

PERCAPITA INCOME, DOMESTIC SAVINGS AND LONGEVITY AMONG DEVELOPED COUNTRIES AND ITS IMPLICATIONS FOR INDIA

¹Dr. R. Venkataraman, ²Thilak Venkatesan,

¹Dean, ²Research Scholar
¹Presidency College, Bangalore

Abstract: India's growth story is increasingly becoming visible in the global context. The growth is predominantly consumption driven and an apt initiative of Make in India, attracting higher FDI acts as stimulant of growth. The growth in terms of Per capita income needs to translate to savings, which can aid in better lifestyle post retirement. The developed nations strive for better policies for the social security and pension systems of their citizens. India, with most of the average population in the working class, needs to take action to induce savings and implement various schemes for adaptation of better pension schemes. In this context, the study was focussed to understand the relationship among Per capita income, life expectancy, GDP and savings. The variables were significant in influencing the savings in the developed and developing countries. The data was collected through secondary sources, and the tools used for the analysis were panel vector auto regression, seemingly unrelated regression and granger causality. The level of savings varied among the countries and the SURE estimates suggested a negative relationship between life expectancy and savings in case of India.

Keywords: Income, Savings, longevity, policy measure, Panel VAR, Granger Causality

JEL Classification: D31, E21, E60

I. INTRODUCTION

The median population of India is under 30 and a majority of them are in the working class. The Asian counterparts have had certain policy measures that had restricted the population and thereby leading to demography of an aged population. The developed countries have witnessed problems of underfunded pension systems. The Citibank reported that "The total value of unfunded or underfunded government pension liabilities for 20 countries belonging to the Organization for Economic Co-operation and Development (OECD) — a group of largely wealthy countries is \$78 trillion". The study included the richest nations as classified by the OECD, U.S., Canada, Australia to name a few.

The immediate response by the policy makers in the developed countries was to hike the retirement ages so as to link the retirement age to match the expected longevity. Eventually citizens will be forced to work post retirement so as to manage the expenses post retirement. The ageing demography precedes the medical cost associated with it. The technological advancement has made every disease curable but at a cost. The moment retirement planning is thought, it links to the savings or the funding options. Major corporations, pension systems are cutting costs and shifting towards a defined contribution compared to a defined benefit. This eventually leads to a private savings vehicle to be implemented with incentives to savings to ensure that the retirement kitty is large enough to address the issue.

In this context the research is focused to study the life expectancy, Per capita income, savings, GDP and population of developed and developing countries. The model of the variables is built to understand the developed countries and any implications that can be drawn to aid the policy makers of the developing country in particular India. The policy actions at all developing countries and India should be to incentivize long term savings, promote literacy and to attain higher stands of financial inclusion.

The paper is organised into the following sections: The second section would cover the review of literature and research gap for the current study. The third section describes the objectives of the study, hypothesis to be tested and model for the study, section four discusses the data analysis and inferences of the topic covered and, finally, the fifth section would conclude the results with implications followed by the scope & implications.

II. LITERATURE REVIEW

Longevity and the raise in the life expectancy across nations of the world have been daunting the policy makers, Pension funds and the insurance companies. Many developed countries have had issues in the recent past of failures towards higher pay-outs to the pensioners. The actual survival age in many developed countries are higher than the most developing countries. The various studies indicate that the savings have also been increasing to meet the consumption post retirement. Longevity raises the rate of savings and physical capital accumulation. Some countries had initially a higher tax rate due to public education (Zhang, Zhang, & Lee, 2003).

The rising inflation also is a hindrance for the investment companies to deliver returns beating inflation. The various studies in this context have been on aggregate savings level and longevity, the research findings observed that in certain conditions, the hypothesis of the economic theory supports that increase in longevity leads to a higher aggregate savings in steady state (Sheshinski, 2009)&(Bloom, 2002). The holding period of the assets also were longer when classified for a permanent income distribution and the findings observed people with high permanent incomes kept large amounts of assets until very late in life and proved a rise in medical expenses with age (De Nardi, French, & Jones, 2009). As regards to aging, the requirement for health care was observed for longer period compared to previous generations (Lindgren, 2016). The improvement in technology for treatments, cost involved and modest progress against chronic diseases like cancer would lead to enormous social values (Murphy & Topel, 2005).

Longevity risk can be offset by defined-benefit pension plans; their study also stated the underfunding of defined benefit plans and the importance of hedging these investments (Evans & Sherris, 2010). Due to the increase in life expectancy, the accumulated retirement corpus would fall short and in order to avoid such risks the authors proposed endogenous savings (Cocco & Gomes, 2011). Certain research findings prove that the increase in the life expectancy, increased retirement expectations, with working at old age. The previous generations experience also had an effect on increasing knowledge of younger cohorts (Khan, Rutledge, & Wu, 2014).

A study that focused on simulation, reiterated that the respondents interacted with their virtual future selves and those who did had an increased tendency for accepting a later monetary reward compared to immediate ones (Hershfield et al., 2011). The transition in demography had a positive effect on aggregate saving, due to old-age survival improvements in spite of youth dependency declines. The aging of the population aging does not lead towards decline in aggregate saving rates (Kinugasa & Mason, 2005).

III. RESEARCH DESIGN

3.1 Nature Of The Study

The study is analytical, quantitative, and historical. Analytical as it confines to an existing information, quantitative because it attempts to model the variables under study and historical as past data is used for analysis and interpretation. The research is built upon the secondary data from World Bank for the period 1994 to 2015.

3.2 Objectives Of The Study

1. To group the countries as developed and developing nations as panel data.
2. To model the savings and life expectancy for the developed and developing nations.
3. To compare the models and critically evaluate for the India's scenario.

3.3 Sampling

The current study was accomplished using country wise savings, life expectancy, Per capita GDP and GDP. The time frame opted was from 1994 to 2015, so as to match the secondary data in common to all the countries and the data were obtained from World Bank estimates. Gretland E-Views 8 software were used for analysis.

3.4 Research Hypothesis

H_{01} : There is no relationship between Income, savings, and life expectancy.

H_{02} : The developed and the developing countries follow same pattern of Income, savings, and life expectancy.

3.5 Research Methodology

3.5.1 Panel Data

The data was grouped under two categories developed and developing. The countries in the developed group were Australia, Canada, United States, France and United Kingdom. The developed countries were selected on literature review and prior work in

those countries. The developing countries consisted of Brazil, China, India, Russia and South Africa. The panel data was set up using the data for Life expectancy, savings, Percapita income, GDP and population.

3.5.2 Model Specification

SURE Model: For Developed Countries

Equation 1: $GNS_{Aus} = Exp_{Aus} * \beta_{a1} + PGDP_{Aus} * \beta_{a2} + GDP_{Aus} * \beta_{a3} + Pop_{Aus} * \beta_{a4} + e$

Equation 2: $GNS_{Can} = Exp_{Can} * \beta_{a1} + PGDP_{Can} * \beta_{a2} + GDP_{Can} * \beta_{a3} + Pop_{Can} * \beta_{a4} + e$

Equation 3: $GNS_{US} = Exp_{US} * \beta_{a1} + PGDP_{US} * \beta_{a2} + GDP_{US} * \beta_{a3} + Pop_{US} * \beta_{a4} + e$

Equation 4: $GNS_{Fr} = Exp_{Fr} * \beta_{a1} + PGDP_{Fr} * \beta_{a2} + GDP_{Fr} * \beta_{a3} + Pop_{Fr} * \beta_{a4} + e$

Equation 5: $GNS_{UK} = Exp_{UK} * \beta_{a1} + PGDP_{UK} * \beta_{a2} + GDP_{UK} * \beta_{a3} + Pop_{UK} * \beta_{a4} + e$

Similar equations were used for describing developing countries.

IV. DATA ANALYSIS AND INTERPRETATION

The panel analysis for the developed and the developing countries are summarized in the below table. The table consists of independent variables considered for predicting the Gross national savings. The Dependent variables were life expectancy, Percapita GDP, Population and GDP.

Table 4.1 Summary of Panel analysis of Developed Countries

	Pooled OLS		Fixed Effects Model		Random Effects Model	
	<i>Coefficient</i>	<i>Significant</i>	<i>Coefficient</i>	<i>Significant</i>	<i>Coefficient</i>	<i>Significant</i>
const			76.7767	1%	58.569	1%
Expectancy			-0.40	5%	-0.46	5%
GDPpercapita			6.28E-05	5%	9.80E-05	1%
Population			-3.49e-07	1%		
GDP	-6.16e-013	10%	1.54E-12	1%		
Country						

The panel of developed countries model observed all independent variables significant in the Fixed Effects model and the model suggested varying intercepts and non-zero beta coefficients. The Expectancy had negative coefficient for expectancy both in the fixed effects and the random effects model. Population and GDP were not significant in the random effects model.

Table 4.2 Summary of Panel analysis of Developing Countries

	Pooled OLS		Fixed Effects Model		Random Effects Model	
	<i>Coefficient</i>	<i>Significant</i>	<i>Coefficient</i>	<i>Significant</i>	<i>Coefficient</i>	<i>Significant</i>
const	-1.81e+012	1%	-2.85e+011		-2.79e+011	
Expectancy	1.62E+10	5%	3.24E+09		2.27E+09	
GDPpercapita	1.14E+08	1%	9.96E+07	1%	9.99E+07	1%
Population	549.014	1%	-103.906			
GDP	-0.167	1%	-0.089	1%	-0.09	1%
Country	1.14E+11	1%				

The Developing countries model observed all independent variables significant in the pooled OLS model. The panel model for Ordinary least squares, fixed effects and random effects were compared based on the significant factors and the Beta co-efficient. The models were observed to have different intercepts among the countries and the beta coefficients were significantly different from Zero. The coefficient for Expectance was positive in case of the developing countries model which implies an increase in Expectancy increased Gross national savings. The Developed countries model was confined to the fixed effects model as signified by the Hausman test statistic as given below.

	Developed	Developing	Null hypothesis:
Joint test on named regressors	5.37E-06	2.48E-24	Beta coefficients are Zero
Test for differing group intercepts	4.29E-38	3.12E-26	The groups have a common intercept
Breusch-Pagan test	6.8E-146	3.41E-137	Variance of the unit-specific error = 0
Hausman test	0.004555	0.970065	GLS estimates are consistent

The Developing countries model was observed a random effects model and only GDPpercapita and GDP were observed significant in influencing the dependent variable Gross National Savings. Further analysis was performed by splitting each country and observing the changes in the coefficients using the seemingly unrelated regression estimation model.

Country	Canada		U.K.		Germany	
	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>
const	-345.438	5%			488.98	1%
Expectancy	5.63	10%	6.36	1%	0.78	1%
GDPpercapita			-0.0074	1%	-0.011	1%
Population			-9.83E-06	1%	-6.47E-06	1%
GDP			1.24E-10	1%	1.45E-10	1%

The SURE model estimates were significant for Canada, U.K. and Germany, and all three counties had a positive coefficient for expectancy. Population had a negative significance on the savings indicating a higher population leading to a lower savings. The GDP though significant had a negligible effect and the Percapita GDP had a negative impact on savings.

Country	India		China		Russia	
	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>	<i>Coefficient</i>	<i>P-Value</i>
const	1117.34	1%	-402.8	1%	-1.07	1%
Expectancy	-29.74	1%	15.25	1%	4.18E+09	10%
GDPpercapita	0.166	1%			1.48E+08	1%
Population	7.19E-07	1%	-5.21E-07	1%	5.57E+03	5%
GDP	-1.24E-10	1%			-1.50E-01	10%

The SURE model for Developing countries had results with similar observations in case of population. Expectancy in case of India had a negative relationship to Savings. GDP of India and Russia had a negative relationship. The results from the model had diverse significance among the developed and the developing countries.

Further analysis on Expectancy and other factors were done using a Panel Vector auto regression. The variables were observed stationary at first difference and the equation for the estimation of VAR is as given below:

$$DEXP = C(28)*DSAV(-1) + C(29)*DSAV(-2) + C(30)*DPERCAPIN(-1) + C(31)*DPERCAPIN(-2) + C(32)*DGDP(-1) + C(33)*DGDP(-2) + C(34)*DEXP(-1) + C(35)*DEXP(-2) + C(36)$$

In the models for Developed and developing countries Expectancy was observed significantly influencing by the two period lagged savings and the one period lagged expectancy. The results of Granger causality as well supported the unidirectional influence.

	Developed	Developing
	<i>P-Value</i>	<i>P-Value</i>

DSAV does not Granger Cause DEXP	0.0196	0.0051
DEXP does not Granger Cause DSAV	0.6609	0.2219

The results of the granger causality proved that Per-capita income Granger causes expectancy and the results was found significant among both developed (at 5%) and developing countries (at 10%). Life expectancy was observed Granger causing GDP in developed countries.

V. DISCUSSION AND CONCLUSION

Savings had a unidirectional influence on the Life expectancy; the models through this research augment the prior studies. The models of savings as a dependent variable, using panel of developed and developing countries draw divergent results. The developed nation's model converged to a fixed effects model, with all independent variables significant, whereas the developing countries inclined to a random effects model with only Per-capita income and GDP significantly influencing the savings. The SURE estimates showed a positive relationship between expectancy and savings for almost all the considered countries except for India. The Panel VAR substantiated the relationship between the variables. The policymakers should revise the retirement age in developing countries and more policies should be implemented towards the pension schemes. The policy makers and the financial institutions are advised to up skill adequate literacy level to aid in the inclusion process. Further studies can be explored on how to engage the aged demography.

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