Fiscal Effects of Demographic Transition in Sri Lanka: With Reference to Government Spending and Ageing Population

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INTRODUCTION

With the stringent changes in the population currently taking place, the demographic transition is a common phenomenon, experienced by most countries in the world. Sri Lanka is not an exception to this. In the Sri Lankan context, demographic transition, particularly attributed by increasing in the aging population has caused socio-economic challenges, labour market challenges, and overwhelming fiscal burden with raising the concern over the capacity of the social security system to cater to the needs of such elderly segment in the country.

The share of the elderly population (aged 60 and above) in Sri Lanka has increased from 11 percent to 16.5 percent during the period from 1950 to 2020, while the share of the population aged below 15 years decreased from 38.7 to 23.7 percent during the same period, indicating a clear trend in demographic transition in the county (United Nations, 2020). It has been predicted that the elderly population will increase further and reach 28.1 percent of the total population by 2050 (Asian Development Bank, 2019). With these changes, Sri Lanka will become one of the countries with a higher portion of the elderly population in South Asian region.

Elders mainly have four ways of financing their retirement consumption needs, viz: family support, government welfare, labour force participation and re-employment, and accrued savings/pension plans (Rannan-Eliya et al., 1998). Pension schemes are in the lead under the financial support for the elderly. Implementation of social welfare programs as social security for elderly people is the main responsibility of the government in this regard and it has become a challenging task for the government due

to the high fiscal cost associated with these programs. On top of this, the healthcare spending for the elderly also can lead to intensifying the financial burden incurred due to population aging. With this ambiance, proper policy formulations to address issues that have arisen due to an increase in the elderly population are important.

Sanz & Velázquez, (2007) pointed out that the population aging is one of the main drivers of increased government spending in OECD countries, particularly expenditure on social welfare, health, and defence. Similarly, health expenditure also increases continuously in European countries due to the aging population (Marešová, Mohelská & Kuča, 2015). As suggested by Cai, et al. (2018) policymakers will be required to make difficult choices due to the indispensable surge in the fiscal burden of social expenditure incurred by the population aging in China.

A study done in Sri Lanka, Rannan-Eliya, et al. (1998) pointed out that a surge in cost for pension is unavoidable, while the fiscal burden is intensified by lowering the retirement age for the public sector pensioners. However, there is a dearth of research conducted in Sri Lanka, to assess the fiscal effects of population aging. This knowledge gap needs to be filled by a systematic study to direct and design effective policies to reduce the fiscal burden of the population aging. Therefore, the main objective of this study is to identify the fiscal effects of population aging with reference to government pension spending and health spending.

METHODOLOGY AND FINDINGS

The methodology of this study is mainly driven by the multivariate cointegration technique (Johansen cointegration) and Vector Error Correction Model (VECM), adopted from a study conducted by Sanz and Velázquez (2007). This time-series method of estimation captures both dynamic impact (short-run) and long-run relationship between the selected variables, as shown in Equation (1).

$$lPENHL_t = \beta_0 + B_1 ELD_t + \beta_2 lPCI_t + \beta_3 REP_t + u_t \quad (1)$$

Where, variables lPENHL, ELD, lPCI and REP respectively denote the log of summation of government spending on pension and health (in real term), Share of the elderly population, log of per

capita income (in real term), relative prices measured by GDP deflator, respectively. The u_t is the white noise error term; t is the time. The theoretical basis for the selection of variables for the model is drawn from the voter group decision model introduced by Craig & Inman (1986), and followed by Sanz and Velázquez (2007). As per this model, the composition of government expenditure at the equilibrium level is a weighted average of the preferred allocation of each cohort of the population. In terms of the elderly share, this share increases the weight of their demand in a new equilibrium, thereby creating a positive association with expenditure on social welfare and health.

The estimation process is followed by main steps – conducting unit root tests (Augmented Dickey- Fuller (ADF) and Phillips-Perron (PP) tests) to identify the stationary level of each variable, identifying the number of lags using suitable lag length criteria and estimating the cointegrating equations by employing the Johansen cointegration technique, and estimation of the VECM, as given in Equation (2).

$$\Delta Y_t = \alpha_t + \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Phi_i^* \, \Delta Y_{t-i} + \varepsilon_t \qquad (2)$$

Where, $\Delta Y_t = \ Y_t - Y_{t-1} +$; $\Pi = \alpha\beta'$; where α is coefficient of error correction term, β'; (1×4) Vector of cointegrating coefficients, $Y_t = [lPENHL_t, ELD_t, lPCI_t, REP_t]'$ vector of endogenous variables, Y_{t-i} is the lagged value of variables and ε_t is the white noise error term.

The study obtained required annual data for the period 1985 to 2020 from Central Bank of Sri Lanka, Ministry of Finance and World Population Prospects, United Nations.

FINDINGS

The results of the ADF and PP unit roots tests indicated that all variables in the models are non- stationery in their level form, but stationary at the first difference, d(1) (see Appendix 1). This fulfills the requirement for conducting the cointegration test. According to SC criterion, lag length of 2 was the optimal lag length. Results of the Johansen co-integrating test confirmed that

there is one cointegrating equation (see Appendix 2), indicating a long-run relationship between variables exists, and it is given in Equation 3 (see Appendix 3).

$$lPENHL = \beta_0 + 0.369ELD^* + 0.914lPCI^* - 0.005REP^* \quad (3)$$

[6.564] [4.198] [- 3.458]

Note: * denotes 1 percent significance level. t- statistics are mentioned in parentheses

As indicated by the results, all independent variables are statistically significant at a 1 percent significant level, indicating a long-run relationship between the three variables. In line with the main objective of the study, the results indicate that the elderly share of the country positively affects the government spending on pension and health, which indicates that the population aging directly causes a fiscal burden by creating positive pressure on government expenditure. These findings are consistent with the findings of Sanz and Velázquez (2007) and Marešová, Mohelská & Kuča (2015). As per the result of the study, per capita income and relative prices also affect the government spending on pension and health positively and negatively respectively. This indicates that rising income causes increase in the government expenditure. The upward pressure on relative prices deteriorates the real value of the government spending, thereby intensifying the fiscal burden. The error correction term of the VECM is significant and shows the expected sign (see Table 1, and Appendix 4). Accordingly, 0.65 percent of the deviation from long-run equilibrium is corrected within a year. Moreover, only one independent variable, per capita income affects the dependent variable in short-run (see Table 2).

Table 1: Long-run equilibrium

Error Correction:	D(lPENHL)
CointEq1	-0.65205* [-2.70866]

*Note: * denotes 1 percent significance level, t-statistics are mentioned in the parentheses*

Table 2: Results of short-run relationship (Dependent variable: D(lPENHL))

D(ELD(-1))	D(ELD(-2))	D(lPCI(-1))	D(lPCI(-2))	D(RP(-1))	D(REP(-2))
-0.340	-0.262	0.687	0.366***	0.001	0.005
(0.591)	(0.617)	(0.514)	(0.212)	(0.002)	(0.003)
[-0.575]	[-0.424]	[1.335]	[1.731]	[0.543]	[1.589]

*** denotes 10 percent significance level

Standard errors are mentioned within brackets and t-statistics are mentioned in the parentheses

Finally, diagnostic tests, Breusch-Godfrey Serial Correlation LM test, Breusch-Pagan-Godfrey (BPG) test and Jarque-Bera test confirmed that residuals are not serially correlated, no heteroscedasticity and residuals are normally distributed.

CONCLUSIONS

As revealed by the findings of the study there is an inevitable fiscal pressure associated with the ageing population in the country, which requires a policy-level concern over mitigating the issue of fiscal weight. As such, formulating a rationalized social security system and creating new employment opportunities for the elderly are lead in this regard. Particularly they can be offered employment opportunities during their retirement period, especially for those who are healthy and willing to engage in work. Lifting the retirement age limit up would be an effective measure to reduce fiscal burden. However, this measure should be implemented carefully without affecting the unemployment or underemployment of the young cohort of the population. Further, incentive programs to stimulate the elderly to contribute to economic activities could be introduced and implemented in a proper manner.

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Appendix 1

Table 1: Results of unit root tests – ADF and PP (intercept and trend)

Variables	Level	Level	1st Difference	1st Difference
	ADF	PP	ADF	PP
lPENHL	0.9412	0.9955	0.0000*	0.0000*
ELD	0.9992	1.0000	0.0000*	0.0142**
lPCI	0.9706	0.9608	0.0013**	0.0011**
REP	0.9992	1.0000	0.0371**	0.0271**

*, ** denote 1 percent and 5 percent significant levels, respectively

Appendix 2

Table 2: Results of Johansen co-integrating test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.582551	55.98217	47.85613	0.0072
At most 1	0.405073	26.28000	29.79707	0.1205
At most 2	0.155551	8.623227	15.49471	0.4014
At most 3	0.081078	2.874832	3.841466	0.0900

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 3

Table 3: Results of long-run relationship (Dependent variable lPENHL)

C	ELD	lPCI	REP
2.37570	0.369*	0.9141*	- 0.005*
	(0.056)	(0.218)	(0.001)
	[6.564]	[4.198]	[- 3.458]

* denotes 1 percent significance level

Standard errors are mentioned in brackets and t-statistics are mentioned in parentheses

Appendix 4

Table 4: Results of long-run equilibrium (adjustment) part of ECM

Error Correction	D(lPENHL)	D(ELD)	D(lPCI)	D(REP)
CointEq1	-0.652*	-0.002	0.343*	34.584***
	(0.241)	(0.0820)	(0.061)	(19.903)
	[-2.709]	[-0.019]	[5.622]	[1.738]

*,**,*** denotes 1 percent, 5 percent and 10 percent significance levels, respectively

Standard errors are mentioned in brackets and t-statistics are mentioned in the parentheses