9.2 million persons, with the largest share of beneficiaries under the NOAPS (88 per cent). These beneficiaries accounted for about 13 per cent of the total population in the age group of 60–90 in 2004.² This indicated that the size and coverage of direct public expenditure on elderly individuals was negligible in India. This was perhaps the main reason for considering the scenario of low public support to elderly individuals in India. However, the NTA methodology, to which we turn below, gives a broader measure of public transfers to elderly individuals, by including all transfers that may not be labelled by the government as specially targeting elderly individuals.

Empirical Framework

National Transfer Accounts (NTA)

The NTA is a useful macroeconomic framework for drawing age profiles of the labour income and public consumption variables, by introducing age into the National Income and Product Accounts. Economic-demographic theory, empirical analysis and case studies of the NTA are provided in Lee and Mason (2011a), and a regularly updated methodology of the NTA is available in NTA (2012). An overview of the methodology for the computational purposes of this paper is presented below.

Following Mason *et al.* (2006) and Mason and Lee (2011), the NTA is a measure of reallocations or shift of resources from one age group to another, or of inter-generational transfers at the national level of aggregation. Reallocations occur because consumption and production differ at different ages of individuals. The NTA documents the means by which those with lifecycle deficits, e.g. the young and the old, draw on lifecycle surplus generated, for example, during the working ages. The individual is the fundamental analytic unit and hence, all transactions are treated as flowing to and from individuals, and are classified on the basis of the age of individuals. Public and private institutions, e.g. families, mediate the individual transactions, and all estimations are distinguishable by public and private sectors.

The NTA Flow Account identity (suffix 'f' stands for the private sector and 'g' for the public sector, and 'i' refers to the individual or age group) is defined by the following:

$$Y_{L,i} + Y_{A,i} + (T_{f,i}^+ + T_{g,i}^+), = (C_{f,i} + C_{g,i}) + S_i + (T_{f,i}^- + T_{g,i}^-) \quad (1)$$

where $Y_{L,i}$ is labour income, $Y_{A,i}$ is non-labour or asset income, $T_{f,i}^+$ and $T_{f,i}^-$ are private transfer inflows and outflows, respectively, $C_{f,i}$ is private consumption expenditure, $C_{g,i}$ is public (government) consumption expenditure, S_i is savings, and $T_{g,i}^+$ and $T_{g,i}^-$ are public transfer inflows and outflows, respectively. In short, equation (1) shows the equality between the total inflows and outflows. Rearranging terms in (1), we get:

$$(C_{f,i} + C_{g,i}) - Y_{L,i} = (Y_{A,i} - S_i) + (T_{f,i}^+ - T_{f,i}^-) + (T_{g,i}^+ - T_{g,i}^-) \quad (2)$$

The left hand side of (2) is defined as the lifecycle deficit (LCD). On the right-hand side, $(Y_{A,i} - S_i)$ is asset reallocations, $(T_{f,i}^+ - T_{f,i}^-)$ is net private transfers and $(T_{g,i}^+ - T_{g,i}^-)$ is net public transfers. The sum of assets reallocation, net private transfers and net public transfers is equal to the total age reallocations. Net exports are indirectly introduced in (2) to take care of Rest-of-World (ROW) and equal to: $[Y_{L,ROW} + Y_{A,ROW} + (T_{ROW}^+ - T_{ROW}^-) + S_{ROW}]$, where $Y_{L,ROW}$ is net compensation of employees from ROW, $Y_{A,ROW}$ is net property and entrepreneurial income from ROW, $(T_{ROW}^+ - T_{ROW}^-)$ is net transfers from ROW, and S_{ROW} is net borrowings from ROW (or net savings). Thus, the variables in (2) are consistent with an open-macro economy.

In empirical terms, the NTA is a computational framework to calculate the per capita age profiles of the variables by drawing heavily from survey and administrative data.³ These age profiles explain the age pattern of actual behaviour. The calculation needs selective adjustment in aggregate controls, i.e. aggregated across all ages and held constant throughout the estimations, to derive aggregate and per capita age profiles. A general adjustment procedure is to derive age profiles to match the aggregate controls.

This is as follows. Let x_i be the per capita age profile, N_i the population, and X the aggregate control. Then, per capita age profiles are adjusted using a factor, θ , such that: $\theta = \sum(x_i N_i)/X$, and final per capita profile and aggregate profile are given, respectively, by: $x_i^* = (x_i/\theta)$ and $X_i^* = (x_i^* N_i)$.

Equation (2) is a general basis for cross-sectional estimation of the age profiles of aggregate labour income and public consumption variables. These variables extend the public support for elderly individuals beyond the civilian pensions for the aged and provide a comprehensive framework for the estimation of public support for the elderly. Selective age profiles of public sector variables in (2) are the basis for drawing the expenditure profiles in the Budget Forecasting Model presented in the following section.

Budget Forecasting Model

Following Miller (2006), the Budget Forecasting Model is formulated to quantify the impact of population ageing on India's public finance under three alternative policy scenarios: unsustainable; baseline; and rapid growth of health spending. Each scenario includes specific assumptions on taxes, expenditure and debt. The unsustainable scenario forecasts the means of financing new fiscal burden of population ageing as that of public borrowings, and without increases in taxes and reductions in benefits (or expenditure). A short-run solution that leads to an unsustainable explosion is explored in this unsustainable scenario. The baseline scenario considers a combination of fiscal policies which either prevent an explosion of public debt or ensure the attainment of a sustainable level of debt, i.e. 80 per cent of GDP. The rapid growth of the health spending scenario assumes that health spending per beneficiary grows 1 per cent faster than labour productivity and forecasts a fiscally sustainable growth rate of this health expenditure.⁴ The specific assumptions in forecasting the above scenarios are as follows:

- a) Aggregate labour income [YL(t)] is derived by using a fixed age shape of labour earnings $YL(x,t^*)$, which shifts upward over time at the growth rate of labour productivity (e^{rt}), combined with a forecast of the population by age $P(x,t)$.

$$YL(t) = \sum e^{rt} YL(x,t^*) P(x,t) \quad (3)$$

- b) GDP is derived by assuming a fixed ratio of GDP to aggregate labour income (α).

$$GDP(t) = \alpha YL(t) \quad (4)$$

- c) Government revenues are assumed to be derived from taxes on labour income and are expressed as a fraction of GDP [$\beta(t)$ is the tax rate].

$$T(t) = \beta(t) GDP(t) \quad (5)$$

- d) Aggregate government expenditures are derived by using a fixed age shape of programme benefits, which shift upward over time at the growth rate of labour productivity, combined with a forecast of population by age. For instance, let the aggregate government expenditure on education be $E(t)$. Then,

$$E(t) = \sum e^{rt} E(x,t^*) P(x,t) \quad (6)$$

- e) Rates of productivity growth, the interest rate and the inflation rate are assumed to be unaffected by levels of government debt and taxation, and the distribution of government spending.

Throughout, the fiscal structure of India, as defined by the combined budgetary position of the union and state governments in the period 2004–2005, is assumed to remain intact up to 2050. Long-term fiscal sustainability is measured by a public debt-to-GDP ratio that does not rise beyond 80 per cent in the period 2004–2005.⁵ This approach to fiscal sustainability is close to that of Jackson and Matier (2002), who defined fiscal sustainability as a debt-to-GDP ratio that does not 'begin to rise considerably' (p. 4). Further, public expenditure is broadly grouped under education, health, civilian pensions and other cash transfers, poverty and other social protection, and government services. The forecasting model is integrated with the NTA through the age profiles of labour income and public expenditure variables. In particular, the age profiles of the public sector's consumption and public transfer inflows in the NTA are converted into expenditure profiles in the Budget Forecasting Model. The age specificity of these expenditures is explained in the following section.

Data and Variable Descriptions

Table 1 summarises the description of variables, parameters and data sources of fiscal and non-fiscal variables used in the Budget Forecasting Model. Data descriptions and the NTA rules on the age profiles of labour income and public consumption (or in-kind transfers) and cash transfer variables are given in Table 2. Throughout, all variables are measured at current prices. The NTA assumptions and approximations used to obtain the aggregate controls and age profiles are briefly discussed below.

Columns 1 and 2 in Table 2 list the aggregate controls and their measurements in India's NAS. Aggregate labour income is constructed by sum of labour income in the formal sector (compensation of employees and net compensation of employees from the ROW) and the informal sector (labour share of mixed income). The key assumption is that two-thirds of mixed income goes to labour. This share is generally assumed in the NTA methodology when no other sources of information on relative share of labour in mixed income are available.⁶

Column 3 in Table 2 gives the methods and databases of deriving age profiles for all aggregate control variables. Throughout, the United Nations-projected population (medium variant) by single years in 2004 is used to compute the aggregate controls and draw the per capita age profiles. The India Human Development Survey 2005 (Desai *et al.* 2008) is a micro data on households and individuals from a nationally representative sample of 41,554 households comprising 215,754 individuals, spread over 1503 villages and 971 urban neighbourhoods, and available in the public domain from the Inter-University Consortium for Political and Social Research. The main advantages of this database include the following. Both income and consumption data are available for the same households, and closely correspond with the National Sample Survey Organization's Consumer Expenditure Survey and Employment and Unemployment Survey, except for a smaller sample size and coverage. In the absence of data at the individual level, however, specific assumptions are needed to assign the labour income of households or families to

TABLE 1
Variable descriptions and data sources for the Budget Forecasting Model.

Variable	Measurement	Data source(s)
1. Real interest rate on government debt	Nominal interest rate minus the inflation rate. The nominal interest rate is equal to the highest interest rate on the small public savings scheme.	Government of India (2009)
2. Real growth rate of labour productivity per worker	Annual growth of gross value added per worker (at 1999–2000 prices) over the period 1999–2000 to 2004–2005.	Government of India (2008)
3. Labour earnings	Measurement of labour earnings and its age profile are based on the NTA methodology for computation of aggregate labour income and its age profile in Table 2.	Author
4. Inflation rate	Annual percentage change in the Wholesale Price Index for all commodities.	Government of India (2010)
5. GDP	Gross domestic product at current market prices.	Central Statistical Organization (2008)
6. Total outstanding government debt	Liabilities position of the central and state governments at end March 2005.	Government of India (2009)
7. Annual government deficit	Combined gross fiscal deficit of the central and state governments.	Government of India (2009)
8. Total government revenue	Combined revenue receipts of the central and state governments.	Government of India (2009)
9. Total government spending	Combined revenue and capital expenditure of the central and state governments.	Government of India (2009)
10. Education	Combined revenue and capital expenditure of the central and state governments on education (includes art and culture). Age profile of this expenditure is based on the NTA methodology for computation of aggregate public education consumption and its age profile in Table 2.	Government of India (2009)
11. Health	Combined revenue and capital expenditure of the central and state governments on medical and public health (includes water supply and sanitation) and family welfare. Age profile of this expenditure is based on the NTA methodology for computation of public health consumption and its age profile in Table 2.	Government of India (2009)
12. Poverty and other social protection	Combined revenue and capital expenditure of the central and state governments on social security and welfare. Age profile of this expenditure is based on the NTA methodology for computation of 'poverty and other social protection' and its age profile in Table 2.	Government of India (2009)
13. Debt servicing	Combined expenditure of the central and state governments on interest payments.	Government of India (2009)
14. Civilian pensions and other cash transfers	Measurement of this expenditure and its age profile expenditure are based on the NTA methodology for computation of 'civilian pensions and other cash transfers' and its age profile in Table 2.	Government of India (2009)
15. Government services	Total government spending minus (10) through (14). Age profile of this expenditure is based on the NTA methodology for computation of other public consumption and its age profile in Table 2.	Government of India (2009)

Source: Author.

TABLE 2

Variable and data descriptions for the construction of aggregate controls and their age profiles by the NTA methodology.

Aggregate controls	Measurement of aggregate controls	Age allocation methods and data sources
1. Labour income	Compensation of employees + (2/3) of mixed income + net compensation of employees from rest-of-world (ROW)	Age profile is based on the combined age profile of income from salaries, wages and self-employment, using the individual income from wages and salaries, and household income from self-employment, i.e. farm income and non-farm business income, in the India Human Development Survey 2005 (Desai <i>et al.</i> 2008). The self-employment income of a household is allocated to individuals in a household who are reported as self-employed, using the age profile of mean earnings of employees. Accordingly, self-employment income accruing to the i^{th} individual in household j [$YLS_{ij}(x)$] is equal to $YLS_j \cdot \gamma(x)$ and $\gamma(x) = [w(x) \cdot SE_j(x)] / \sum w(a) \cdot SE_j(a)$, where x is the age of i^{th} household; $SE_j(a)$ is the number of people in household j who are self-employed or who are unpaid workers of age a ; $w(a)$ is the 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 .
2. Public consumption	Government final consumption expenditure (GFCE)	Age profile is derived by public formal and informal education. Public formal education age profile is computed based on public education consumption per student by level 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 the National Sample Survey Organization (July 2004–June 2005) on the Status of Education and Vocational Training in India 2004–2005, the share of attendance in public institutions, by level of education, is computed. This share is applied for total enrolment data in the Government of India's Education Statistics 2004–2005 to obtain the attendance rate in public institutions, i.e. government and local body institutions. Second, using the Indian Public Finance Statistics 2008–2009 (Government of India 2009), revenue expenditure on education, by all levels of government (including non-education departments), is obtained. Public education consumption is presumed to be proportional to revenue expenditure by level 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 a per capita basis for age group 30–60.
2.1. Public education consumption	Expenditure on education services under the GFCE	

TABLE 2 (Continued)

Aggregate controls	Measurement of aggregate controls	Age allocation methods and data sources
2.2. Public health consumption	Expenditure on health and other services under the GFCE	Age profile is drawn using individual-level data on the utilisation of public health facilities in the 60th Round of the National Sample Survey on Healthcare, Morbidity and Conditions of the aged in India in 2004. Public health facilities refer to health services provided by public hospitals and dispensaries including primary health centres, sub-centres and community health centres. Utilisation is proxied by expenditure incurred on treatment for hospitalised or inpatient care (during the 365 days prior to the survey), non-hospitalised or outpatient care (during the 15 days prior to the survey), and other expenditures, e.g. transport expenses to and from the hospital visits.
2.3. Other public consumption	Expenditure on non-education and non-health services under the GFCE	Other public consumption includes: general public services; defence; housing and other community amenities; cultural, recreational and religious services; and economic services, e.g. agriculture, mining, transport and communication. This variable is allocated on a per capita basis.
2.4. Poverty and other social protection	Social security and welfare services under the GFCF	Age profile is based on the beneficiaries of various anti-poverty programmes, such as the Integrated Rural Development Programme, and recipients of such things as government land, housing and house construction materials. The age profile of these beneficiaries and recipients is related to the head of the household, under income from other sources for the household, in the India Human Development Survey 2004–2005 (Desai <i>et al.</i> (2008).
3. Public cash transfers		
3.1. Civilian pensions and other cash transfers	Sum of other current transfers from the general government and social benefits not in-kind	In India's National Accounts Statistics and in the Accounting Framework of System of National Accounts 1993, cash transfers are distinguishable from 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 health and other social sectors. These transfers are considered non-age-specific, and are allocated on a per capita basis. Social benefits not in-kind mainly include social assistance programmes such as the National Old Age Pension Scheme, the Widow Pension Scheme, the National Maternity Benefit Scheme, the National Disability Pension Scheme and the 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 2004–2005 (Desai <i>et al.</i> 2008), the age profile of cash transfers is derived.

Note: All aggregate controls are derived and measured using the data in the India National Accounts Statistics 2008 (Central Statistical Organization 2008).

Source: Author.

individuals, because the individual is the fundamental entity in the NTA. This is evident, for instance, for labour income from self-employment.

Public consumption variables do not pose the problem of intra-household allocation as they are directly assigned to individuals. Of the public consumption variables, the simplest rule of per capita allocation is applied to general government services, because this consumption includes goods and services available to all persons such as defence and administrative services. The age profile of public education consumption is derived separately for: (a) public formal education based on per student consumption computed by levels of education; and (b) public informal education, e.g. adult literacy programme, on a per capita basis for the age group 30–60. Public health consumption is allocated to individuals based on their expenditure on the utilisation of health services in public health institutions.

In India's NAS, pension for government employees is a part of the compensation for employees and cannot be included under civilian pensions.⁷ Thus, pensions refer to civilian pensions, but not to pensions to government employees. The civilian pensions are broadly defined as a form of cash transfer, and are measured by the sum of other current transfers and social benefits not in-kind in India's System of National Accounts. The expenditure profile of poverty and other social protection is drawn based on the age distribution of the beneficiaries of anti-poverty programmes.

The age profile of per capita labour income is shown in Figure 1. The labour income increases rapidly and then slowly, peaking in the early or mid 40s, dropping precipitously around age 60, and more slowly at ages above 60. These age patterns of labour income may be explained by the nature of the formal and informal sectors' employment, because the labour income from both these sectors is combined in the profile. For instance, the drop of labour income around age 60 is due to the official retirement age (60–62 years) in formal sector jobs. The availability of employment opportunities in the informal sector, with no strong enforcement of the Child Labour (Prohibition and Regulation) Act 1986, and no official or mandatory retirement age, are strong reasons for the existence of labour

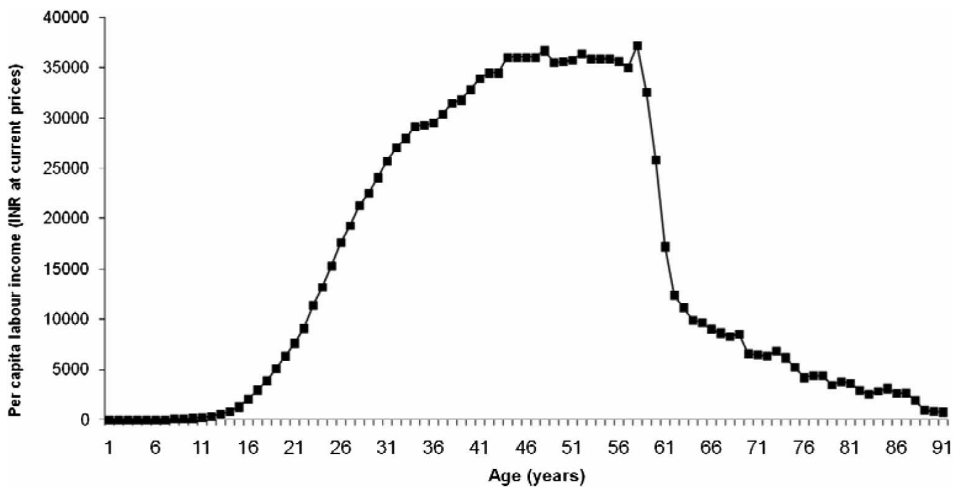


FIGURE 1
Age profile of per capita labour income, India, 2004–2005.

income for children and the elderly. Particularly in agriculture and the informal service sectors, age at entry into the labour force is early for children and age at withdrawal is late for the elderly. Consequently, the decline in labour income is gradual, or drop-off is slower, at ages above 60.⁸ In addition, youth unemployment and under-reporting/non-reporting of income, by age, in informal sector jobs may explain the shift of profile towards later ages as the starting point of earning labour income.⁹

It is important to recognise in Figure 1 that elderly individuals (aged 60 and above), as well as children (below age 15), account for a portion of labour income, though this portion is much larger for the elderly than for children. Aggregate labour income for the elderly is INR674.96 billion—about nine times bigger than aggregate labour income for children. Per capita labour income for children at age 14 (INR1255) is lower than that for the elderly up to age 87. Further, there is a much smaller variation in per capita labour income for children than for the elderly (the standard deviation of per capita labour income is 364 for children and 3197 for the elderly). This has important implications for the Budget Forecasting Model because the labour income is the basis for tax revenues used to finance public expenditures.

Lee and Mason (2011b) have presented the international comparisons between the pooled labour income profiles of four developed countries, i.e. USA, Sweden, Finland and Austria, and four poor non-Asian developing countries, i.e. Brazil, Costa Rica, Nigeria and Kenya. Their interesting findings include: (1) children in poor countries beginning productive economic activity at younger ages and hence, having higher labour income than those in developed countries; (b) labour income dropping precipitously after age 60 or so in developed countries for various reasons including the incentives and opportunities provided by public sector pension programmes; and (c) greater labour income at the extremes of age distribution being a characteristic feature of poor countries. Further, a comparison between the pooled labour income profile of the above four poor non-Asian developing countries and four South and Southeast Asian countries, i.e. Thailand, India, Philippines and Indonesia, show: (a) a higher labour income for the Asian countries up to around age 40; and (b) labour income coinciding between Asian and non-Asian countries in subsequent ages up to the mid-60s. Interestingly, the shape of India's per capita labour income profile for the elderly in Figure 1 is comparable to the above findings of Lee and Mason (2011b) for the developing countries in Asia and Africa. This comparability suggests the generalisability of labour income profile for the elderly across the developing countries.

Per capita expenditure profiles are shown in Figure 2. The education-based expenditure is zero for elderly individuals. The size of government services to the elderly age groups is smaller than that to the non-elderly age groups because it is allocated on a per capita basis. The per capita health expenditure is low, but not constant, across the ages.¹⁰ Its variability is lower as compared to other expenditures. For instance, the standard deviation of per capita health expenditure is about 77, compared to the standard deviation of education expenditure (913), civilian pensions and other cash transfers (1338), and poverty and social protection (280). For elderly individuals, the standard deviation of per capita health expenditure is about 12. Civilian pensions and other cash transfers, as they relate to the Social Assistance Programmes under the social benefits not in-kind, are mainly directed to the elderly population. For instance, except for the National Maternity Benefit Scheme and the National Disability Pension, a large number of sample beneficiaries in the India Human Development Survey 2004–2005 include elderly

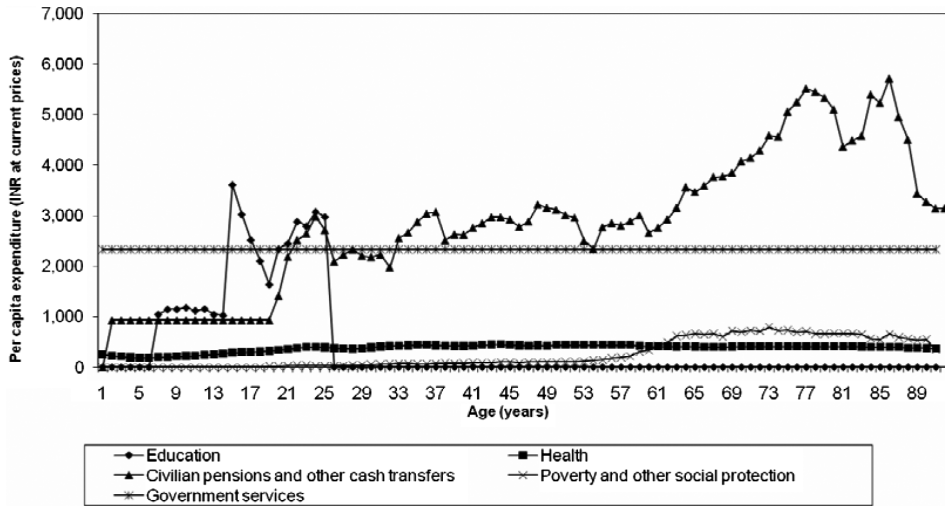


FIGURE 2
 Age profiles of per capita public expenditure, India, 2004–2005.
 Source: Author.

individuals, and the highest number of sample beneficiaries belonged to the National Old Age Pension Scheme. This is consistent with the fact that the highest proportion of beneficiaries of the Social Assistance Programme belongs to the NOAPS, as explained in an earlier section in this paper. The other component of cash transfers, i.e. other current transfers from the general government are considered non-age specific and allocated on a per capita basis. Overall, these transfer-based expenditures show strong age effects in favour of elderly individuals. In the same way, the strong age effects in favour of elderly individuals are evident from the age profile of poverty and other social protection-based expenditure. These public expenditures are important for capturing the impact of population ageing on public finance through the Budget Forecasting Model in this paper.

Results of the Budget Forecasting Model

The results of the Budget Forecasting Model are presented by impact of population ageing on public expenditures, tax revenues and debt, and overall public finance in India. In addition, the results are distinguished by three policy scenarios.

The forecasted share of elderly individuals by composition of public expenditure (or expenditure in brief) and aggregate expenditure in the baseline scenario is presented in Table 3. First, the forecasted expenditure share of elderly population is the highest for: (a) civilian pensions and other cash transfers; and (b) poverty and other social protection. For instance, forecasted expenditure on the elderly population is about 31 per cent of the total expenditure on civilian pensions and other cash transfers, and about 69 per cent of the total expenditure on poverty and other social protection in 2050. In principle, these expenditures are not entirely intended for the elderly individuals. However, based on the age profiles of these expenditures, they are shown to have strong benefits for the elderly population. This result is mainly attributable for application of the NTA methodology,

TABLE 3

Share of public expenditure and labour earnings for the elderly population, India, 2005–2050.

Year	Health		Civilian pension and other cash transfers		Poverty and other social protection		Government services		All public expenditure		Labour earnings	
	Amount for elderly (INR billions)	Percentage of elderly to the total of all ages	Amount for elderly (INR billions)	Percentage of elderly to the total of all ages	Amount for elderly (INR billions)	Percentage of elderly to the total of all age	Amount for elderly (INR billions)	Percentage of elderly to the total of all ages	Amount for elderly (INR billions)	Percentage of elderly to the total of all ages	Amount for elderly (INR billions)	Percentage of elderly to the total of all ages
2005	3119	8.27	33,350	14.01	5531	53.42	17,918	6.88	59,917	9.48	57,131	3.61
2010	5608	8.66	60,214	14.58	9936	53.20	32,212	7.31	107,970	10.00	101,529	3.63
2015	10,646	9.65	113,450	15.91	18,759	54.92	61,170	8.25	204,025	11.16	195,676	4.01
2020	20,137	10.80	214,281	17.55	35,533	57.08	115,767	9.37	385,718	12.57	369,698	4.38
2025	37,586	12.04	402,396	19.37	66,600	59.13	216,011	10.58	722,593	14.13	681,914	4.72
2030	69,194	13.35	746,037	21.29	122,735	60.92	397,505	11.88	1,335,471	15.79	1,233,879	5.05
2035	126,195	14.80	1,367,228	23.35	223,738	62.63	725,028	13.34	2,442,189	17.61	2,217,726	5.44
2040	229,066	16.46	2,484,467	25.59	405,642	64.50	1,316,695	14.97	4,435,869	19.64	3,984,419	5.95
2045	412,166	18.30	4,476,721	28.06	729,830	66.52	2,369,678	16.75	7,988,396	21.85	7,118,099	6.56
2050	735,834	20.33	8,013,625	30.78	1,303,673	68.64	4,230,917	18.71	14,284,050	24.26	12,589,571	7.27

Notes: (a) All forecast values of expenditure refer to the baseline scenario; (b) the elderly refers to persons aged 60 and above; (c) education forecast values are not reported as they are equal to zero for all the years.

Source: Computed by author.

which is also useful to distinguish and identify this expenditure as a form of programme spending on elderly individuals. Second, the forecasted share of the total expenditure for the elderly population shows an increase from about 10 per cent in 2005 to about 24 per cent in 2050. The increasing share is largely the result of a bigger expenditure on civilian pensions and other cash transfers because the magnitude of this forecasted expenditure in 2050 is six times bigger than the expenditure on poverty and other social protection. This result is surprising because India does not yet have universal old age social security. Third, India's elderly individuals may not be very expensive in terms of public health expenditure and hence, population ageing may not be particularly threatening to public finance in terms of providing public healthcare. This surprising result is due to the smaller size of public health expenditure and the lower utilisation of public health facilities by elderly individuals. This result is the opposite of what one might expect, given global trends in the developed countries of North America and Europe.

Table 3 also includes the forecasted labour earnings share of the elderly population. The share rises from about 4 per cent in 2005 to 5 per cent in 2030, and 7 per cent in 2050. This result implies that the elderly population also contributes to tax-financed expenditures because labour earnings are the bases for raising tax revenues [see equation (5)].

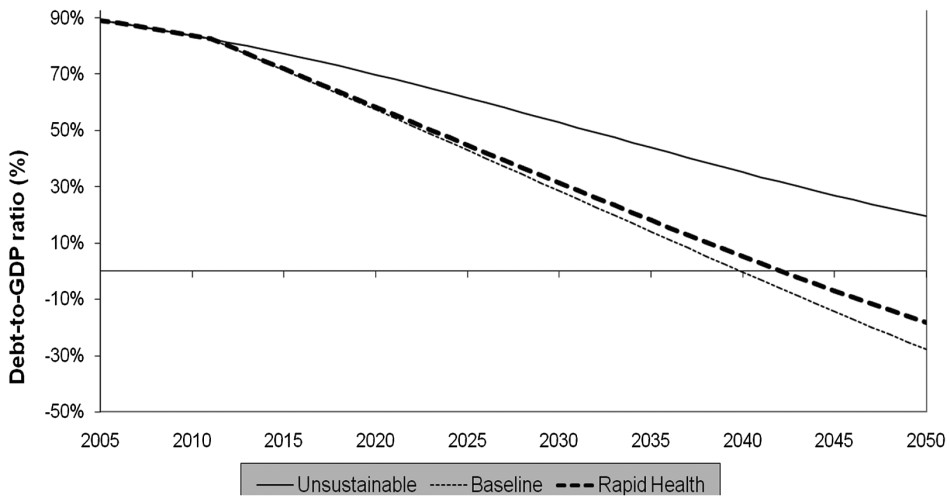
The impact of population ageing on the expenditure side of public finance is evident from the positive growth rates of all components of expenditures in the baseline scenario (Table 4). Interestingly, the growth rate of expenditure for the elderly population is higher than that for all ages, and in all expenditure components.

Figure 3 shows the debt-to-GDP ratio by the three policy scenarios. Sustainability is attained in 2013 and beyond in the unsustainable scenario, where debt is the only instrument to financing the expenditure requirements due to population ageing. In contrast, sustainability is reached in 2011 in both the baseline and the rapid growth in health scenarios. The ratio reaches 20 per cent in the unsustainable scenario, as compared to 0 per cent in 2040 in the baseline scenario and 2042 in the rapid growth in health scenario. It should be emphasised that the tax rates and hence, the tax revenues, are

TABLE 4
Growth rate (%) of public expenditures for the elderly population, India, 2005–2050.

Year	Health		Civilian pension and other cash transfers		Poverty and other social protection		Government services		All public expenditure	
	All ages	Elderly	All ages	Elderly	All ages	Elderly	All ages	Elderly	All ages	Elderly
2005–2010	11.42	12.45	11.65	12.54	12.53	12.43	11.11	12.45	11.29	12.50
2010–2015	11.25	13.68	11.54	13.51	12.83	13.55	10.95	13.68	11.12	13.57
2015–2020	11.06	13.60	11.36	13.56	12.75	13.63	10.77	13.61	10.91	13.58
2020–2025	10.87	13.29	11.21	13.43	12.59	13.39	10.57	13.29	10.76	13.38
2025–2030	10.66	12.98	11.02	13.14	12.33	13.01	10.37	12.97	10.58	13.07
2030–2035	10.47	12.77	10.82	12.88	12.14	12.76	10.20	12.77	10.40	12.83
2035–2040	10.30	12.66	10.64	12.69	11.97	12.64	10.10	12.67	10.25	12.68
2040–2045	10.11	12.47	10.45	12.50	11.78	12.46	9.97	12.47	10.11	12.49
2045–2050	9.95	12.29	10.29	12.35	11.60	12.30	9.84	12.29	10.00	12.33

Notes: (a) All growth rates refer to the baseline scenario; (b) the elderly refers to persons aged 60 and above; (c) education growth rates are not reported as they are equal to zero for all the years.
Source: Computed by author.

**FIGURE 3**

Public debt as percentage of GDP, India, 2005–2050.

Source: Author.

different by these scenarios. For instance, the tax rate is constant at 17.9 per cent in the unsustainable scenario, but increases from 17.9 per cent in 2005 to 19.5 per cent in 2011 and beyond in the baseline and rapid growth in health scenarios.¹¹ Consequently, primary deficit is incurred up to 2019 in the unsustainable scenario, and up to 2011 in the other scenarios.

It is important to note that the forecasted debt-to-GDP ratio declines in all the three scenarios in Figure 3. A plausible explanation for this result is as follows. In all the scenarios, the tax rate is calculated from equation 5 by using the actual data on labour earnings in the period 2004–2005. Given the labour earnings profile in the period 2004–2005 (Figure 1) and the tax rate, the projected age structure transition determines the age-specific labour earnings and the tax revenues from 2006 through 2050. For instance, India's well-known demographic advantages include a higher share of the working age population (not less than 60 per cent over the period 2005–2050). The impact of this advantage on labour earnings is evident in the forecasted share of non-elderly individuals in aggregate labour earnings in the last column of Table 3. Consequently, in all the scenarios, tax revenues increase and result in a decline of the debt-to-GDP ratio. This implies that population ageing does not lower tax buoyancy in the long run because it does not have the consequence of a falling proportion in the productive labour force.

The above changes in instruments of financing the public expenditure have implications on the nature of budget composition by these scenarios. The budget composition in the unsustainable scenario is marked by higher and increasing share of civilian pensions and other cash transfers, and government services (Figure 4). The budget share of health and poverty alleviation and other social protection shows a gradual increase. However, the shares of these three expenditures remain below 10 per cent throughout. A remarkable decline is observed for the budget composition of debt-servicing, which is consistent with the decline in the debt-to-GDP ratio over the period. The rapid (gradual) increase in the budget shares of civilian pensions and other cash

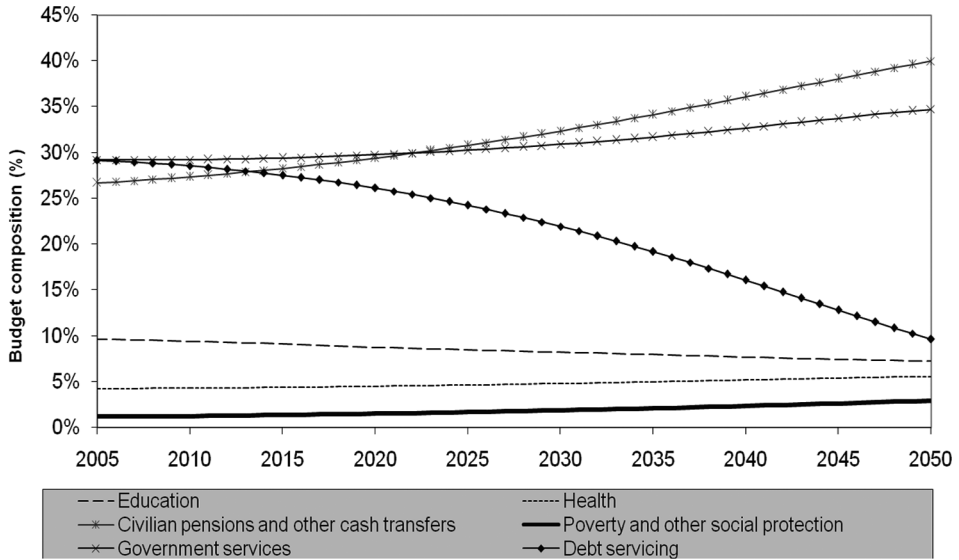


FIGURE 4
Budget composition in the unsustainable scenario, India, 2005–2050.
Source: Author.

transfers (poverty and other social protection) is a clear indicator of the impact of population ageing on the expenditure side of public finance.

Qualitatively, the budget compositions in the baseline scenario in Figure 5 are comparable with the unsustainable scenario in Figure 4, except for the rapid decline in debt servicing. In the same way, the budget compositions in the rapid growth in health spending scenario in Figure 6 are comparable with the baseline scenario in Figure 5, except for an increase in the health expenditure including for the elderly. For instance, the total health expenditure on the elderly increases from INR3119 billion in 2005 to INR45,862 billion in 2025, and to INR1,151,441 billion in 2050. Over this period 2005–2050, the growth rate of rapid health spending is about 14 per cent per annum. However, as a percentage of total expenditure, the health expenditure in the baseline and rapid growth of health expenditure scenarios increases from about 8 per cent in 2005 to about 12 per cent in 2025, and to about 20 per cent in 2050. In particular, increasing size, positive growth rates and rising budget share of public health expenditure on the elderly are important indicators of population ageing effects.¹²

Health expenditure per beneficiary is assumed to grow 1 per cent faster than labour productivity in the rapid health spending scenario. Under this assumption, the growth of public expenditure on health is fiscally sustainable, i.e. debt-to-GDP ratio does not exceed 80 per cent, up to 2050, as in the case of the baseline scenario. If the growth of health spending is greater than 1 per cent, but less than or equal to 5 per cent, faster than labour productivity, fiscal sustainability is attainable from 2012 to 2050. This sustainability is almost the same as that attainable under the baseline scenario, i.e. from 2011 to 2050.¹³ However, the rapid health spending scenario is fiscally unsustainable and not comparable with the baseline scenario if the increase in spending is 6 per cent or more faster than the labour productivity.

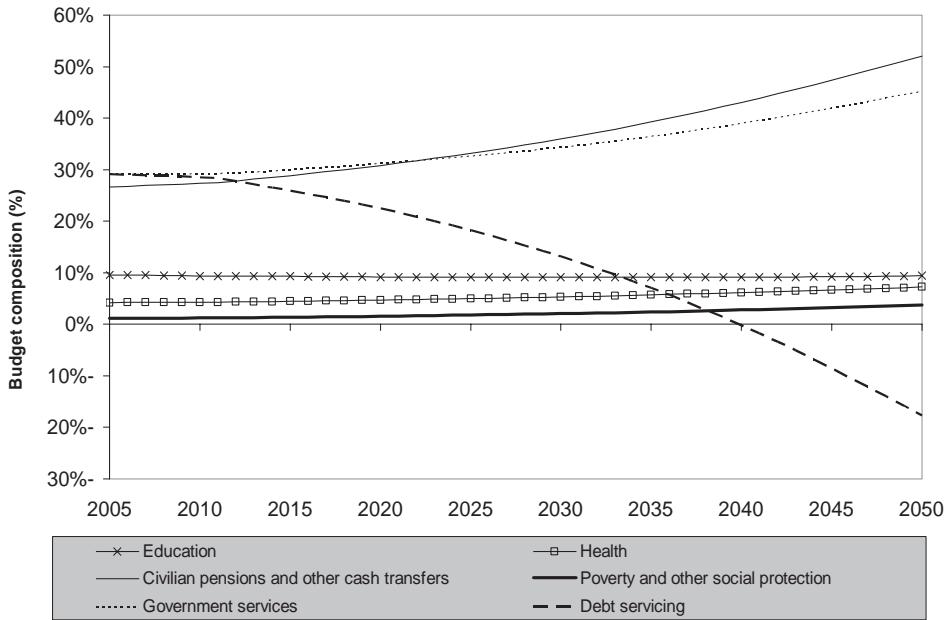


FIGURE 5
Budget composition in the baseline scenario, India, 2005–2050.
Source: Author.

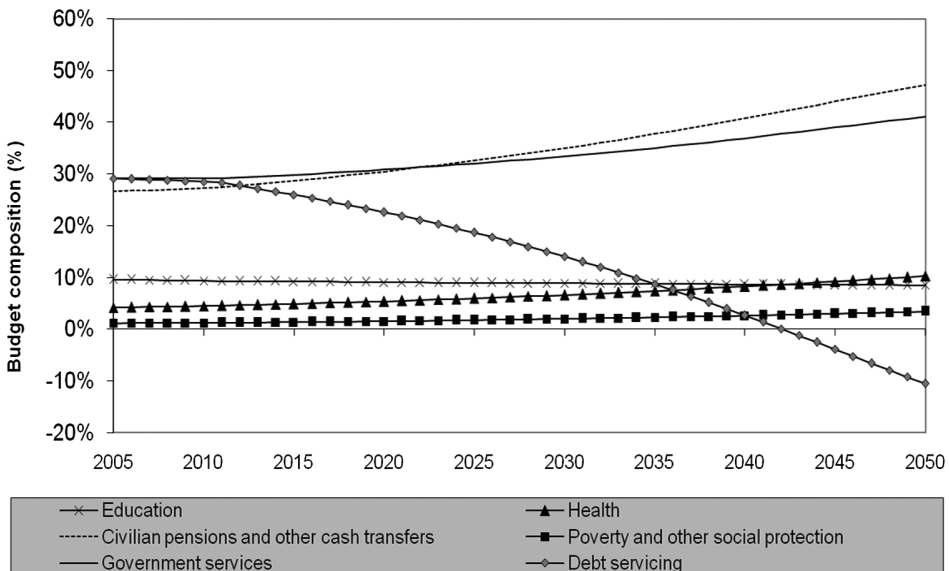


FIGURE 6
Budget composition in the rapid growth in health spending scenario, India, 2005–2050.
Source: Author.

The above simulation results offer evidence for the impact of population ageing on long-term public finance by the expenditures and instruments of its financing through debt and taxes. One simple way of summarising the impact of population ageing (as a part of overall age structure transition) on overall public finance is to look at the budget surplus (deficit) under different policy scenarios. Two familiar indicators of budget surplus (deficit) are primary surplus (deficit) and total surplus (deficit). Total surplus (deficit) is excess of total government expenditure (revenues) over total government revenues (expenditure). Primary surplus (deficit) is total surplus (deficit) minus debt servicing. Table 5 gives the primary and total surplus (deficit) as a percentage of GDP from 2005 through 2050. Primary surplus is evident in all the three scenarios from 2020. In contrast, total surplus is limited to the baseline and rapid growth health scenario from 2035, notwithstanding the increasing total expenditure on elderly population as a percentage of GDP: 3.10 per cent in 2035, 3.42 per cent in 2014, 3.80 per cent in 2045 and 4.25 per cent in 2050. Thus, the increasing total surplus in the presence of population ageing implies that population ageing may not have an unsustainable and adverse impact on the long-term overall public finance in India.¹⁴

The fiscal support ratio is another summary measure of the impact of age structure transition on public finance. The fiscal support ratio is a ratio of tax revenues received to primary public expenditure (or public transfers paid out for education, health, civilian pensions and other cash transfers, poverty and other social protection, and government services) (Miller 2011). Table 6 gives the computed values of the fiscal support ratio for India from 2005 through 2050 by the three alternative policy scenarios. In all the scenarios, the ratio increases over the period and the highest increase is evident for the baseline scenario. Ratios higher than 100 per cent indicate the extent of funds available, either for expanding the programmes or for cutting taxes. This result offers further evidence for the long-run sustainability of public finance during the period of population ageing in India. Miller (2011) shows the fiscal support ratio for 20 countries in Asia, South America,

TABLE 5
Budget surplus/deficit under different policy scenarios, India, 2005–2050.

Year	Unsustainable scenario		Baseline scenario		Rapid health growth scenario	
	Primary surplus/deficit as percentage of GDP	Total surplus/deficit as percentage of GDP	Primary surplus/deficit as percentage of GDP	Total surplus/deficit as percentage of GDP	Primary surplus/deficit as percentage of GDP	Total surplus/deficit as percentage of GDP
2005	-1.64	-9.66	-1.64	-9.66	-1.64	-9.66
2010	-1.00	-8.54	-1.00	-8.54	-1.06	-8.61
2015	-0.46	-7.42	1.17	-5.26	1.05	-5.42
2020	0.08	-6.21	1.71	-3.45	1.54	-3.72
2025	0.54	-5.00	2.17	-1.70	1.94	-2.10
2030	0.92	-3.83	2.55	-0.01	2.26	-0.56
2035	1.22	-2.73	2.85	1.59	2.49	0.87
2040	1.37	-1.79	3.00	3.04	2.58	2.11
2045	1.38	-1.04	3.01	4.31	2.52	3.15
2050	1.23	-0.55	2.86	5.36	2.28	3.92

Note: Positive (negative) number indicates the surplus (deficit).

Source: Computed by author.

TABLE 6
Fiscal support ratio (%), India, 2005–2050.

Year	Unsustainable scenario	Baseline scenario	Rapid growth in health scenario
2005	92	92	92
2010	95	95	94
2015	97	106	106
2020	100	110	109
2025	103	113	111
2030	105	115	113
2035	107	117	115
2040	108	118	115
2045	108	118	115
2050	107	117	113

Source: Computed by author.

North America and Europe over the period 2010 to 2050. In all the countries, the fiscal support ratio declines, except in three Asian countries: Thailand, Indonesia and the Philippines. For instance, the fiscal support ratio increases from 100 to 104 in Thailand, 108 in Indonesia, and 116 in the Philippines. The results for India in Table 6 are comparable with these three Asian economies.

Conclusions and Implications

This paper has integrated frameworks of the NTA and the Budget Forecasting Model to compute and simulate the long-run economic effects of population ageing on India's public finance. Using the labour income and select public expenditure age profiles in the period 2004–2005, budget forecasting is obtained from 2005 through 2050 under the three alternative policy scenarios: unsustainable, baseline and rapid growth in health. Each scenario is distinguished by specific assumptions on public expenditures, taxes and debt. Major conclusions and implications from the results of these analyses are as follows.

First, the forecasted share of elderly individuals is higher on: (a) civilian pensions and other cash transfers; and (b) poverty and other social protection. The application of the NTA methodology is useful to distinguish and identify these expenditures as forms of programme spending on elderly individuals. Second, the forecasted share of elderly individuals in total public expenditure shows an increase from about 10 per cent in 2005 to about 24 per cent in 2050. The increasing share is largely accounted for by bigger public expenditure on civilian pensions and other cash transfers, because the magnitude of this forecasted expenditure in 2050 is six times bigger than that on poverty and other social protection. This result is surprising because India does not yet have a universal old age social security system. Third, India's elderly may not be very expensive in terms of public health expenditure and hence, population ageing may not be particularly threatening to government finances in terms of providing public health care. This result is due to the smaller size of public health expenditure and the lower utilisation of public health facilities by elderly individuals, and is opposite of what one might expect given global trends in the developed countries of North America and Europe. Overall, these results imply that India's move towards higher redistributive expenditure on poverty and universal old age social

security would pose challenges to India's public finance because the elderly individuals are, and would be, the strong beneficiaries of these expenditures. Fourth, in all the three policy scenarios, tax revenues are shown to increase and result in a decline of debt-to-GDP ratio or attainment of fiscal sustainability. The reduction in the debt-to-GDP ratio is an interesting manifestation of the demographic dividend in India because it is the surge in the workforce which is leading to the reduction in this ratio. This implies that population ageing does not lower tax buoyancy in the long run because India's population ageing does not have the consequence of a falling proportion in the productive labour force over the period 2005–2050. This result is different from the experiences of developed countries in North America and Europe. Fifth, primary surplus is evident in all the three scenarios from 2020. In contrast, total surplus is limited to the baseline and rapid growth health scenarios from 2035. In addition, the fiscal support ratio increases in all the scenarios over the period 2005–2050. Thus, population ageing may not have an unsustainable and adverse impact on overall public finance in the long run.

The results, conclusions and implications of this paper must be qualified by the assumptions of the models and limitations on data. This includes the: (a) constancy of age profiles of labour earnings and public expenditure components; (b) rates of productivity growth, the interest rate and the inflation rate being unaffected by levels of government debt and taxation, and the distribution of government spending; and (c) limitations of survey and administrative data in drawing the age profile of the beneficiaries of all public expenditure programmes. A future attempt to relax these assumptions and overcome these data limitations offers opportunities to extend this paper in many new directions.

ACKNOWLEDGEMENTS

Earlier versions of this paper were presented at the 7th Global Conference of National Transfer Accounts, 11–12 June 2010, East-West Center, Honolulu, Hawaii, USA, and the 8th Global NTA Conference on Intergenerational Approaches to Social and Economic Policy, 8–9 December 2011, Cedeplar-UFMG, Belo Horizonte, Brazil. Grateful thanks are due to: (a) Professor Ronald Lee, Professor Andrew Mason, Professor Naohiro Ogawa, Dr Tim Miller, Professor L. Ladusingh and Dr Edgard Rodriguez for technical guidance and discussions; and (b) the International Development Research Centre, Ottawa, Canada, and the East-West Center, Honolulu, USA, for full financial assistance for participation in these conferences. Constructive comments and suggestions from two anonymous referees on an earlier version of this paper are gratefully acknowledged. However, the usual disclaimers apply.

NOTES

1. No detailed description of social security for India's aged has been attempted here as these are well documented including for the unorganised-sector workers. See, for instance, Chapter 2 in Rajan and Mathew (2008), or Part II in Central Statistical Organisation (2006), for these detailed descriptions.
2. These indicators are computed by using the basic data on the Social Assistance Programme from the Ministry of Rural Development, Government of India, http://rural.nic.in/nsap_1.htm, and the India Public Finance Statistics 2008–2009 from the Ministry of

Finance, Government of India, <http://www.finmin.nic.in/reports/IPFStat200809.pdf>, both accessed on 16 April 2011.

3. For a recent international comparison of income, consumption, LCD and other NTA profiles including for India, see Lee and Mason (2010a, 2010b), and Ogawa *et al.* (2009).
4. In health economic theory, this assumption reflects the continued shift in relative prices of health or aims at capturing the fact that per capita health expenditure increases more than wages or labour productivity as a result of an increase in the utilisation and complexity of health services (Cardarelli & Towe 2004).
5. The issue of fiscal sustainability is a long-standing debate in Indian public finance in terms of arguing for different levels of initial or target levels of debt-to-GDP ratio. For instance, Rangarajan and Srivastava (2005) have examined the issue of fiscal sustainability, given the objectives of the fiscal policy of economic growth and stabilisation (in terms of containing the fiscal deficit), and have recognised a clear need to bring down the combined debt-to-GDP ratio from 80 per cent in 2004–2005. They have proposed a long-run fiscal policy with a stabilisation phase, in which the fiscal deficit stabilises at 6 per cent of GDP and debt-to-GDP ratio at 56 per cent of GDP. Topalova and Nyberg (2010) have developed a simulation model to investigate the medium-term path of India's public debt by 2014/2015 under different policy scenarios such as baseline, subsidy, revenue and privatisation reforms. Their results show that the combined scenario is the most powerful tool for fiscal consolidation, with a decline in debt-to-GDP ratio to about 60 per cent, and general government deficit to 3 per cent of GDP. However, these studies are not focused on fiscal sustainability in the context of India's population ageing.
6. India is no exception because the NAS does not report this share. Available nationally representative sample surveys on the unorganised sector or the informal sector are not comprehensive in their coverage of all sectors, i.e. agriculture, manufacturing and services, in the national economy. These surveys include the NSS 62nd Round on the Unorganised Manufacturing Sector (2005–2006), the NSS 57th Round on the Unorganized Services Sector (2001–2002), and the NSS 55th Round on the Informal Sector in India (1999–2000).
7. For an excellent recent description of India's pension schemes for workers in the organised or formal sectors, see, for instance, World Bank (2008).
8. The patterns of labour income profile in Figure 1 (based on the India Human Development Survey 2004–2005) is consistent with the shape of the age profiles of wages and earnings based on the National Sample Survey data. For instance, Dev and Venkatanarayana (2011) show a sharp fall in the average daily wage rate (INR), by age group, of all workers (regular wage/casual labour and casual labourers) in the age group above 60, using the unit level data from the NSS 60th Round Employment and Unemployment Survey 2004–2005. No such fall is evident when the age profile is drawn for casual labourers (informer workers).
9. For a detailed description of child labour and youth unemployment in the period 2004–2005, see, for instance, Dev and Venkatnarayana (2011).
10. Public health consumption expenditure has been relatively low in India. For instance, as per India's NAS 2008 (Central Statistical Organization 2008), the sum of Final Government Consumption Expenditure and Private Final Consumption Expenditure on health is equal to INR1065.50 billion in the period 2004–2005. Of this, the share of Final Government Consumption Expenditure is about 15 per cent. We might note here that the National

Health Accounts India 2001–2002 (Government of India 2005) estimated the share of public health expenditure at about 20.3 per cent of total health expenditure.

11. Fiscal sustainability is sensitive to the tax rate. For instance, if the tax rate is reduced from 17.9 per cent to 17 (16) per cent, fiscal unsustainability is continued up to 2020 (2043) in the unsustainable scenario.
12. It should be emphasised here that these forecasting results are based on the cross-sectional age profiles in the period 2004–2005. If these profiles are estimable for a subsequent year or a few subsequent years, the age patterns of health expenditure, among other expenditures, may change. Thus, an estimation of a time series of age profiles may reveal the changing patterns of health expenditure including with ageing and the increasing importance of non-communicable diseases.
13. These results for India are different from the past research findings of US studies, which suggest that growth of healthcare spending is sustainable if it grows one percentage point faster than per capita GDP or labour productivity. These studies include Lee (2001), Cardarelli and Towe (2004), and Follette and Sheiner (2005).
14. Prudential debt management consistent with fiscal sustainability through limits on central government borrowings, debt and deficits is one of the key objectives of current fiscal policy as it relates to the Fiscal Responsibility and Management Act 2003. The Act is related to fiscal policy operations of the central government and state-level acts are separately formulated. Fiscal sustainability in this paper is related to the general government, unlike the central government in the Act. Thus, fiscal sustainability issues in this paper are not focused on in the framework of the Act.

REFERENCES

- CARDARELLI, R. & TOWE, C. (2004) 'Long-run U.S. fiscal imbalance: an intergenerational analysis', in *U.S. Fiscal Policies and Priorities for Long-run Sustainability*, eds M. Mühleisen & C. Towe, International Monetary Fund, Washington, DC, pp. 29–34.
- CENTRAL STATISTICAL ORGANIZATION (2006) *Elderly in India—Profile and Programmes 2006*, Ministry of Statistics and Programme Implementation, Government of India, New Delhi.
- CENTRAL STATISTICAL ORGANIZATION (2008) *National Accounts Statistics 2008*, Ministry of Statistics and Programme Implementation, Government of India, New Delhi.
- CHAKRABORTI, R. D. (2004) *The Graying of India: Population Ageing in the Context of Asia*, Sage Publications, New Delhi.
- DESAI, S., DUBEY, A., SHARIF, A. & VENNEMAN, R. (2008) *India Human Development Survey 2005*, National Council of Applied Economic Research, New Delhi & Inter-University Consortium for Political and Social Research, Ann Arbor, MI.
- DEV, S. M. & VENKATANARAYANA, M. (2011) 'Youth Employment and Unemployment in India', Working Paper No. 2011-09, Indira Gandhi Institute of Development Research, Mumbai, [Online] Available at: <http://www.igidr.ac.in/pdf/publication/WP-2011-009.pdf> (accessed 25 April 2012).
- FOLLETTE, G. & SHEINER, L. (2005) 'The Sustainability of Health Spending Growth', Finance and Economics Discussion Series No. 2005-60, Division of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, DC, [Online] Available at: <http://www.federalreserve.gov/pubs/feds/2005/200560/200560pap.pdf> (accessed 25 April 2012).
- GOVERNMENT OF INDIA (2005) *National Health Accounts India 2001–2002*, National Health Accounts Cell, Ministry of Health and Family Welfare, New Delhi.

- GOVERNMENT OF INDIA (2008) *Report on Definition and Statistical Issues Relating to Informal Economy*, National Commission for Enterprises in the Unorganized Sector, New Delhi.
- GOVERNMENT OF INDIA (2009) *Indian Public Finance Statistics 2008–2009*, Department of Economic Affairs, Ministry of Finance, New Delhi, [Online] Available at: <http://finmin.nic.in/reports/IPFStat200809.pdf> (accessed 25 April 2012).
- GOVERNMENT OF INDIA (2010) *Economic Survey 2009–10*, Ministry of Finance, New Delhi.
- HELLER, P. S. (2006) 'India: today's fiscal policy imperatives seen in the context of long-term challenges and risks', in *A Sustainable Fiscal Policy for India: An International Perspective*, eds P. S. Heller & M. G. Rao, Oxford University Press, New Delhi, pp. 154–182.
- HELLER, P. S. (2007) 'Is Asia prepared for an aging population?', in *Population Aging, Intergenerational Transfers and the Macroeconomy*, eds R. Clark, N. Ogawa & A. Mason, Edward Elgar, Northampton, MA, pp. 270–294.
- JACKSON, H. & MATIER, C. (2002) 'Public Finance Implications of Population Ageing: An Update', Working Paper No. 2003-03, Department of Finance, Economic and Fiscal Policy Branch, Government of Canada, Ottawa.
- KLUGE, F. A. (2011) 'The impact of population aging on fiscal policies in Germany', paper presented at the Population Association of America conference on Population Aging, Fiscal Impacts, and Economic Growth Around the World, Washington, DC, Marriott Wardman Park, 31 March–2 April.
- LEE, R. D. (2001) *The Fiscal Impact of Population Aging: Testimony Prepared for the Senate Budget Committee*, [Online] Available at: <http://demog.berkeley.edu/~rlee/papers/rlee.testimony.pdf> (accessed on 29 March 2012).
- LEE, R. & MASON, A. (2010a) 'Generation economies in a changing world', paper presented at the 7th Global Conference of National Transfer Accounts, East-West Center, Honolulu, 11–12 June.
- LEE, R. & MASON, A. (2010b) 'Some macroeconomic aspects of global population aging', paper presented at the 7th Global Conference of National Transfer Accounts, East-West Center, Honolulu, 11–12 June.
- LEE, R. & MASON, A. (EDS) (2011a) *Population Aging and the Generational Economy: A Global Perspective*, Edward Elgar, Cheltenham, UK.
- LEE, R. & MASON, A. (2011b) 'Population aging, intergenerational transfers, and economic growth: Asia in a global context', paper presented at the conference on Policy Research and Data Needs to Meet the Challenges and Opportunities of Population Aging in Asia, National Academy of Sciences of India, New Delhi, 14–15 March.
- MASON, A. (2005) 'Demographic transition and demographic dividends in developed and developing countries', paper presented at the United Nations Expert Group Meeting on Social and Economic Implications of Changing Population Age Structure, Mexico City, 31 August–2 September.
- MASON, A. & LEE, R. (2011) 'Introducing age into national accounts', in *Population Aging and the Generational Economy: A Global Perspective*, eds R. Lee & A. Mason, Edward Elgar, Cheltenham, UK, pp. 55–78.
- MASON, A., LEE, R., TUNG, A.-C., LAI, M.-S. & MILLER, T. (2006) 'Population Aging and Intergenerational Transfers: Introducing Age into National Accounts', Working Paper No. 12770, National Bureau of Economic Research, Massachusetts.
- MILLER, T. (2006) *Demographic Models for Projections of Social Sector Demand*, Latin American and Caribbean Demographic Centre (CELADE)—Population Division, Santiago, Chile, [Online]

Available at: <http://www.eclac.cl/publicaciones/xml/7/27197/lcl2477i-P.pdf> (accessed 26 April 2012).

- MILLER, T. (2011) 'The rise of the intergenerational state: aging and development', in *Population Aging and the Generational Economy: A Global Perspective*, eds R. Lee & A. Mason, Edward Elgar, Cheltenham, UK, pp. 161–184.
- MILLER, T. & CASTANHEIRA, H. (2011) 'Public finance implications of population aging in Brazil: 2005–2050', in *Becoming Old in an Older Brazil*, ed. The World Bank, Human Development Department, Latin America and the Caribbean Region, The World Bank, Washington, DC, pp. 127–151.
- MILLER, T., MASON, C. & HOLZ, M. (2011) 'The fiscal impact of demographic change in ten Latin American countries: projecting public expenditures in education, health, and pensions', in *Population Aging: Is Latin America Ready?*, ed. D. Cotlear, World Bank, Washington, DC, pp. 233–272.
- MOHAN, R. (2004) 'Fiscal challenges of population aging: the Asian experience', paper presented at the symposium on Global Demographic Change: Economic Impacts and Policy Challenges, sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, 26–28 August, [Online] Available at: <http://www.kansascityfed.org/publications/research/escp/escp-2004.cfm> (accessed 10 July 2012).
- NATIONAL TRANSFER ACCOUNTS (NTA) (2012) *Methods*, [Online] Available at: <http://www.ntaccounts.org/web/nta/show/Documents/Methods> (accessed 22 March 2012).
- OECD (2003) *The Impact of Ageing Populations on Public Finances: Overview of Analysis Carried out at EU Level and Proposals for a Future Work Programme*, EPC/ECFIN/435/03 Final, Economic Policy Committee, Brussels.
- OGAWA, N., CHAWLA, A. & MATRUKURA, R. (2009) 'Some new insights into the demographic transition and changing age structures in the ESCAP region', *Asia-Pacific Population Journal*, vol. 24, no. 1, pp. 87–116.
- RAJAN, S. I. & ALIYAR, S. (2008) 'Population ageing in India', in *Institutional Provisions and Care for the Aged*, eds S. I. Rajan, C. Risseeuw & M. Perera, Anthem South Asian Studies, Delhi, pp. 39–54.
- RAJAN, S. I. & MATHEW, E. T. (2008) 'India', in *Social Security for the Elderly: Experiences from South Asia*, ed. S. I. Rajan, Routledge, New Delhi, pp. 39–106.
- RAJAN, S. I. & PRASAD, S. (2008) 'Pension and social security in India', in *Institutional Provisions and Care for the Aged*, eds S. I. Rajan, C. Risseeuw & M. Perera, Anthem South Asian Studies, Delhi, pp. 115–133.
- RAJAN, S. I., MISRA, U. S. & SARMA, P. S. (1999) *India's Elderly: Burden or Challenge?*, Sage Publications, New Delhi.
- RANGARAJAN, C. & SRIVASTAVA, D. K. (2005) 'Fiscal Deficits and Government Debt in India: Implications for Growth and Stabilisation', Working Paper No. 35/2005, National Institute of Public Finance and Policy, New Delhi.
- TOPALOVA, P. & NYBERG, D. (2010) 'What Level of Public Debt Could India Target?', IMF Working Paper No. 10/7, International Monetary Fund, Washington, DC.
- UNITED NATIONS (2007a) *World Population Ageing 2007*, United Nations, New York.
- UNITED NATIONS (2007b) *World Population Monitoring, Focusing on the Changing Age Structures of Populations and Their Implications for Development: Report of Secretary-General (40th Session, 9–13 April)*, Economic and Social Council, Commission on Population and Development, New York.

- VISCO, I. (2001) 'Ageing populations: economic issues and policy challenges', paper presented at the Kiel Week Conference on Economic Policy for Ageing Societies, OECD, Paris, 18–19 June.
- WORLD BANK (2008) *Pensions at a Glance: Asia/Pacific Edition*, The World Bank & OECD, Washington, DC.

M. R. Narayana, Centre for Economic Studies and Policy, Institute for Social and Economic Change, Bangalore 560072, India. Tel: +91-80-23397699; Fax: +91-80-23217008.
Email: mnrn@isec.ac.in