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Demographic change and private savings in India

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Abstract

India is on the edge of a demographic revolution with a rapidly rising working-age population. For the first time in this study, we investigate the role of the rising working-age population on per capita small savings in post offices and banks net of socio-economic characteristics using state-level panel data compiled from multiple sources for the period 2001–2018. Our comprehensive econometric assessment with multiple robustness checks provides three key findings: (1) per capita private savings is increasing because of India's growing working-age population; thus, the 'economic life cycle hypothesis' is evidentially supported; (2) the demographic factors contribute around one-fourth of the per capita private savings inequality across Indian states; and (3) the demographic window of economic opportunity for India can yield maximum benefits in terms of private savings when accompanied by favourable socio-economic policies on education, health, gender equity, and economic growth.

Keywords Demographic change · Working-age population · Population ageing · Private savings · Life cycle hypothesis · Econometric analyses

JEL Classification J11 · O15 · O16

Introduction

Despite receiving a considerable attention from economists and economic demographers globally, there is hardly any evidence on the impact of demographic change on private savings in India. Over the last five decades, the 'dependency hypothesis' by Coale and Hoover (1958) and the 'life cycle hypothesis of savings' by Modigliani and Brumberg (1954) are considered as pioneering analytical frameworks in understanding the relationship between

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the change in age distribution of the population and savings. Both hypotheses simply assert that the 'age-saving' profile shows a humped graph, that is, higher savings during the working age and lower savings at young and old ages. Stated differently, the working-age population serves as a catalyst for promoting economic growth through savings (Loayza et al. 2000a, b; Lee et al. 2000; Mason 1988, 2016; Masson et al. 1998; Mason and Kinugasa 2008). Based on these hypotheses, for the first time, this paper seeks to undertake an econometric assessment of the nexus between demographic changes and the private savings[1] for India, drawing on a panel of major states for the period 2001–2018.

India is experiencing a 'demographic revolution' with a shift towards the working-age group in age structure of the population relative to the population of dependents (child and old age population). Figure 1 illustrates the age structural transition of the Indian population (1951–2100). Its share of the working-age population has increased from approximately 58% in 2000 to reach a maximum of approximately 65% in 2035. The size of child population is continuously falling, whereas the share of the older-age population is rising slowly due to improvement in life expectancy. In 2020, the average age in India was 29 years, while in the USA, Europe, and Japan, for instance, it was 40 years, 46 years, and 47 years, respectively (National Policy for Skill Development and Entrepreneurship Report, 2015). Since young people tend to save more, a substantial impact on private savings in India is expected.

Besides, there are huge interstate variations in the process of demographic transition in India, which can exert influence on the private saving pattern and such heterogeneity makes an ideal setting to test our hypothesis. Figure 2 highlights the trends in the share of working-age population across major states of India for the period 2001–2016. It can be seen that the share of working-age population is rising across all major states of India. Some states from south and west India will find their demographic dividend phase closing in next few years due to early decline in fertility levels, while the window of opportunity is yet to commence in high fertility states like Bihar, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh.

The empirical results of the impact of age structure on savings based on cross-country panel data, and time series data from individual countries have been ambiguous. Some studies, in line with the life cycle and dependency hypotheses, have suggested that a rise in the share of dependents (both young and old) tends to reduce savings level (Ahmad 2002; Akhtar 1986; Ali et al. 1997; Burney and Khan 1992; Dayal-Ghulati and Thimann 1997; Fry and Mason 1982; Heller 1989; Higgins and Williamson 1997; Horioka 1997; Hurd 1996; Kelley and Schmidt 1996; Khan and Malik 1992; Leff 1969; Loayza et al. 2000a;

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[1] Private savings is defined as gross small savings collection in post offices and banks provided by National Savings Institute, Ministry of Finance, Government of India. These schemes commenced in 1882 with the establishment of Post Office Savings Bank in India. The main purpose of the scheme was to inculcate a habit of saving among all sections of the society and to mobilize resources for capital formation, economic growth, and development in the country. It has been a vital source of financial savings of households in the country due to its safe and secure nature of investment (as they are liabilities of the central government), offering better returns than other saving products in the market along with tax benefits, etc. The significance of these schemes has enhanced over time with structural changes in the Indian economy, greater financial inclusion with bank nationalization, opening up of post offices and bank branches throughout the country, better financial sector safety, and provision of social security through numerous schemes of the government such as NREGA and old-age pension schemes. Small savings schemes are carried out by a nationwide network of 1.5 lakh post offices, majority of which are located in remote parts of rural areas and which help in boosting formal financial savings in these regions through small savings schemes (Report of the Committee on Comprehensive Review of National Small Savings Fund, 2011).
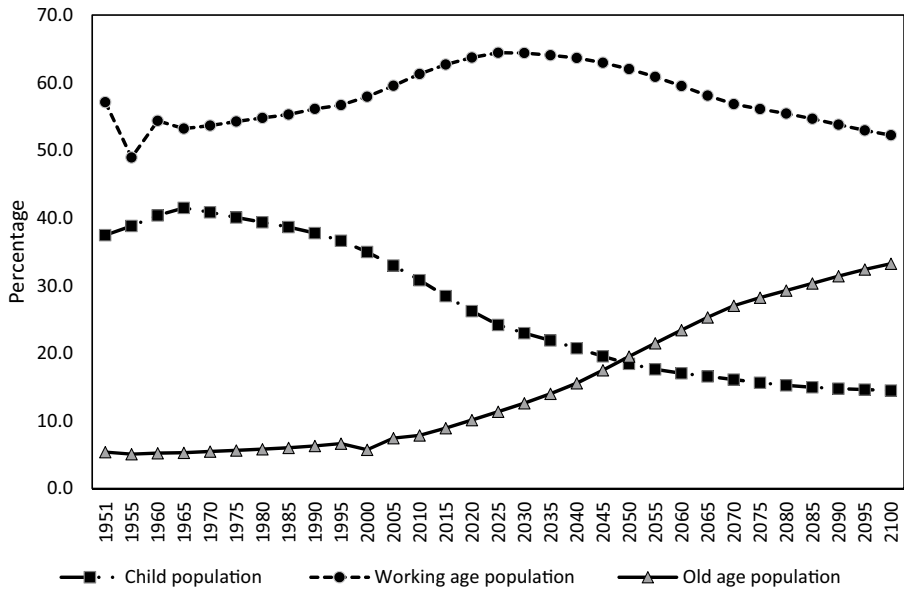
Fig. 1 Age composition of India's Population (1951–2100). *Source*: World Population Prospects (19th Revision), United Nations 2019
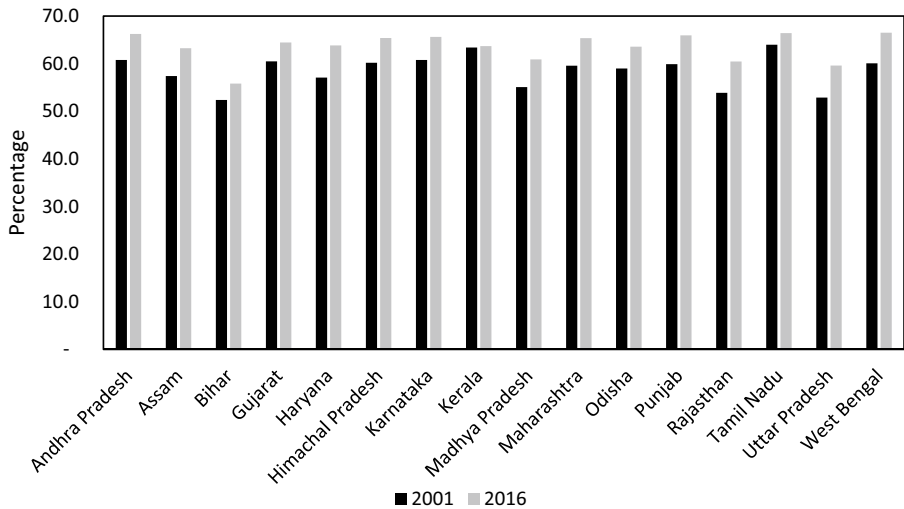
Fig. 2 Trends in the working-age population share across major Indian states (2001–2016). *Source*: Census of India, Office of the Register General India

Mason 1988; Modigliani 1970; Pryor 2003; Thornton 2001; Uremadu 2009; Yasin 2008). While others have found little evidence of a significant relation between the dependency ratio and savings (Adams 1971; Gersovitz 1988; Goldberger 1973; Gupta 1971; Ram 1982, 1984; Rossi 1989; Shumaker and Clark 1992), studies by Curtis et al. (2017), Higgins and Williamson (1997), Higgins (1998), Horioka and Hagiwara (2010), Kim and Zang (1997),

Park and Shin (2009), Schultz (2004), Shumaker and Clark (1992), and Ram (1982, 1984) have empirically tested this relationship for a global sample of countries, including India, covering various years from 1970 to 2007 and found a mixed impact of population age structure on savings for India.

Main contributions of the study

This study makes five major contributions: First, previous studies based on India have analysed the relationship of age structure and savings for the period before 2000, while the onset of the 'demographic window of opportunities' for India was in 2005–2006. Thus, it is important to document evidence on the relationship of population age structure and savings for the period after its onset. Second, this is the first study that employs state-level panel data of per capita private saving collections in post offices and banks, provided by the National Savings Institute, Ministry of Finance, Government of India, to study its relationship with demographic changes in the country. Third, the study controls for a range of key socio-economic variables to estimate a net demographic effect on private savings. Fourth, an interaction analysis of the demographic change with key socio-economic covariates is carried out to ascertain whether the influence of working-age population on the private savings is conditioned by the socio-economic environment of the country. Finally, following the framework proposed by Loayza et al. (2000a, b), the reliability of the basic results is verified by using multiple robustness tests along two dimensions: first, we employ alternative econometric techniques: (1) for the first time, we use regression-based inequality decomposition model to estimate the contribution of demographic differences to inequality in per capita private savings across Indian states; (2) we consider there is a possibility of endogeneity in the relationship between the working-age population and savings, as its impact on savings operates through the channels of education, health, gender equity, and economic growth. Also, growth in per capita income is likely to be jointly determined with savings through the saving–investment link. Thus, the instrumental variable model (two-stage least square) is employed to assess the endogeneity issue. Second, we use an alternative sample to check the baseline result.

Our primary objective is to answer three questions: (1) How much of the impressive increase in private savings in India can be explained by its increased working-age population? (2) How much of the interstate inequality in private savings can be explained by differences in the level of working-age population across the states and over time? (3) What are the possible channels through which the increasing working-age population can influence private savings?

The summary of the findings based on analysis of 16 major states of India for the period 2001–2018 using multiple econometric methods, such as panel data regression model, regression-based inequality decomposition model, and instrumental variable regression (two-stage least square), is reproduced below.

First, our results confirm the life cycle hypothesis that larger working-age population leads to a rise in the savings. According to fixed effects estimation, a one per cent rise in the working-age population raises private savings by nine percentage points, other factors being constant. Second, demographic factors explain around one-fourth of the per capita private savings inequality across states after controlling for other core policy variables. Third, the demographic window of economic opportunity for India could result in higher per capita private savings if favourable socio-economic policy environment such as healthy

and educated working-age population, higher gender equity, and a higher level of per capita income is in place.

The rest of this paper is organized as follows. "Literature review" section provides a literature review. "Empirical strategy" section deals with the empirical strategy, including data and descriptive, and empirical specifications. "Estimation results" section discusses estimation results and conducts numerous robustness checks. "Conclusion" section concludes the paper.

Literature review

Since the inspiring work of Coale and Hoover (1958), long-term economic analysis of savings has been focusing on demographic changes by way of a simple and strong 'dependency hypothesis' which states that a higher dependency burden would result in higher consumption expenditure and lower savings rate. Over time, young dependents would mature to become the working-age population and a higher savings rate will result. Finally, savings would decline with the demographic transition moving towards increasing elder dependents.

Another theoretical framework for understanding the relationship between demographic structure and savings is the 'life cycle hypothesis' (Modigliani and Brumburg 1954), according to which increasing working-age population may escalate the aggregate savings of the economy, as, at first sight, it naturally implies an increase in the size of productive workforce that produces more than it can consume relative to the very young and the elderly population which consumes more than it produces (that is, it dis-saves). Secondly, a fall in the dependency ratio induced by the lower fertility rate and slower population growth lead to a greater participation of females in the labour market, in turn raising the per capita productive capacity of the economy. In addition, households with fewer children and elderly could save the expenditure incurred for the dependent's care and allows them to make a greater investment in their health and education, which over time improves their life expectancy and further compels people in the working age to save more for their retirement (Bloom and Williamson 1998; Bloom et al. 2003; Bloom 2011; Modigliani and Brumburg 1954).

Based on these theoretical grounds, empirical estimation of the impact of age structure on savings was first attempted by Leff (1969) and Modigliani (1970), who found a strong negative relation between the dependency ratio (the ratio of young and old to the working-age population) and aggregate savings in less developed countries. However, subsequent empirical analysis by Adams (1971), Gupta (1971), Goldberger (1973), Ram (1982, 1984), Gersovitz (1988), Rossi (1989), and Shumaker and Clark (1992) criticized Leff's original work (1969) because of the way the data handled and variables specified as well as sample composition, and estimation methods, and found an insignificant impact of dependency on savings in the Third World countries.

Further studies based on individual countries' time series and panels of cross-country data revealed a mixed impact of age structure on savings. For instance, studies by Akhter (1986), Burney and Khan (1992), Khan and Malik (1992), and Ahmad (2002) found a negative relation between dependency ratio and savings in Pakistan. The life cycle hypothesis was supported by Kelley and Schmidt (1996) for 89 countries during the 1960s–1980s and by Horioka (1997) for time series data of Japan by applying the co-integration techniques. Higgins and Williamson (1997) estimated this relationship for 16 Asian countries

(including India) for the period 1950–1992 and explained the East Asian Miracle by linking the opening of a window of economic opportunity that resulted in higher savings and economic growth rates (Bloom and Williamson, 1998; Birdsall et al. 2003; Mason 2001). Later, the study by Schultz (2004) re-estimated the same relationship by taking the same sample and time frame and found insignificant results after considering lagged savings as endogenous.

One of the earlier estimates for India by Higgins (1998) found that India's demographic changes remained stable and increased savings by only 1.8 percentage points between 1965–1969 and 1985–1989. The negative impact of dependency on private savings was found by Dayal-Ghulati and Thimann (1997) for a sample of Southeast Asian and Latin American countries over the period 1975–1995 and by Loayza et al. (2000a) using World Bank data on savings for 150 countries for a period of 1965–1994. Thornton (2001) found similar results for the USA by applying co-integration techniques to annual time series data for the period 1956–1995. Yasin (2008) tested the life cycle hypothesis for fourteen emerging markets for the period 1960–2001 and found a significant positive relationship between the savings ratio and percentage of the working-age population. Park and Shin (2009) study estimated this relationship for eight countries (including India) between 1970 and 2005 and found that dependency (both aged and young) had a negative impact on the saving rates. Uremadu (2009), however, for the period 1980–2004 did not find a significant impact of demographic factors on the savings ratio in Nigeria despite a high dependency ratio of the population. Horioka and Hagiwara (2010) found aged dependency ratio, income levels, and the level of financial development as important predictors of the domestic saving rates in Asia (including India) during 1966–2007. Curtis et al. (2017) is the latest study in this context for India, China, and Japan covering the period 1970–2007. The study confirmed the life cycle hypothesis using the preferences model from Barro and Becker (1989) for all three countries. They found that India's rising working-age population along with smaller family size has resulted in higher household savings rate; they also projected the higher saving rates to continue in the future. Another recent study by Hu et al. (2020) based on a panel data of 172 countries for the period 1960–2019 also confirmed the life cycle hypothesis by showing that a one per cent rise in the share of elderly population reduces the aggregate saving rates by 1.04%.

Summing up, the empirical estimation of the link between age structure and savings is ambiguous regarding both direction and magnitude across different countries and time frames. This study does a fresh investigation of this relationship for India by employing robust econometric models based on state-level panel data for the period 2001–2018.

Empirical strategy

Data and variables description

The data used here are compiled from widely acceptable and reliable sources for 16 major states of India[2] for the period 2001–2018. A stacked time-series balanced panel data are constructed for 16 states × 2 time points, thus for a total of 32 cases.

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[2] The states included are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal.
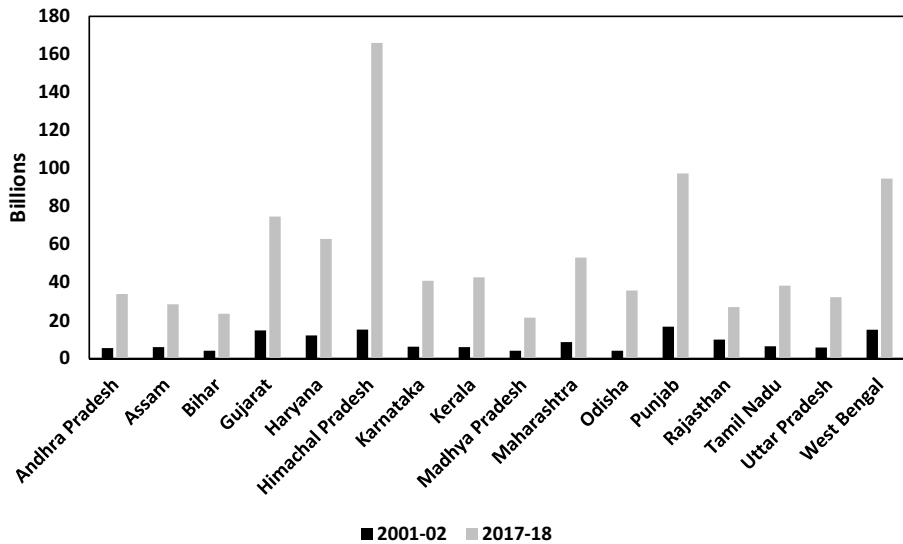
Fig. 3 Trends in per capita gross private small saving collections in post offices and banks (2001–2018). *Source*: National Savings Institute, Ministry of Finance, Government of India

Outcome variable

The per capita gross private saving collections in post offices and banks obtained from the National Savings Institute, Ministry of Finance, Government of India,[3] are considered as the outcome variable. As per the annual report on analysis of trends of small savings collections (2017–2018), gross private saving collections in post offices and banks during 2017–2018 were around five lakh crores, registering an annual impressive growth of 19.18% compared to the preceding year. Out of the total gross collection in 2017–2018, around 82% was contributed by post offices with a remaining share contributed by the authorized commercial banks. Figure 3 highlights the trends in the state-wise per capita gross private small savings collections in post offices and banks during 2001–2002 to 2017–2018. It shows that there has been a significant increase in per capita gross collections across all the states during the period considered. The highest surge in gross collections has been found in Himachal Pradesh, followed by Odisha, Kerala, Karnataka, West Bengal, Andhra Pradesh, and Maharashtra in that order.

Explanatory variables

The working-age population ratio (15–59 years) taken from the Census of India in percentage is considered as the main *predictor variable* of savings. Besides, other *covariates* are taken to have a net demographic effect on private savings. These are social sector expenditure, governance index, wealth inequality, farm GSDP share, female-headed households, rural inflation, urban inflation, literacy rate, post office density, bank density, gender

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[3] http://www.nsiindia.gov.in/internalpage.aspx?Id_Pk=153.

development index, gender empowerment measure, life expectancy, log per capita income, growth in per capita income, and mean monthly per capita consumption expenditure (MPCE). The selection of these explanatory variables is premised on the existing research and a theoretical rationale. Below, we discuss specific definitions of each of these control variables.

Social sector expenditure

Social sector expenditure comprises the expenditure on education, healthcare, and rural development by the government as a percentage of GSDP. There is no previous study which has considered the effect of social sector expenditure on savings. We expect that it may boost private savings by reducing out-of-pocket expenditure of families.

Governance index

The governance index captures five areas, namely infrastructure, social services, fiscal performance, justice, law and order, and quality of the legislature. This is expected to promote private savings as the better the quality of delivery of core public services, the higher the emergence of 'development clusters' (Mundle et al. 2016).

Wealth inequality

Theoretically and empirically, the effect of wealth distribution on savings is ambiguous (Loayza et al. 2000a). On the one hand, higher wealth inequality can promote savings as households with higher wealth tend to have a higher propensity to save than households with lower wealth. On the other hand, it can lower aggregate savings due to relatively lower savings by lower- and middle-class wealth holders and the tendency of higher consumption by rich people.

Farm GSDP share

The share of the farm sector in GSDP is another relevant factor affecting savings. The statistical evidence on this relationship has been mixed. On the one hand, a decline in the share of the farming sector is an important factor for the rise in savings in India after the 1970s, since the marginal propensity to save of the farming sector is lower than that of the non-farm sector (Krishnamurty and Saibaba 1981; Mˡuhleisen 1997; Rakshit 1983). On the other hand, one may expect a higher marginal propensity to save in the farming sector than in the non-farm sector based on the permanent income hypothesis, which conjectures a higher marginal propensity to save out of transitory income. The studies by Athukorala and Sen (2004) and Samantaraya and Patra (2014) did not find a statistically significant influence of share of agriculture on savings in India.

Female-headed households

Several studies have estimated the impact of female-headed households on poverty in India. It is often argued that female-headed households face socio-economic gender discrimination in education, income, rights, and economic opportunities (Dreze and Srinivasan 1997;

Gangopadhyay and Wadhwa 2003; Meenakshi and Ray 2002; Rajaram 2009). This makes an important case to check their impact on private savings.

Rural and urban inflation

The impact of inflation on private savings is indefinite. On the one hand, inflation could promote savings through income redistribution, real balance effects, and precautionary motive. Under the real balance effect or real wealth effect, consumers try to maintain a target level of wealth relative to income (as inflation depresses the value of real wealth) which reduces their consumption and raises savings. Further, with increased macroeconomic volatility (say, changes in future policies), people save a greater portion of their income as a precaution (Athukorala and Sen 2004; Dayal-Ghulati and Thimann 1997; Krishnamurty and Saibaba 1981; Loayza et al. 2000a, b; Samantaraya and Patra 2014). Also, rural people tend to save more with inflation than urban, since income prospects in rural areas are much more uncertain and there is a lack of financial markets penetration for risk diversification (Loayza et al. 2000a), while on the other hand, in a country like India, where consumption levels are relatively low, consumers can resist cutting into real consumption and this could have negative effects on savings. Therefore, the ultimate impact of inflation would depend upon the magnitude of inflation (for instance, a very high inflation rate discourages growth and hence savings), the composition of consumption basket (durables and non-durables) and savings portfolio (physical and financial assets), future expectations, rate of interest, etc. (Krishnamurty and Saibaba 1981).

Literacy rate

Literacy rate is a new variable which no previous study has controlled so far to examine its effects on savings. It is expected to augment private savings as a literate person can make informed choices to manage income and resources. It can be taken as a proxy indicator for financial literacy.

Post office density and bank density

The level of financial development is an important determinant of private savings (Athukorala and Sen 2004; Dayal-Ghulati and Thimann 1997; Horioka and Hagiwara 2010; Loayza et al. 2000a, b; Park and Shin 2009). We have taken two measures of financial depth: (1) Post office density, that is, population served by a post office. It helps in boosting formal financial savings through the network of 1.5 lakh post offices, with a majority of them located in remote parts of rural areas (Report of the Committee on Comprehensive Review of National Small Savings Fund, 2011). (2) Bank density, that is, distribution of scheduled commercial banks divided by the population of a state. This is expected to contribute significantly to rise in private savings.

Gender development index (GDI) and gender empowerment measure (GEM)

Gender equality by way of investment in women's health, education, and economic opportunities can be one of the most powerful indicators of economic growth and hence savings. The present study analyses the link between gender equality and private savings through two effective instruments of gender equity: GDI and GEM. GDI measures gender gap in

health, knowledge, and standard of living, while GEM captures female participation in political and economic areas, and the power they have over economic resources (Report on Gendering Human Development Indices, 2009).

Life expectancy

An increase in life expectancy increases the post-retirement period of an individual, and hence a given income is to be stretched for a longer time horizon. This leads to a rise in savings in all periods of an individual's life (Krueger 2004; Park and Shin 2009).

Income

The basic life cycle hypothesis relates savings with the growth of per capita income, not the level of per capita income, as it assumes individuals are forward-looking and hence make private savings decisions based on lifetime income rather than current income. A growth of per capita income raises the lifetime resources of an individual, particularly of young relative to that of elderly and thus unambiguously increases the savings (Modigliani 1970). Besides, it increases the number of households above the subsistence level of income, below which they are unable to save, which makes them more sensitive to interest rate changes (Ogaki et al. 1996). However, less developed countries like India, where a section of the population survives at the starvation level (that is, having low per capita income) cannot shift resources for later consumption. For such people, savings would increase with income level for a given growth rate (Athukorala and Sen 2004; Modigliani 1970). Hence, both the (log) level of income and growth in income are considered in the present analysis and expected to have a positive effect on the private savings as suggested by other studies (Athukorala and Sen 2004; Dayal-Ghulati and Thimann 1997; Horioka and Hagiwara 2010; Loayza et al. 2000a, b; Modigliani 1970).

Mean monthly per capita consumption expenditure (MPCE)

Mean MPCE is taken as a proxy for the income variable as income estimates are often underreported. Thus, MPCE can be taken as an indirect monetary measure in assessing the well-being of an individual. We expect it to be positively related to savings, at least for those individuals who are above the subsistence level of living. This means the higher the consumption expenditure, the higher the propensity to save.

The descriptive statistics presented in Table 1 shows that the average per capita gross private savings is rupees 3167 crores with its value ranging from rupees 407 crore to rupees 16,599 crore, demonstrating glaring disparities in per capita private savings across the states over time. Similarly, the main variable of interest, that is, the working-age ratio, also varies from 52.4 to 66.5% across the states over time. Other covariates too display stark differences in their value.

The "Appendix Table 7" shows the correlation matrix for the pooled sample from 2001 to 2018. It is evident from the table that the log of working-age share is highly correlated with the log per capita private savings. (The correlation value is 0.70.) Other significant correlates of the per capita private savings are level of per capita income, growth in per capita income, bank density, GEM, life expectancy, literacy rate, mean MPCE, rural inflation, share of farm GSDP, social sector expenditure, and GDI.

Table 1 Descriptive statistics and source of the variables

Variables	Data source	Mean	SD	Min	Max
Outcome variable					
Per capita gross private small saving collections in post offices and banks	National Savings Institute, Ministry of Finance, GoI	3167.2	3536.1	407.1	16,599.7
Predictor variable					
Working-age ratio (%)	Census of India (2001) and Report of the Technical Group on Population Projections (2019)	61.1	4.1	52.4	66.5
Covariates					
Social sector expenditure (as a % of GSDP)	Goswami and Bezbaruah (2011) and RBI handbook of state statistics	10.5	4.8	4.3	21.8
Governance index	Mundle et al. (2016)	0.5	0.1	0.2	0.7
Wealth inequality	National Family Health Survey (NFHS)	0.7	0.7	0.0	2.9
Share of farm GSDP	EPWRF	20.3	7.1	7.0	33.0
Proportion of female-headed households	National Family Health Survey (NFHS)	13.0	5.1	6.3	25.6
Rural inflation (CPI–RL)	Ministry of labour & employment, Labour Bureau, GoI	4.7	2.6	−1.9	10.1
Urban inflation (CPI–IW)	Ministry of labour & employment, Labour Bureau, GoI	5.9	1.4	3.2	8.4
Log mean monthly per capita consumption expenditure (MPCE)	National Sample Survey Organization	6.6	0.3	6.1	7.1
Literacy rate	Census of India	71.0	9.6	47.0	94.0
Post office density	Report of Tenth Five Year Plan and Lok Sabha Proceedings	8.6	0.5	7.5	9.7
Bank density	RBI handbook of state statistics	0.10	0.1	0.1	0.3
Gender development index	Gendering Human Development Indices: Recasting the Gender Development Index and Gender Empowerment Measure for India (2009)	0.8	0.1	0.5	0.9
Gender empowerment measure	Same as Gender development index	0.5	0.1	0.4	0.7
Life expectancy	Sample Registration System	67.3	3.9	59.2	75.1
Per capita income level	Central Statistical Organization	10.7	1.0	8.8	12.1
Growth in per capita income	Central Statistical Organization	8.1	4.6	−3.4	18.7

Balanced panel data of 32 observations over 16 states in the 2001–2018 period

Empirical specification

Panel data regression model is employed to control for variables that are not directly observable or measurable across states such as cultural factors or variables that change over time but not across entities. We have modelled F test for the fixed effect (FE) model, Breusch–Pagan Lagrange multiplier (LM) test for the random effect (RE) model, and Hausman test to decide between FE or RE to be conducted. The main equation of interest of the panel data regression model used in this paper is given as

$$
\begin{aligned}
Log\ per\ capita\ private\ savings_{it} &= \alpha \\
&+ \beta_0 Log\ working - age\ ratio_{it} + \beta_1\ Log\ working \\
&- age\ ratio_{it} \times Life\ expectancy_{it} \\
&+ \beta_2 Log\ working - age\ ratio_{it} \times Literacy\ rate_{it} \\
&+ \beta_3 Log\ working - age\ ratio_{it} \times Gender\ development\ index_{it} \\
&+ \beta_4 Log\ working - age\ ratio_{it} \times Gender\ empowerment\ measure_{it} \\
&+ \beta_5 Log\ working - age\ ratio_{it} \times Logper\ capita\ income_{it} \\
&+ \beta_6 Social\ sector\ expenditure_{it} + \beta_7 Governance\ index \\
&+ \beta_8 Wealth\ inequality_{it} + \beta_9 FarmGSDP\ share_{it} \\
&+ \beta_{10} Female\ headed\ households_{it} \\
&+ \beta_{11} Rural\ inflation_{it} + \beta_{12} Urban\ inflation_{it} \\
&+ \beta_{13} Log\ mean\ MPCE_{it} + \beta_{14} Log\ literacy\ rate_{it}\beta_{15} Bank\ density_{it} \\
&+ \beta_{16} Log\ post\ office\ denisty_{it} + \beta_{17} Growth\ in\ per\ capita\ inome_{it} + u_i + v_{it}
\end{aligned}
\tag{1}
$$

where $log\ percapitaprivatesavings_{it}$ represents the per capita private savings of state i in time period t. The impact of the main predictor variable $log\ working\ age\ ratio_{it}$ is shown both individually and in interaction effects with the life expectancy, literacy rate, GDI, GEM, and per capita income. β is the coefficient for independent variables; u_i ($i = 1,\ldots,n$) is a FE or RE specific to individual state or time period that is not included in the regression; v_{it} is the error term.

Further, an additional analysis is carried out to examine the influence of other potential determinants of private savings such as interest rates, external terms of trade, public savings, and wages. Since these indicators are not available at the provincial level, we have made a descriptive assessment of these indicators at the national level. Next, the reliability of the main results is checked in the robustness section by using, first, alternative econometric techniques of regression-based inequality decomposition model and instrumental variable model (two-stage least square) and, second, by employing an alternative sample which covers 28 states.

Estimation results

Main results: panel data regression model to quantify the effect of demographic change on private savings

Baseline results

Table 2 reports the results of a fixed-effects model from Eq. (1). The baseline results in column (1) suggest the presence of a positive and statistically significant relationship between the log of the working-age population and log of the per capita gross small saving collections in post offices and banks. More concretely, a one per cent increase in the working-age population leads to an increase of 18.7% in private savings. This model can explain 49% of the variations in private savings, suggesting that goodness of fit of the model where demographic changes explain a major proportion of variation in per capita private savings is upright.

Inclusion of control variables

In column (2), we can observe that with the inclusion of social sector expenditure and governance index, the coefficient of the working-age population decreases in magnitude but remains positive and statistically significant at the conventional level. Social sector expenditure emerges as a significant determinant of private savings, which shows the importance of expenditure incurred by the state governments on social sectors such as education, healthcare, and rural development, helping in reducing the out-of-pocket expenditure of households and thereby promoting private savings. In column (3) also, the coefficient for the working-age population is positive, statistically significant, and its magnitude decreases by only one percentage point when we control for farm GSDP share and wealth inequality. The farm GSDP share has a negative and statistically significant impact on private savings. This is in line with the findings of Krishnamurty and Saibaba (1981), Mˈuhleisen (1997), and Rakshit (1983); column (4) controls for additional explanatory variables and there is a marginal change in the results. In column (5), we show that the presence of additional explanatory variables such as urban inflation, mean MPCE, and literacy rate does not significantly reduce the influence of working-age population on the private savings. Among covariates, mean MPCE and literacy rate emerge as important factors driving private savings. Column (6) shows that a one per cent rise in the working-age population raises private savings by nine percentage points, holding bank density and post office density constant. These two measures of financial development (bank density and post office density) also emerged as significant determinants of private savings in the findings of Athukorala and Sen (2004), Dayal-Ghulati and Thimann (1997), Horioka and Hagiwara (2010), Loayza et al. (2000a, b), and Park and Shin (2009). The model's explanatory power improves significantly with adjusted R^2 reaching 71%.

Clearly, these results confirm the life cycle hypothesis that larger working-age population leads to a rise in the savings. These findings are in line with the empirical literature based on cross-country panel data (Dayal-Ghulati and Thimann 1997; Fry and Mason 1982; Heller 1989; Higgins and Williamson 1997; Kelley and Schmidt 1996; Leff 1969; Loayza et al. 2000a; Mason 1988; Modigliani 1970; Yasin 2008), time-series data for Pakistan (Ahmad 2002; Akhtar 1986; Ali et al. 1997; Burney and Khan 1992; Khan and Malik

Table 2 Impact of working-age population share on per capita private savings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline		Control variables	Control variables		Control variables		Interaction analysis		
Dependent variable: Log of per capita gross private small saving collections in post offices and banks										
Log working-age ratio	18.71*** (1.676)	11.08** (4.011)	10.88*** (3.564)	9.017*** (3.040)	8.901*** (3.015)	9.051*** (1.822)				
Log working-age ratio×life expectancy							0.918** (0.407)			
Log working-age ratio×literacy rate							0.445* (0.221)			
Log working-age ratio×gender development index								1.661*** (0.255)		
Log working-age ratio×gender empowerment measure									2.811*** (0.360)	
Log working-age ratio×log per capita income										0.210*** (0.0264)
Social sector expenditure		0.107* (0.0514)								

Table 2 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline		Control variables			Control variables		Interaction analysis		
Governance index		−2.001 (2.032)								
Wealth inequality			−0.0813 (0.314)							
Farm GSDP share			−0.118** (0.0535)	−0.11*** (0.0341)						
Female-headed households				0.0194 (0.0505)						
Rural inflation				0.0768 (0.0472)					0.0287 (0.0231)	
Urban inflation					−0.0449 (0.0636)			−0.0978* (0.0518)		
Log mean MPCE					3.643*** (1.192)					
Log literacy rate					3.642*** (0.904)					
Bank density						14.69*** (3.221)	13.00*** (3.317)	19.45*** (1.433)	9.042*** (2.714)	
Post office density						0.464** (0.183)	0.345* (0.191)	0.342** (0.157)	0.330** (0.123)	
Growth in per capita income										0.0178 (0.0209)
Constant	−69.3*** (6.888)	−38.16** (16.36)	−34.73** (15.58)	−27.91** (13.04)	−68.39*** (5.913)	−35.15*** (7.044)	−20.42*** (4.581)	−2.218** (0.816)	−2.353* (1.316)	−1.872* (1.000)

Table 2 (continued)

	(1) Baseline	(2)	(3) Control variables	(4)	(5)	(6) Control variables	(7)	(8) Interaction analysis	(9)	(10)
Observations	32	32	32	32	32	32	32	32	32	32
Groups	16	16	16	16	16	16	16	16	16	16
R^2	0.49	0.59	0.53	0.54	0.50	0.73	0.75	0.69	0.70	0.80
Adjusted R^2	0.49	0.55	0.48	0.48	0.43	0.71	0.71	0.65	0.67	0.78
State effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors are robust clustered at state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All models are based on the fixed effects estimation. The VIF (variance inflation factor) values in all the models are less than 3, suggesting no problem of multicollinearity

1992), USA (Hurd 1996; Pryor 2003; Thornton 2001), Japan (Horioka 1997), and Nigeria (Uremadu 2009) and particularly those studies with respect to India which covers it as one of the sample countries in the panel of cross-country data (Curtis et al. 2017; Higgins and Williamson 1997; Higgins 1998; Horioka and Hagiwara 2010; Park and Shin 2009).

Interaction analysis

Columns (7, 8, 9, and 10) demonstrate the possible interaction effects of the demographic change with key socio-economic covariates to ascertain whether the positive effect of working-age population on private savings is conditioned by the socio-economic environment of the country. In column (7), we observe that the estimated private savings effect of the interaction of working-age population with the life expectancy and literacy rate is positive and statistically significant, implying that healthy and educated working-age population is essential to raise private savings. Previous empirical studies by Krueger (2004) and Park and Shin (2009) also found that an increase in life expectancy increases the post-retirement period of an individual and hence the income has to be stretched for a longer time horizon. This leads to a rise in savings in all periods of an individual's life.

In columns (8) and (9), working-age population is interacted with the effective instruments of gender equity that is GDI and GEM. The interaction terms reveal positive and statistically significant relationship, suggesting that the level of gender equity significantly positively adjusts the positive impact of the working-age population on private savings. Thus, India need to make higher level of investment in women's health, education, and economic opportunities, then only it can realise the fruits of 'gender dividend' which is causally related to higher saving rates and economic growth rates. This is in line with the theoretical arguments put forward by Bloom (2011) and Desai (2010).

In the final column, column (10), working-age population interacts with the per capita income level. The estimated private savings effect is positive and statistically significant. It indicates that the higher the level of per capita income, the stronger the positive impact of working-age population on private saving. This asserts that policies that support development help in stimulating savings by the working-age group, a result consistent with the findings of Athukorala and Sen (2004), Dayal-Ghulati and Thimann (1997), Horioka and Hagiwara (2010), Loayza et al. (2000a, b), and Modigliani (1970). The adjusted R-squared of the model reaches 78% in the final column, suggesting a good fit of the model.

In summary, the results of the interaction analysis suggest that opening of the window of economic opportunity for India could result in higher private savings if favourable socio-economic policy environment is in place, such as healthy and educated working-age population, higher gender equity, and a higher level of per capita income.

Additional analysis

Although the study controls for a range of key socio-economic variables to estimate a net demographic effect on private savings, an extension of the study is possible by checking for the influence of other potential determinants of private savings, such as interest rates, external terms of trade, public savings, and wages. Since these indicators are not available at the provincial level, we could not include them in our main analyses. In this section, we have made a descriptive assessment of these indicators at the national level.

The effect of interest rates on private savings is theoretically ambiguous. A higher interest rate can encourage private savings as the substitution effect makes current

consumption relatively expensive. However, the income effect tends to reduce private savings with the rise in interest rates by raising current income of an individual who is a net lender. Previous empirical research also presented mixed evidence. Athukorala and Sen (2004) found a positive effect of real rate of return on bank deposits on private saving rate in India, using time series data for the period 1954–1998. Globally, Ogaki et al. (1996) and Masson et al. (1998) have also found positive effects on private savings, while Bosworth (1993) found negative effects in a panel estimation.

Another potential determinant of private savings is external terms of trade. The relationship between the two is based on the Harberger–Laursen–Metzler hypothesis, which states that an improvement in the terms of trade raises price of domestically produced goods relative to that of foreign goods and increases real income and savings. This hypothesis assumes that consumers have short-term expectations. On the other hand, if consumers are assumed to be forward looking, then its effects depend on whether there is a transitory or permanent change in the terms of trade. A transitory change in the terms of trade and private savings has a positive correlation, in line with Obstfeld (1982)'s hypothesis which says that a permanent deterioration in the terms of trade may increase savings in the current period by domestic residents who want to maintain the real standard of living in the future (Athukorala and Sen 2004; Masson et al. 1998).

The impact of public savings on private savings is also noteworthy. The extreme case presented by Ricardian equivalence implies that public and private savings are perfect substitutes, provided there are perfect capital markets and no uncertainty in savings behaviour. However, in real world, these assumptions may not hold (Athukorala and Sen 2004). Also, different government policies can have varied impact on private savings. For instance, a higher government expenditure may reduce the resources available to private sector and hence reduce their savings, whereas, if a government undertakes a productive public investment, which may not require further taxes in the future, it may not significantly offset private savings. Previous empirical results also reject the Ricardian equivalence hypothesis. (See Masson et al. 1998 for a detailed review of the empirical literature.) Lastly, the effect of wages on private savings is analysed in the Indian context considering that it may have a direct impact on private savings.

Given the above theoretical background, we conduct graphical analysis to check whether there is any relationship between private savings and interest rates, external terms of trade, public savings, and wages by exploiting time series data for India for the period 2000–2018 at an approximate interval of 5 years. The data for per capita private savings are obtained from National Savings Institute, Ministry of Finance, Government of India. The working-age ratio data are collected from World Population Prospects (19th Revision), United Nations 2019. Weighted average call money rate provided by the RBI is used to measure interest rates. External terms of trade data are taken from RBI and trading economics.com. The data for public savings are collected from Central Statistics Office (CSO) and the wages data from annual reports of labour bureau. The graphical analysis (Fig. 4) clearly highlights that wages along with demographic factor are in tandem with private savings, whereas other factors such as terms of trade, public savings, and interest rate do not exhibit any systematic relationship with private savings in the Indian context during the period 2000–2018. Thus, wages seem to play an important role in determining private savings.
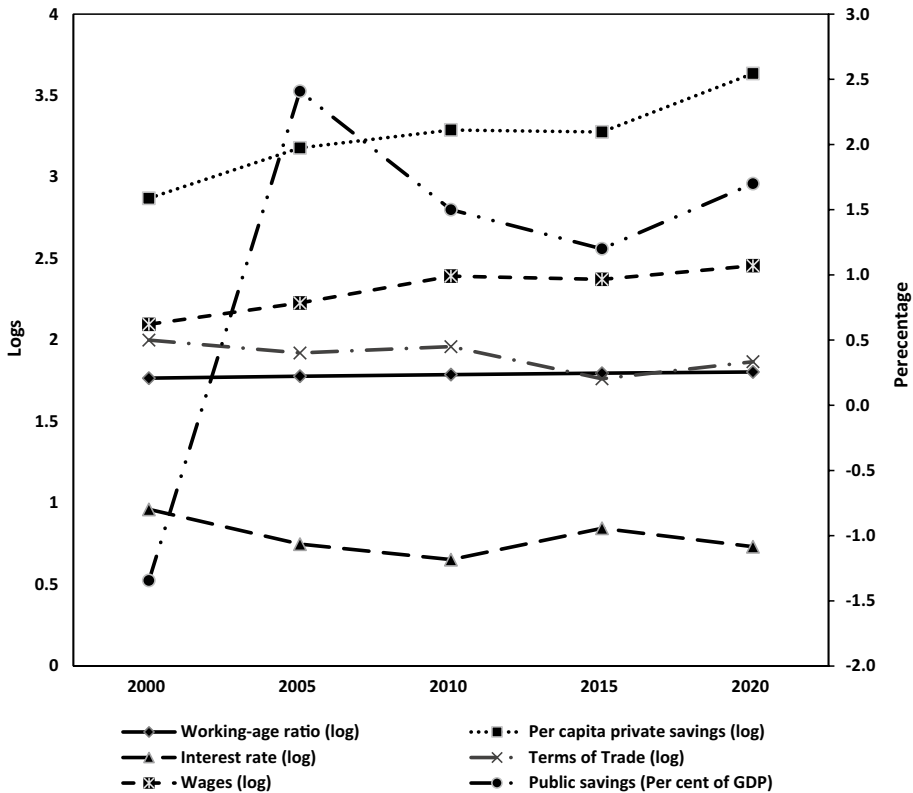
Fig. 4 Trends in other potential determinants of private savings (2000–2020). *Source*: Authors' calculations from various sources

Robustness checks

In this section, we examine the robustness of our findings for different econometric techniques and alternative sample. Below, we discuss in more detail some of the robustness checks performed.

Relative contribution of the working-age population to per capita private savings inequality: regression-based inequality decomposition model

In this method, first, a saving-generating function is set as

$$\ln(s_i) = \alpha + \sum_{i=1}^{k} \beta_i x_i + \varepsilon \tag{2}$$

where s_i is per capita private savings for $I = 1, \ldots, k$; x_i is a vector of explanatory variable; β_i are the corresponding regression coefficients estimated by OLS regression; and ε is the residual term, assumed to be unrelated to other variables.

Table 3 Estimates of regression-based inequality decomposition model—contribution of variation in working-age population share to inequality in per capita private savings (in percentage)

	(1)	(2)	(3)	(4)
Dependent variable: Log of per capita gross private small saving collections in post offices and banks				
Log working-age ratio	27.84*	23.12*	24.38*	26.35**
Log life expectancy		16.59		
Log literacy rate	14.57			
Gender development index				0.56
Gender empowerment measure			22.33**	
Social sector expenditure	14.19**	15.47**	11.04*	7.08
Governance index				− 3.19
Wealth inequality				− 0.46
Farm GSDP share			2.01	
Female-headed households	0.12			
Rural inflation	4.68	3.40	6.33	
Urban inflation	0.28			
Log mean MPCE		8.99		
Bank density				40.31***
Post office density	9.38**	7.45**	7.18**	8.89***

Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. The pooled OLS regression of decomposition model is given in "Appendix Table 8"

$$\ln\left(s_i\right) = \alpha + \sum_{i=1}^{k} Z_i + \varepsilon \tag{3}$$

where each Z_i for $i = 1, \ldots, k$. is a 'composite' variable, equal to the product of an estimated regression coefficient and an explanatory variable. To calculate inequality decomposition, the value of α is not relevant as it is constant for every observation. Thus, one may consider the following equation:

$$\ln\widehat{\left(s_i\right)} = \alpha + \sum_{i=1}^{k} Z_i \tag{4}$$

where dependent variable is $s_i hat$ or predicted savings variable. Note that there is no residual term and we can neglect the constant term α.

Following Fields and Yoo (2000), Fields (2003), and Shorrocks (1982), the contribution of each composite variable to total per capita private savings inequality can then be assessed as follows:

$$\sigma^2(s) = \sum_{i=1}^{k} \beta_i \text{cov}\left(s, x_i\right) + \sigma^2(\varepsilon) \tag{5}$$

where $\sigma^2(s)$ is the variance of s, $\text{cov}\left(s, x_i\right)$ represents the covariance of s with each variable (x_i), and this term can be considered as the relative contribution of factor components to total per capita private savings inequality, which sums to 100%.

The "Appendix Table 8" presents four different models of pooled OLS regression from Eq. (4) based on the correlation among explanatory variables. Table 3 from Eq. (5)

reveals that around one-fourth of per capita private savings inequality is contributed by the working-age population across the states, after controlling other core policy variables in different models. This reinforces the significance of working-age population in determining per capita private savings. Bank density is another important variable which explains around 40 per cent of the private savings inequality across the states. GEM contributes to around 22% of the regional savings inequality and is followed by social sector expenditure (explaining around 11–15%) and post office density (explaining around 9%).

Checking endogeneity of the working-age population: instrumental variable model

In this method, we address the possible endogeneity issue in working-age population as its influence on private savings may work through various channels such as education, health, level of development, and gender equity. Bloom et al. (2003) and Bloom (2011) have highlighted the significance of these channels for the realization of demographic dividend. On this line, we take literacy rate, life expectancy, per capita income, growth in per capita income, and GEM as instruments. The statistical expression for the model is as follows:

$$
\begin{aligned}
Log\ per\ capita\ private\ savings_{it} = {} & \alpha + \beta_0 (Log\ working - age\ ratio_{it} \\
= {} & log\ literacy\ rate_{it},\ log\ life\ expectancy_{it},\ log\ per\ capita\ income_{it}, \\
& growth\ in\ per\ capita\ income_{it,},\ gender\ empowerment\ measure_{it}) \\
& + \beta_i\ Control\ variables_{it} + u_{it}.
\end{aligned}
\tag{6}
$$

where $\log percapitaprivatesavings_{it}$ is the dependent variable; $\log workingageratio_{it}$ is the instrumented variable; other explanatory variables have the usual interpretation.

The (two-stage least square) 2SLS estimates from Eq. (6) presented in Table 4 suggest magnified statistical significant bearing of the working-age population on per capita private savings. The results are quantitatively similar in column (2) when compared to the final estimates of panel data regression model. To be precise, a one per cent rise in the share of working-age population increases per capita private savings by around nine per cent, when instrumented by literacy rate, life expectancy, per capita income, growth in per capita income, and GEM, while controlling for other variables. The test of endogeneity confirms that working-age population is an endogenous variable as the null hypothesis of exogeneity of the working-age population is rejected at a conventional level of significance. The instruments used are valid as per the test of over-identifying restrictions, and the value of F-statistic shows that the instruments are not weakly correlated with the endogenous regressors.

Checking endogeneity of the growth in per capita income: instrumental variable model

The results reported in the panel data regression model (main results from Table 2) are valid only if growth drives private savings during the period considered. There might be an issue of endogeneity of the growth in per capita income since savings leads to a higher capital accumulation and hence higher economic growth (Mankiw et al. 1992). Loayza et al. (2000a, b) found that growth in per capita income may be jointly endogenous with the saving rates and controlled for this endogeneity using 'internal instruments', that is by taking its lagged values. We check for the possibility of reverse causality in saving regression by

Table 4 Estimates from instrumental variables model (2SLS)—checking endogeneity of working-age population share

	(1)	(2)	
Dependent variable: Log of per capita gross private small saving collections in post offices and banks			
Log working-age ratio	17.28*** (3.770)	9.196*** (2.460)	
Social sector expenditure		0.0287 (0.0297)	
Governance index	− 3.521** (1.665)		
Wealth inequality	0.152 (0.299)	0.254 (0.210)	
Farm GSDP share	0.0347* (0.0183)		
Female-headed households	0.0250 (0.0307)		
Rural inflation		− 0.0334 (0.0506)	
Urban inflation		0.0210 (0.0812)	
Log mean MPCE	1.400 (1.279)		
Bank density		9.642*** (3.314)	
Post office density	0.797*** (0.283)	0.687*** (0.228)	
Constant	− 79.08*** (13.55)	− 37.60*** (10.52)	
Observations	32	32	
Groups	16	16	
R^2	0.64	0.76	
First-stage F-statistic	10		10.11
Over-identifying restrictions (Ho: zero correlation between instruments and the error term)			
Sargan chi^2	4.6638 ($p=0.3236$)		3.0584 ($p=0.5481$)
Exogeneity of instrumented explanatory variable (Ho: variable is exogenous)			
Robust score	7.6555 ($p=0.0057$)		6.4361 ($p=0.0112$)
Robust regression	8.0201 ($p=0.0094$)		10.8526 ($p=0.0032$)

Robust Standard errors in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.1$. Gender development index is not included in the regression due to high pairwise correlation with the instruments used

using the instrumental variable model and taking lagged growth in per capita income as an instrument. The statistical expression for the model is as follows:

$$Log\,per\,capita\,private\,savings_{it} = \alpha + \beta_0(growth\,in\,per\,capita\,income_{it}$$
$$= growth\,in\,per\,capita\,income_{it-1}) + \beta_i Control\,variables_{it} + u_{it} \qquad (7)$$

where *growth in per capita income$_{it-1}$* represents the lagged growth in per capita income. Table 5 reports the instrumental variable estimated results for Eq. (7). It shows that the growth in per capita income is an exogenous variable as, in the endogeneity test, the null hypothesis of exogeneity of the instrumented explanatory variable is not rejected at a conventional level of significance. The coefficient of the growth in per capita income is also similar in magnitude and statistically insignificant as found in Table 2. These results rule out the possibility of reverse causality in the main results. We can conclude that growth drives private saving in our model, which is in line with the predictions of Modigliani (1970). Attanasio et al. (2000), and Deaton and Paxon (2000), examining the link between savings and economic growth, also found that growth Granger causes savings and a rise in economic growth will follow a rise in savings.

Table 5 Estimates of instrumental variables model (2SLS)—checking endogeneity of growth in per capita income

	(1)
Dependent variable: log of per capita gross private small saving collections in post offices and banks	
Log working-age ratio × Log per capita income	0.378*** (0.126)
Governance index	−3.056 (2.334)
Farm GSDP share	−0.00510 (0.0501)
Female-headed households	0.0664** (0.0291)
Rural inflation	−0.201*** (0.0672)
Urban inflation	0.0923 (0.177)
Log literacy rate	1.162 (2.529)
Growth in per capita income	0.0580 (0.153)
Constant	−13.94** (7.050)
Observations	16
R^2	0.58
Exogeneity of instrumented explanatory variable (Ho: variable is exogenous)	
Robust score chi^2(1) = 1.92534 (p = 0.1653)	
Robust regression F(1,6) = 1.75867 (p = 0.2330)	

Robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

Table 6 Impact of working-age population share on per capita private savings in 28 states of India

	(1)
Dependent variable: Log of per capita gross private small saving collections in post offices and banks	
Log working-age ratio	18.11*** (1.461)
Constant	−66.80*** (5.989)
Observations	56
Groups	28
R^2	0.49
Adjusted R^2	0.49
State effects	YES

Robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1

Using an alternative sample

In Table 6, we present estimates for an alternative sample of states covering 28 states of India[4] to compare these estimates with the baseline result for the 16 major states of India. To choose between RE and FE, necessary tests, F test, Breusch–Pagan Lagrange multiplier (LM) test and Hausman test are conducted to determine the model. The model is based on

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[4] The states included are Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal, Jharkhand, Chhattisgarh, and Uttaranchal.

FE estimation. Panel data regression is run by using population-adjusted weighted regression. The results reveal that the estimate is broadly analogous to the one found for the major states, thus strengthening the robustness of the baseline result.

In summary, the evidence we present in this section implies that the working-age population has a strong causal effect on the per capita gross small savings collection in post offices and banks in India.

Conclusion

The role of the bulging working-age population in private savings specific to the Indian context remains unclear in previous empirical evidence as the only available study investigated this relationship *before* the onset of the demographic window of economic opportunities for the country is by Athukorala and Sen (2004). Moreover, this study assessed only national-level time series data. To the best of our knowledge, our paper is the first one to investigate the impact of demographic changes on per capita gross small savings in post offices and banks net of socio-economic characteristics using state-level panel data compiled from multiple data sources for the period 2001–2018. Our comprehensive econometric assessment with multiple robustness checks present three key findings: First, there exists a positive relation between the working-age population and private small savings, consistent with the economic life cycle hypothesis. To be precise, a one per cent rise in the working-age population raises per capita private savings by nine percentage points, holding other factors constant. Second, the demographic factor explains around one-fourth of the per capita private savings inequality across the states and over time. Third, the demographic window of economic opportunity for India could yield maximum benefits in terms of private savings when accompanied by a favourable socio-economic policy environment related to education, health, gender equity, and economic growth.

Appendix

See Tables 7 and 8 .

Table 7 Correlation matrix of the study variables

	Log PCS	Log WAR	SSE	Gov	wealth	Farm GSDP	F_head	R_inflat	U_inflat	MPCE	Lit	Post	Bank	GDI	GEM	LE	PCY	Gr PCY
Log PCS	1.00																	
Log WAR	0.70	1.00																
SSE	0.48	0.25	1.00															
Gov	0.32	0.64	−0.21	1.00														
wealth	−0.05	−0.32	0.50	−0.71	1.00													
Farm GSDP	−0.48	−0.65	−0.07	−0.43	0.16	1.00												
F_head	0.05	0.04	0.25	−0.04	0.01	−0.07	1.00											
R_inflat	0.52	0.47	0.31	0.16	−0.06	−0.41	0.19	1.00										
U_inflat	−0.38	−0.46	−0.18	−0.42	0.50	0.29	−0.24	−0.22	1.00									
MPCE	0.52	0.65	−0.16	0.82	−0.76	−0.48	0.09	0.28	−0.62	1.00								
Literacy	0.57	0.78	0.03	0.65	−0.43	−0.69	0.19	0.36	−0.53	0.75	1.00							
Post	0.31	−0.05	0.16	−0.13	0.30	−0.07	−0.42	0.19	0.07	−0.02	−0.13	1.00						
Bank	0.74	0.71	0.24	0.56	−0.45	−0.41	0.26	0.55	−0.53	0.72	0.66	−0.05	1.00					
GDI	0.47	0.78	0.16	0.78	−0.42	−0.52	0.04	0.23	−0.52	0.67	0.82	−0.17	0.57	1.00				
GEM	0.70	0.71	0.28	0.60	−0.45	−0.41	0.15	0.33	−0.58	0.69	0.67	0.08	0.77	0.67	1.00			
LE	0.70	0.67	0.21	0.51	−0.29	−0.53	0.39	0.46	−0.54	0.72	0.73	0.09	0.71	0.58	0.66	1.00		
PCY	0.90	0.82	0.46	0.50	−0.19	−0.62	0.00	0.60	−0.56	0.62	0.70	0.25	0.80	0.66	0.80	0.72	1.00	
GrPCY	0.63	0.43	0.60	0.22	0.23	−0.22	−0.15	0.26	−0.18	0.20	0.42	0.39	0.35	0.50	0.49	0.42	0.66	1.00

PCS, per capita private savings; WAR, working-age ratio; SSE, social sector expenditure; Gov., governance index; Wealth, wealth inequality; F_head, female-headed households; R_inflat, rural inflation; U_inflat, urban inflation; Bank, bank density; GDI, gender development index; GEM, gender empowerment measure; LE, life expectancy; PCY, per capita income; GrPCY, growth in per capita income

Table 8 Pooled OLS regression-based decomposition of inequality in per capita private savings

	(1)	(2)	(3)	(4)
Dependent variable: log of per capita gross private small saving collections in post offices and banks				
Log working-age ratio	6.083* (3.289)	5.050* (2.468)	5.326* (2.883)	5.756** (2.723)
Log life expectancy		4.221 (3.069)		
Log literacy rate	1.932 (1.565)			
Gender development index				0.158 (2.666)
Gender empowerment measure			4.732** (2.240)	
Social sector expenditure	0.0639** (0.0293)	0.0698** (0.0274)	0.0497* (0.0247)	0.0319 (0.0312)
Governance index				−0.771 (1.656)
Wealth inequality				0.141 (0.282)
Farm GSDP share			−0.0062 (0.0209)	
Female-headed households	0.00480 (0.0301)			
Rural inflation	0.0365 (0.0562)	0.0265 (0.0496)	0.0494 (0.0510)	
Urban inflation	−0.00561 (0.103)			
Log mean MPCE		0.725 (0.768)		
Bank density				12.13*** (3.492)
Post office density	0.700** (0.312)	0.555**(0.240)	0.535** (0.252)	0.663*** (0.232)
Constant	−32.58*** (10.94)	−41.42*** (11.53)	−22.04* (12.08)	−23.26** (10.16)
Observations	32	32	32	32
R^2	0.71	0.75	0.73	0.80
Adjusted R^2	0.63	0.69	0.67	0.74

Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Declaration

Conflict of interest The authors declare that they have no conflict of interest.

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