The Education Component of Human Capital: Explorations with an Indicator for Sri Lanka

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Introduction

Education is a primary component of 'human capital'[18], a key factor of production (Becker 1992, 1964; Romer, 1986; Lucas, 1988). Physical indicators of education are either 'input-based', as in years of schooling and enrollment ratios, or 'outcome-based' as in literacy rate and 'Learning-Adjusted Years of Schooling' (World Bank, 2019).

A recent approach (Sumaiya and Abayasekara, 2016; Kariyapperuma, 2018) measures the human capital of the *employed population*[19] for Sri Lanka through an 'Education-adjusted Employment Index' (EAEI), to account for the changing composition of education over time. The computed index does not cover the unemployed and those outside the labor force; nor does it differentiate between genders[20]. It has also not been 'validated' as an alternative indicator to others in use. The research problem therefore constitutes the following questions: How does the index and its rate of change compare among males and females, employed and unemployed, and those within and outside the labor force in Sri Lanka; and does public expenditure on human capital have an impact on education-based human capital accumulation as measured by the index?.

[18] Other aspects of human capital being health, training and experience
[19] This approach fits the concept of 'deployed ' human capital (WEF, 2017).
[20] Significant gender-wise differences exist in the rate of unemployment as well as labor force participation in Sri Lanka (e.g. Gunewardena, 2015).

Objectives

The objectives of the study were to compute a new Education-Adjusted Index (EAI) in line with data and methodological considerations; to identify trends in the index by gender for the employed, the unemployed, and those outside the labor force; and to draw policy implications about the effectiveness of government expenditure on human capital in augmenting education-based human capital within the labor force.

Methodology

The first objective was met by applying the post-2012 survey definition of 'working age population' to the entire series[21], 1993-2017, and by deriving the index using a different weighting system for education levels. The second objective was met by computing the index separately by gender across all sub-populations specified above. The third objective was met by conducting a time series analysis, regressing the index values (EAI) computed for the labor force for each year on government real expenditure on education as a percentage of real GDP (EEGDP), government real expenditure on public health as a percentage of real GDP (HEGDP), and on per capita real GDP (GDPPC). The model was specified as follows.

$$\mathrm{EAI}_t = \beta_0 + \beta_1 \mathrm{EEGDP}_t + \beta_2\, \mathrm{HEGDP}_t + \beta_3\, \mathrm{LGDPPC}_t + \varepsilon_t \qquad (1)$$

All data for index calculations were obtained from the Annual Reports of the Quarterly Labor Force Survey of the Department of Census & Statistics for the period 1990-2017. Other data used in estimation were obtained from Annual Reports of the Central Bank, Sri Lanka for the same period. Augmented Dickey Fuller and Philips Perron unit root tests were used to check whether the variables were stationary. Due to the limited sample period, Auto Regressive Distributed Lag (ARDL) Bounds Testing approach was used to study the long run equilibrium relationship between variables. ARDL Error Correction Model was estimated to study the short run relationship between variables. Akaike Information criterion was used as the model selection

[21] Replacing the previous definition of '10 & above' by '15 & above' required estimating new percentages for the relevant population group attributed to each education level. Data for those outside the labor force is available only from 2008.

criterion. The level of significance considered in the analysis is 5 percent. Diagnostic Tests were conducted to check whether the results are robust (Jarque-Bera test, Lagrange Multiplier – LM test, Breusch-Pagan-Godfrey test, Ramsey RESET test, Cumulative Sum - CUSUM test and Cumulative Sum Squares - CUSUMSQ test).

Results and Discussion

While all indices showed improvement over the period in question, the relative performance of the gender categories is outlined below.

Table 1. Summary of Index Performance – Average Values 1993-2017

Gender	Female			Male		
Category |	EAI Av.	S.D.	CV (%)	EAI Av.	S.D.	CV (%)
Employed	0.49	0.05	10.3	0.46	0.03	6.5
Unemployed	0.70	0.04	6.0	0.60	0.04	7.0
Working Age Pop.	0.49	0.03	5.3	0.48	0.02	4.9
Not in Labor Force	0.46	0.02	5.2	0.45	0.04	8.8

Note: S.D. refers to Standard Deviation, and CV to Coefficient of Variation
Source: Authors' calculations based on data from the Quarterly Labor Force Survey reports, Department of Census & Statistics, Sri Lanka

An index *value* indicates the proportion covered of the hypothetical gap between *minimum* and *maximum* human capital (education) for a given sub-population. The values are therefore not strictly comparable across sub-populations, except to indicate the success in meeting their *own* 'gap'. For both females and males, the index was highest among their unemployed but relatively low for those 'not in the labor force', as illustrated in Table 1 by their mean values over the period. This implies that raising the human capital of the workforce is more a matter of reducing unemployment rather than increasing labor force participation. The female-male human capital gap is highest among the unemployed, so that reducing female unemployment in particular would contribute more to the above goal. The observed changes in the index suggest that reducing the rate of female unemployment and creating

job opportunities for those with higher educational qualifications would speed up the rate of human capital accumulation in the workforce.

In estimating a dynamic relationship, correlation analysis showed significant negative correlation between government expenditure on education (GDP ratio) and the Education-Adjusted Index for the Labor Force. This does not necessarily mean that government expenditure on education leads to lower education based human capital; the regression analysis showed that government expenditure on education as a percentage of GDP has no significant impact on the accumulation of human capital (through education) either in the long run or short run. In contrast, per capita real GDP and government spending on health have a significant positive impact on education-based human capital. According to the Error Correction model results, there is no significant relationship between variables in the short run. The Error Correction term which is negative and significant, shows that the model is stable in the long run and there is long run adjustment. GDP growth moves back to equilibrium path and the disequilibrium error is corrected by 82 percent each year, following an exogenous shock. All the diagnostic tests proved that there are no diagnostic errors and the results are robust.

The reason for a negative correlation between government expenditure on education and the Education-Adjusted (Human Capital) Index can be explained as follows. Real expenditure on education as a percentage of real GDP has declined over the past. However, the index has increased over time, showing a gradual shift of the labor force from lower to higher education levels. The regression results indicate that government expenditure on education has not contributed to this transition. Hence it is necessary to check on the efficacy of *specific* expenditure items within education[22]. The significant positive impact of government spending on public health to GDP ratio and per capita real GDP on the index in the long run shows that free health services and economic growth greatly contribute to the accumulation of education-based human capital in the long run. In fact, improvement in health and wellbeing does not have a contemporaneous, but lagged effect on

[22] The rise in human capital is also consistent with the impact of unmeasured variables such as private expenditure on education and an attitude among people that educational qualifications are necessary to get a better job.

improvement in human capital. Thus, public expenditure on health is a way of addressing human capital issues in the long run.

Conclusion

Human capital as measured by an Education Adjusted Index indicates that its average level in recent times has been higher among the unemployed than the employed, especially for females. Its rate of increase has tended to be higher for females among those employed, and for males among those unemployed. Accumulation of human capital in the workforce would benefit from movement of both females and males from unemployment to employment. Income growth and public health expenditure have contributed to raising education-based human capital (as measured by this index), but public expenditure on education has not. These findings imply that growth and public health expenditure are important for human capital accumulation, but the effectiveness of the components of public education expenditure should be examined.

References

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