Debt begets debt: The Sri Lankan welfare state and fiscal sustainability

Tilak Abeysinghe
Gamani Corea Foundation, Sri Lanka and National University of Singapore
Email: tilakabey@nus.edu.sg
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Abstract

Universal free education, healthcare and food subsidy and land (and housing) for landless were the key features of the Sri Lankan welfare state. In the 1960s and 1970s Sri Lanka stood as an outlier among developing countries for high human development indicators for a low-income country. Sri Lanka cannot make the same claims today. Many developing countries have surpassed Sri Lanka. Insufficient economic growth and perpetual budget deficits have resulted in an unsustainable build-up of public debt. A segmented trend analysis of the debt-to GDP ratio shows that social welfare programs are not the main drivers of unsustainable debt trends at present. It is debt servicing that perpetuates the debt burden. In fact, fiscal constraints of the country have taken a heavy toll on the quality of the social programs. The debt burden resulting from aging population, though largely offset at present by falling young population proportion, is bound to increase further. Interestingly, apart from higher GDP growth, quality adjusted road network seems to contribute to lowering the debt burden through indirect growth effects. By implication, essential infrastructure development may increase the debt burden in the short run, but lowers in the long run when growth effects start to kick-in.

Keywords: Welfare and human development, domestic and foreign debt, segmented trend analysis, adjusted debt trends and public expenditure, infrastructure and economic growth

JEL classification: C22, E60, H62, H63

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1. Introduction

Sri Lanka embraced the welfare state in the late 1940s, well ahead of many low-income countries. The Donoughmore Constitution in 1931 paved the way for Sri Lankans to voice their concerns to the colonial government. As a result, the emerging welfare ideology in the UK and the West found a fertile ground in Sri Lanka. Buddhist values of compassion (metta) and giving (dana) and the rising Marxist influence that emphasized state intervention were highly conducive to these changes (Gunetilleke, 2017).

Although the seeds were planted towards the end of the colonial period, welfarism flourished after independence in 1948 and eventually became a powerful political weapon. The country also has been constantly struggling to manage perpetual budget deficits and mounting public debt. Although the beneficial effects of welfare spending are well noted (Sen, 1981; Jayasuriya, 2000, 2004; Gunetilleke, 2017) and economic stagnation due to poor economic policies are thoroughly analysed (Athukorala and Jayasuriya, 1994, 2015), the link between unsustainable public debt trends and welfare spending has not come under close quantitative scrutiny in the existing research literature. We carried out our analysis with this objective in mind and found that the problem is largely elsewhere.

In fact, the motivation for this study came from another study. The public debt crisis that surfaced with the Global Financial Crisis (GFC) in 2007/08 hit hard on countries like Ireland, Greece, Portugal, and Spain. Institutions like the Organisation for Economic Cooperation and Development (OECD, 2010) and the International Monetary Fund (IMF, 2013) called for cutting public spending because there were no avenues for increasing government revenues in regimes with already high tax rates. These countries had to engage in unpopular spending cuts to bring the runaway debt problem under some control. By extending a segmented-trend methodology in Abeysinghe and Jayawickrama (2013) to a panel setting we analysed OECD data and observed that there was, in fact, a close link between unsustainable trends of public debt (defined later) and social spending, welfare spending in particular, before the onset of the Crisis. This relationship weakened after the Crisis because of policy interventions and austerity measures (Abeysinghe et. al., 2019a). This prompts the question “Is the welfare state sustainable”? If not, what alternatives are there for social security and welfare of the vulnerable?

In Section 2 we present a brief account of the Sri Lankan welfare state and provide a cross country comparison to highlight some beneficial effects that Sri Lanka derived from welfare

spending despite being a low-income country. Section 3 contains the main methodology of segmented trend analysis and regression results pertaining to obtaining adjusted debt trend segments. The adjusted trend segments are obtained after removing the effect of some fundamental predictors of government revenue and expenditure, thereby of the debt-to-GDP ratio. Fundamental predictors of government expenditure, for example young and old population proportions, basically capture essential expenditure that a country has to maintain to provide social and economic services. Section 4 relates these adjusted trend segments to different government expenditure categories expressed as a percent of GDP to examine which expenditure components drive unsustainable debt trend segments. Section 5 provides an assessment of the quality of social services and Section 6 provides a discussion on policy options.

2. Sri Lankan social welfare in brief

The key elements of the Sri Lankan social welfare state have been 1. universal free education, 2. universal free healthcare, 3. universal food subsidy, subsequently substantially modified and replaced with means tested cash payments, 4. housing for houseless and land for landless. Jayasuriya (2000, 2004), Gunetilleka (2017) and Tilakaratna and Sooriyamudali (2017) provide an extensive coverage of the evolution of these schemes. Athukorala (2016) provides an elaborate analysis of economic policies of post-independent Sri Lanka. Therefore, we do not delve into the history of the welfare schemes except for some highlights given below. Instead, we provide a brief quantitative assessment of the beneficial effects of social welfare and then move on to analyse the debt problem.

In brief, 1. free education from kindergarten to university was a bold and radical approach proposed in the Kannangara report of 1943 that came into effect with the Education Act of 1945. 2. The Compston report of 1950 led to the Health Act of 1952 and established free healthcare at Government medical services. 3. The Jennings report of 1947 led to the establishment of the Department of Social Services in 1948. Jayasuriya (2000) points out that the Jennings report did not translate into solid policies. Nevertheless, it contained visionary ideas of social insurance for social security and fiscal sustainability. The food subsidy program became the key social security scheme. The food subsidy scheme arose out of necessity. The great depression in the 1930s, droughts and malaria brought hardships to the general public. The food subsidy scheme was introduced as a war time measure for food rationing. Subsequently, it became a political weapon and came to be known as “politics of rice”

(Tilakaratna and Sooriyamudali, 2017). 4. The development of the peasant sector started to receive sufficient attention only after 1931 under the leadership of the then minister for agriculture Mr. D.S. Senanayaka and an accelerated welfare-oriented land settlement began after 1948 (Econ Rev, 1986). All these social programs have continued to this day though of course in altered forms.

2.1 Beneficial effects of social welfare[1]

As we noted earlier this is a well discussed topic especially when Sri Lanka was an outlying example among developing countries on human development in the 1960s and 1970s. Instead of repeating this literature, we present a cross-country comparison for some human development indicators just to highlight Sri Lanka's standing. Figures 1 and 2 provide cross-country plots of the relationship between infant mortality rate (per 1000 live births) and per capita income (represented by nominal per capita GDP) in the early 1970s and 2016-17. The figures also show a fitted curve that was obtained by regressing log of infant mortality rate on log of per capita income.[2] The relationship clearly shows that the infant mortality rate declines as income grows. Sri Lanka stands out as a clear outlier. Despite being a very low-income country in the 1970s, Sri Lanka had an infant mortality rate much lower than very rich countries like the United Arab Emirates. By 2016-17 some developing countries rose the income ladder while Sri Lanka moved up very slowly, but Sri Lanka continued to report impressive low infant mortality rates; 8.5 in Sri Lanka vs 10.2 in UAE. Figure 2 pertaining to 2016/17 highlights a denser scatter near the origin indicating the influence of factors other than income in bringing down infant mortality rates in a large group of countries.

Figure 3 shows the relationship between health adjusted life expectancy (HALE) and per capita income in 2015 together with a predicted line obtained by regressing log of HALE on log of per capita income and squared log per capita income. The figure shows that HALE tends to increase with per capita income. Again, Sri Lanka with a very low per capita income reported a HALE of 67 years, slightly lower than that of rich Qatar. As in Figure 2, a dense scatter in Figure 3 for HALE in the range of 63-70 shows the influence of factors other than income. Data in the early 1970s would have shown Sri Lanka's outlying performance with regard to HALE as well.

[1] Data for this section is from World Bank, WHO, and Wikipedia online sites.
[2] The fitted lines in Figures 1 to 4 provide a good fit within the sample range but they are not necessarily ideal because they do not account for asymptotes, for example, zero for the infant mortality rate.

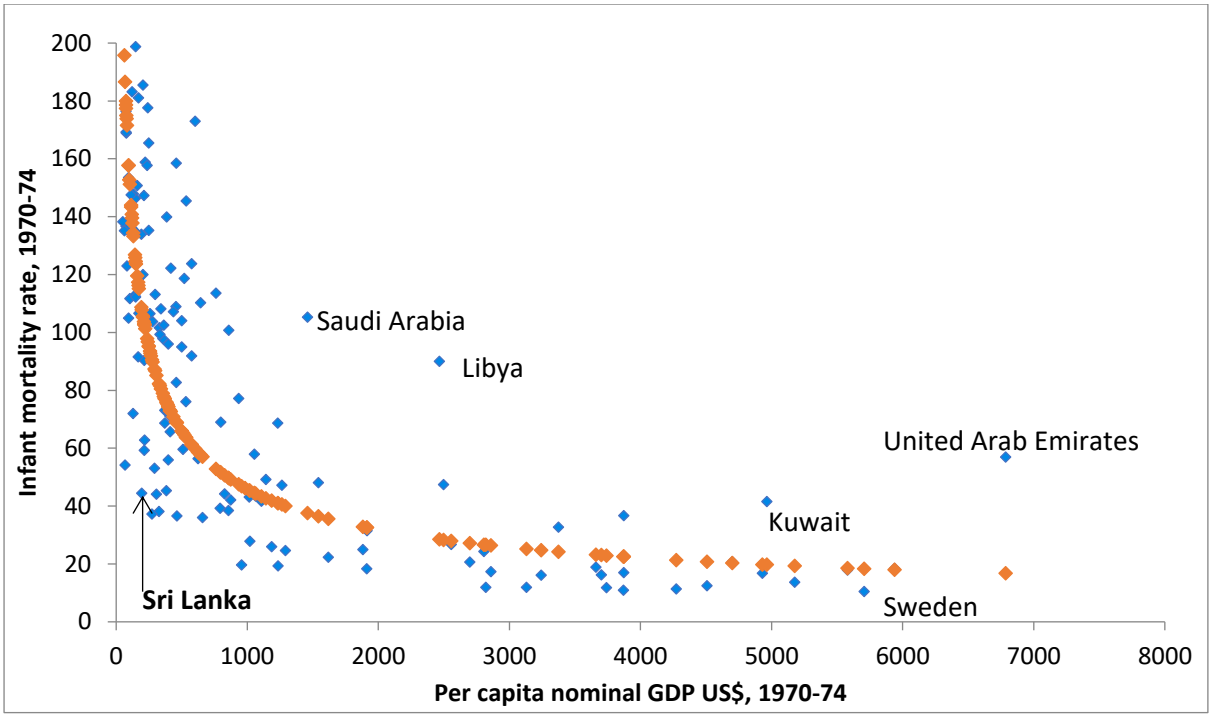

Figure 1. Infant mortality rate and per capita GDP, US$, average over 1970-1974, 137 countries

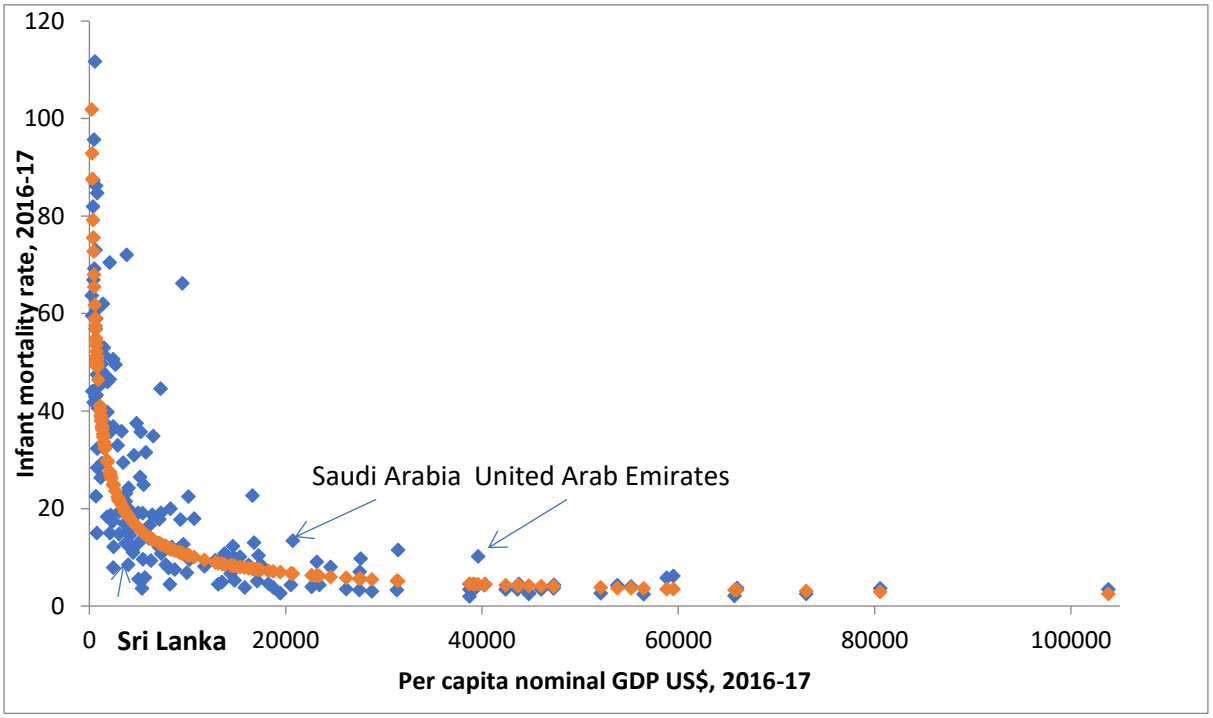

Figure 2. Infant mortality rate and per capita GDP, US$, average over 1916-1917, 184 countries

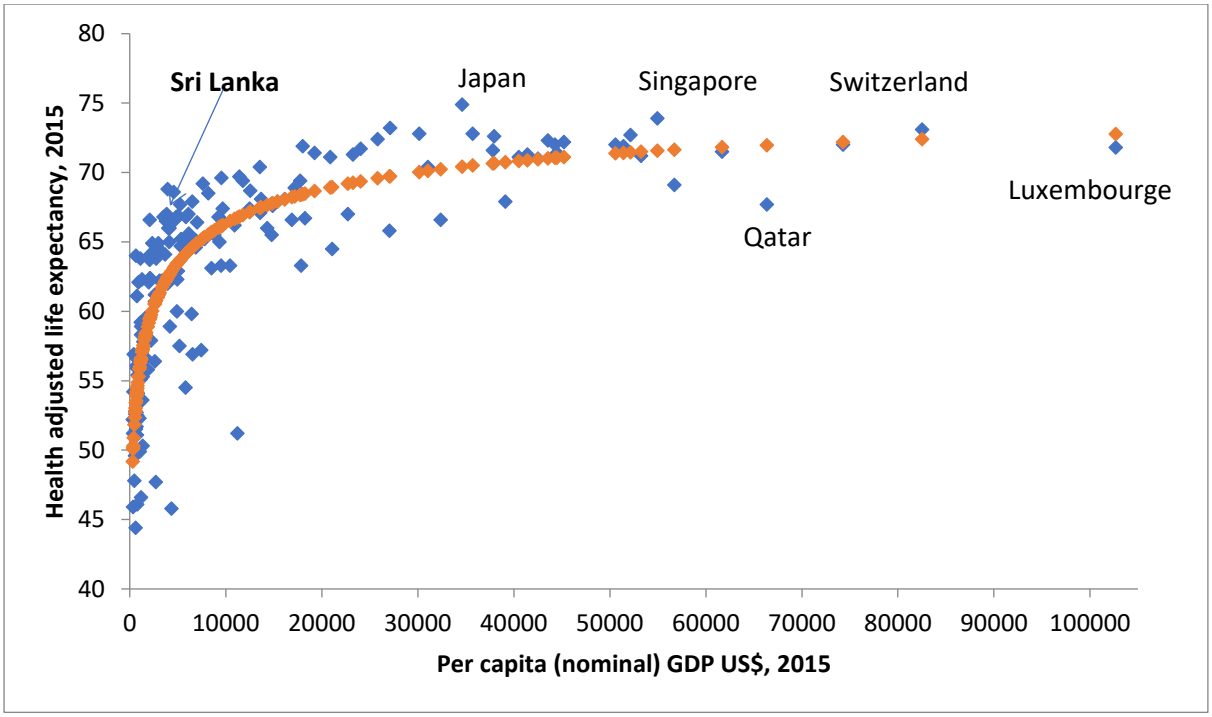

Figure 3. Health adjusted life expectancy (HALE) and per capita GDP, US$, 2015, 176 countries

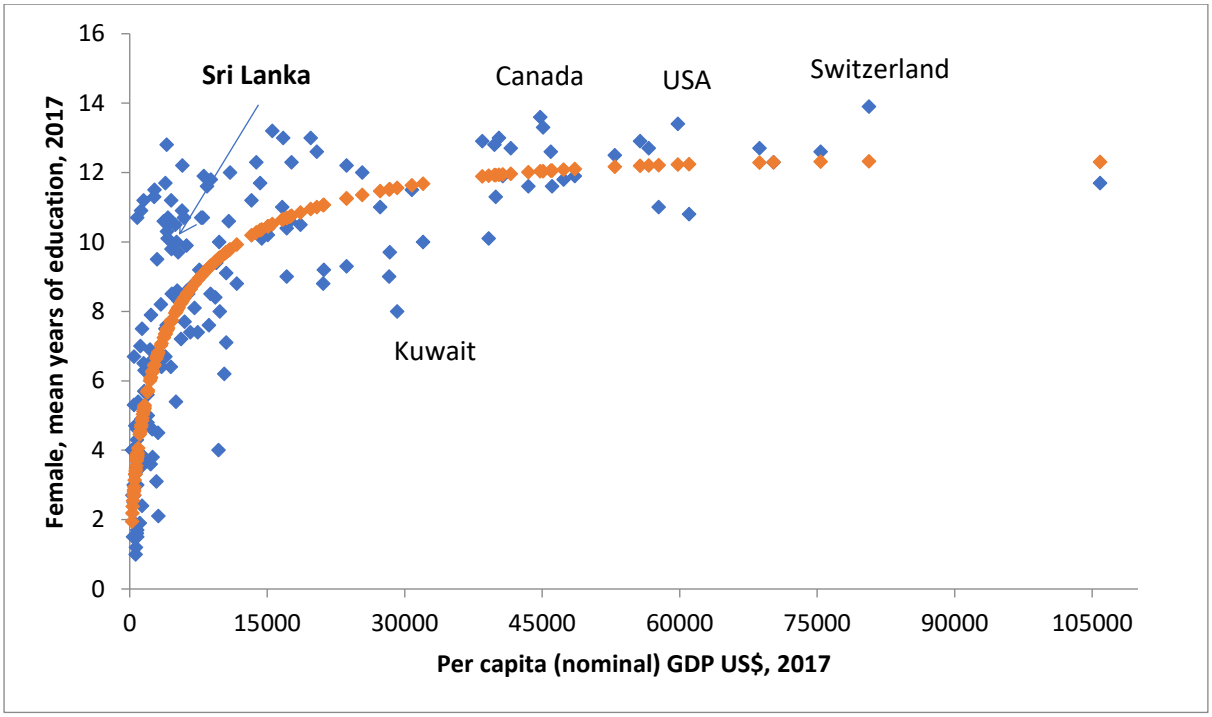

Figure 4. Average years of female education and per capita GDP, US$, average over 2017, 163 countries

Figure 4 shows the relationship between the average years of female education and per capita income in 2017. Female education is not only an important indicator on its own right but also an important contributor to human development of children. The fitted line in the figure was obtained through a regression similar to that of Figure 3. Again, there is a close relationship between female education and income levels. Sri Lanka stands out as a low-income country with impressive performance in this area as well; 10.3 years in Sri Lanka with per capita income of US$4000 and 7.6 in China with per capita income of US$ 8,600. The density of the scatter indicates the influence of factors other than income in raising female education in many countries. Again, data from the early 1970s would have shown outlying performance of Sri Lanka better.

Table 1 provides a summary picture by comparing Sri Lanka and Kuwait using predicted numbers from the fitted regressions in the above Figures. Kuwait was chosen for a better contrast in income levels. In the early 1970s Kuwait was twenty-five times richer than Sri Lanka. Based on these income levels Kuwait should have observed an infant mortality rate around 20 whereas its actual rate was 41.5. In contrast, Sri Lanka should have observed a rate around 108 whereas its actual rate was substantially lower at 44.4. By 2016-17 Kuwait was about seven times richer than Sri Lanka but the actual infant mortality rate of Sri Lanka was substantially lower that that predicted by the income level whereas the actual rate of Kuwait was still higher than the predicted number. Similar contrast can be seen with regard to HALE and female education as well.

Table 1. Positive aspects of Sri Lankan welfare spending

	Sri Lanka		**Kuwait**	
	Predicted by income	Actual	Predicted by income	Actual
(i) Inf Mort 1970-74	107.8	44.4	19.7	41.5
Per cap income US$ 1970-74	196	-	4,964	-
(ii) Inf Mort 2016-17	18.5	8.5	5.6	7.1
Per cap income US$ 2017	3,960	-	27,522	-
HALE years 2015	62.3	67	69.7	65.8
Per cap income US$ 2015	3,875	-	27,036	-
Ave years of Education 2017				
Female	7.5	10.3	11.6	8
Male	8.4	11.4	11.4	6.9
Per cap income US$ 2017	3,960	-	27,522	-

Inf Mort=infant mortality rate (per 1000 live births), HALE= Health Adjusted Life Expectancy

3. Fiscal sustainability problem[3]

The results presented above clearly attest to the beneficial effects that the Sri Lankan welfare system has delivered. Nevertheless, maintaining the welfare state while the debt burden was growing was a challenge for the government.[4] Figure 5(a) shows that the government budget has been in perpetual deficit since 1956 that had to be financed by borrowing, both domestic and foreign. As of 2018, Sri Lanka had total public debt amounting to Rs 11,978 billion (US$ 74 billion) with roughly equal amounts of domestic and foreign debt (Central Bank annual Report, 2018). Depreciation of the Sri Lankan rupee has exacerbated the foreign debt problem further. The debt problem is the pressing issue that the Sri Lankan government has been grappling with and sustainability of the debt burden is a key concern. In this section, we examine this issue.

3.1 Methodology for estimating unsustainable public debt trends

Quite often the focus of many analyses has been on long-run fiscal sustainability. In general, the findings are in favour of sustainability. This is not surprising because any sensible government takes corrective actions when public debt builds up uncontrollably. What is of more policy interest is whether a recent build-up of public debt is heading in an unsustainable direction. To separate out unsustainable debt-trend segments Abeysinghe and Jayawickrama (2013) developed a segment trend methodology and analysed US debt trends over the period 1929-2009. In the present exercise we adopt the same methodology and assess what public expenditure components drive unsustainable debt trends.

In a seminal contribution Hamilton and Flavin (1986) developed the basic methodology for assessing fiscal sustainability. The basic public debt relationship is given by

$$D_t = (1+r)D_{t-1} - S_t \qquad (1)$$

where D_t is the stock of debt in year *t*, S_t is primary budget surplus (overall surplus net of interest payments) and *r* is a fixed real interest rate. By iterating this equation forward Hamilton and Flavin arrived at the following present value borrowing (PVB) constraint for empirical testing:

[3] Data for this section are from Central Bank of Sri Lanka online reports, past annual reports and Historical Statistics (Peebles, 1982).

[4] Athukorala and Jayasuriya (1994, 1915) have argued that loss-making public enterprises and white-elephant infrastructure projects are much more important in explaining massive debt accumulation.

$$D_t = A_0 (1+r)^t + S_t^* \tag{2}$$

where S_t^* is discounted present value of future budget surpluses and A_0 is assumed to be a constant. If $A_0 \leq 0$ (explained below) fiscal sustainability holds. Thus, fiscal sustainability is defined, barring a Ponzi scheme, as a situation where the current public debt level matches the present value of expected primary surpluses in the future. The definition does not rule out running deficits. What is required is that current deficits should generate sufficient growth and surpluses in the future to pay off the debt. Since future surpluses are not observed empirical testing of fiscal sustainability is performed in various ways.[5]

If we work with debt-to-GDP ratio (d_t) we can arrive at a condition similar to (1):

$$d_t = A_0 \left(\frac{1+r}{1+\mu} \right)^t + \sum_{i=1}^{N} \left(\frac{1+\mu}{1+r} \right)^i E_t s_{t+i} \tag{3}$$

where lower case s_t is primary surplus-to-GDP ratio, r and μ are long run real interest rate and GDP growth rate respectively, $A_0 = ((1+\mu)/(1+r))^N E_t d_N$, E_t is expectation conditional on information available at time t, and *N* is the number of periods into the future. If $r > \mu$, for sufficiently large *N*, A_0 should converge to zero. The test is, therefore, still on $A_0 \leq 0$; negative value results if $E_t d_N < 0$.

None of the quantities on the RHS of (3) are observed. Abeysinghe and Jayawickrama (2013) have shown that (3) can be expressed in terms of observables as:

$$d_t = \beta_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + ... \alpha_q t^q + \beta_1' X_t + \beta_2' X_{t-1} + ... + \beta_{r-1}' X_{t-p} + \varepsilon_t \tag{4}$$

where $\alpha_1 = A_0(r-\mu)$, $\alpha_2 = A_0(r-\mu)^2/2$ and so on and X_t is an *r*-dimensional vector of informational variables suitable for predicting future surpluses. By empirically choosing *q* for the time polynomial we can test the condition $A_0 \leq 0$ by testing the time coefficients of (4). This, however, amounts to testing for long-run fiscal sustainability depending on the time period covered. As stated earlier many studies, using different methodologies, have found evidence in support of long-run sustainability; not surprising because policy interventions invariably happen. What is of policy interest is an early warning system where corrective

[5] See Abeysinghe and Jayawickrama (2013) for a literature survey.

actions could be taken early without having to go through painful austerity measures. This is where the segmented trend analysis is applicable. It can assess both short-run and long-run sustainability.

The trend component in (4) can be approximated by segmented linear trend components, each segment representing a short run. Thus, model (4) can be re-formulated as:

$$d_t = \alpha_0 + \alpha_1 t + \delta_1 (t - t_1)^+ + ... + \delta_J (t - t_J)^+ + \beta_1' X_t + \beta_2' X_{t-1} + ... + \beta_{r-1}' X_{t-p} + \varepsilon_t \qquad (5)$$

where $t_1 < ... < t_j < ... < t_J$ are J number of trend turning points or joinpoints and $(t - t_j)^+ = (t - t_j)$ if $(t - t_j) > 0$ and 0 otherwise. For example, if the data range is over 1960-2017 and the first joinpoint is at 1971 then $t = 1, 2, ..., 58$, $t_{1971} = t_{12}$ and $(t - t_{1971})^+ = 0, ...0, 1, 2, ..., 46$, where year 1 is for 1972. Time slopes are given by α_1, $\alpha_2 = \alpha_1 + \delta_1, \ldots,$ $\alpha_J = \alpha_1 + \delta_1 + ... + \delta_J$. Note that these slopes are multiples of A_0 and they can change direction when expectations about future debt ratio, $E_t d_N$, change. Therefore, fiscal sustainability holds if these time slopes are zero or negative. Any positive time slope indicates the build-up of unsustainable debt over that period. The focus here is on the leftover trend that is not captured by some basic predictors of surplus.

An optimal number of joinpoints can be first determined using an automated software like "joinpoint regression program" developed by the researchers at the US National Cancer Institute (Kim et. Al. 2000; available online). Then obviously these joinpoints need to be corroborated by examining the historical events and episodes.

3.2. Segmented debt trends

Figure 5(b) shows the trend segments of public foreign debt as a percent of GDP over 1960-1917. The trend segments were obtained by fitting model (5) without the *X* variables. Political regime changes are indicated below the Figure. Interestingly the best fitting trend segments coincide closely with political leadership changes. The year 1977 marks a major structural shift of the Sri Lankan economy towards a privet sector driven open economy. During the first phase of the right-wing UNP rule under president J R Jayawardana between1977 and 1989 there has been a substantial build-up of the foreign debt ratio that peaks in 1989. During the second phase of the same UNP rule but under president R Premadasa over 1989-94 the debt percentage starts to drop. Then comes the left-wing SLFP leadership over 1994-2014. Under president Chadrika

Kumaratunge (1994-2005) the debt percentage remains roughly the same but declines under president Mahinda Rajapaksa (2005-2014). The debt percentage resumed an uptrend again after 2014 under the unity rule, SLFP president Maitripala Sirisena and UNP prime minister Ranil Wickramasinghe.

Figure 5(c) shows the unadjusted trend segments of public domestic debt as a percent of GDP over 1960-17. Unlike foreign debt, domestic debt does not show a strong link with political swings. Figure 5(d) shows the trend segments in the total debt ratio over the same period. The major turning points of total debt coincide closely with those of foreign debt. The rest of our analysis focuses only on the total debt ratio.

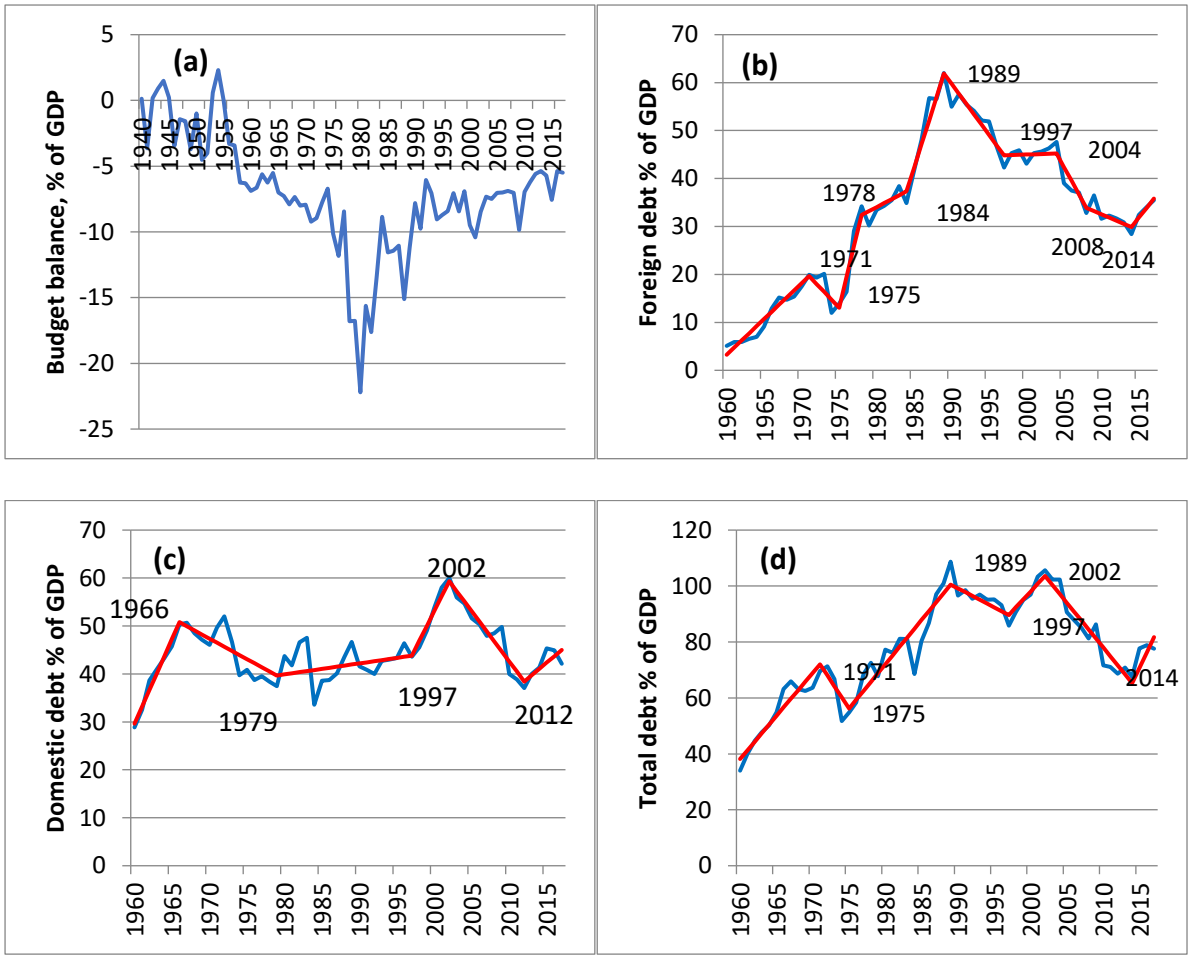

Figure 5. (a) Government budget balance, % of GDP (1940-17), perpetual deficit since 1956, (b) Public foreign debt, (c) Public domestic debt, (d) Public total debt, all as % of GDP over 1960-2017 together with segmented trends

Note: Political parties in power: 1960-65 SLFP, PM: Mrs Sirimavo Bandaranaike; 1965-70 UNP, PM: Mr Dudley Senanayake; 1970-77 SLFP left-alliance and austerity measures, PM: Mrs Sirimavo Bandaranaike; 1977-89 UNP, Open economy, President: Mr JR Jayewardena; 1989-94 UNP, President: Mr R Premadasa; 1994-05 SLFP, President: Mrs Chandrika Kumaratunga; 2005-14, SLFP, President: Mr Mahinda Rajapaksa; 2015- 19, SLFP-UNP alliance, President: Mr Maithripala Sirisena.

3.3 Basic predictors of budget balance and unsustainable debt trends

The debt trends presented above need to be adjusted by removing the effect of *X* variables in model (5) to assess whether there was an unsustainable build-up of debt over a given period. The *X* variables have to be some basic predictors of government revenue and expenditure; they should predict a base-level budget balance that does not necessarily depend on, for example, welfare or military orientation of a government. In the following analysis we use data over 1960-2017.

Revenue side is relatively easy. The revenue effect is already captured in the debt-to-GDP ratio. In addition, as Equation (3) shows, real GDP growth can be used as a revenue predictor. On the expenditure side real interest rate captures both the cost of borrowing (with a negative sign expected) and the cost of debt repayment (with a positive sign expected). The net effect depends on how these two opposing effects offset each other. After some preliminary regression runs, to control for the inflation effect, we decided to use nominal interest rate and inflation rate in the regression separately. The expected real interest rate also includes the expected exchange rate appreciation. We use the rate of change of the US$ exchange rate (SLR/USD) in the regression; the secular depreciation of SLR has increased the debt burden.

Figure 6(a) shows the average interest rate paid on foreign and domestic loans. The average interest rate is simply interest paid as a percent of debt amount of the relevant category. As seen in Figure 6(a) domestic debt has been lot more costly than foreign debt. After 2009 average interest rate on foreign debt has gone above 2% as a result of shifting from concessional to more commercial loans. In the regression analysis we use the overall interest rate, middle line in Figure 6(a), which is effectively the weighted average of domestic and foreign interest rates.

To predict expenditure on general government administration we use public employment as a proportion of total population. This variable (Figure 6(b)), has increased marginally from 3% in 1960 to 5.4% in 2009 and then declined to 4.9% in 2017. To predict demographic effects on social and other expenditures we use young (age<15) and old (age>64) population as a proportion of total population (Figure 6(c)). The old age proportion has increased from 4.5% in 1960 to 10.1% in 2017. Aging population leads to higher expenditures on healthcare and

related services. The young population proportion has decreased from 42% in 1960 to 24% in 2017.

For the regression we take log of these three variables because their coefficients are more robustly estimated compared to non-log variables. Moreover, the log transformation removes a scaling effect to some extent. For example, average wage of a public employee times public employment (Emp) is equal to public employment expenditure (Exp). Per capita income times population (Pop) is equal to GDP. Therefore, Exp/GDP= λ Emp/Pop and the estimated coefficient of Emp/Pop is going to be $\beta\lambda$ which will be large for countries with large λ. However, with β log(λ Emp/Pop)=log λ + β log(Emp/Pop) the regression coefficient remain unaffected and the scaling effect gets absorbed into the constant term.

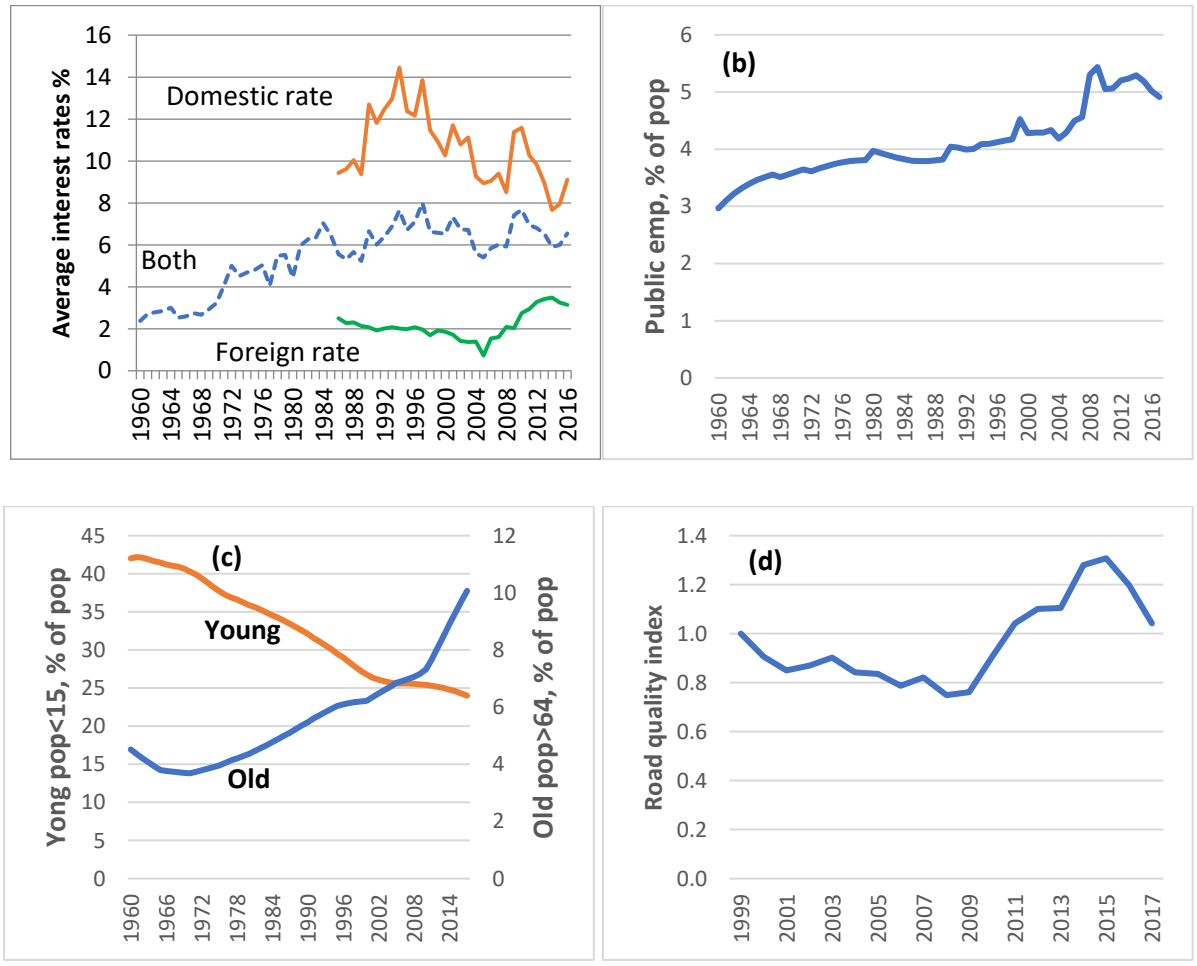

Figure 6. (a) Average interest rates, (b) public employment, % of total population, (c) young (age<15) and old (age>64) population, % of total polpulation and (d) a road quality index

We also need some variables to capture government infra-structure expenditures. This includes transport, energy, water and sanitation, agriculture and irrigation and information technology infra-structures. These data are hardly available, especially all the way back to 1960. We use the growth rate of (partially) quality-adjusted road length (km) as a variable in our regression. Adjusting for quality is necessary because Sri Lanka already has a high road density and increasing the number of roads further is difficult and wasteful. One measure of road quality is International Roughness Index (IRI). It is hard to find data on this in Sri Lanka. We, therefore, devised another measure. The most vulnerable part of a vehicle to a road full of potholes, humps and bumps is its suspension system. Therefore, import expenditure on vehicle suspension and shock-absorbers as a percent of expenditure on vehicle imports is a reasonable indicator of road quality. The lower this percentage the better the road quality. Alternatively, we can take the reciprocal of this so that an increase in this number is indicative of better-quality roads. These import expenditure data are available from UN online website comtrade since 1999. We take three-year moving average of this expenditure ratio to smoothen the fluctuations.

Figure 6(d) shows the road quality index by setting 1999 value to one. It shows that road quality has been on the decline till 2008 and then improved rapidly and then again started to decline after 2015. Note that there is a lag effect of poor roads on vehicle suspension system. Although the road quality improved after 2006, it is reflected as savings on vehicle suspension expenditure two to three years later. We multiply road length in km of road types A, B, C, D, and E (express ways) by this index to obtain quality adjusted road length. Since road quality data prior to 1999 are not available, we assume their quality remained the same over 1960-98 and set the index value to 1 over this period. Although this is not a got assumption to make, we used this variable in the regression because it leads to an important observation.

3.3.1 Regression results

Table 2 presents the regression results with the total debt ratio as the dependent variable. Reg 1 is simply the segmented trend fitting that was shown in Figure 5(d). Note that the cumulative sum of the trend coefficients provides the required slope of a trend segment. Some residual diagnostics are provided at the bottom of the table. Except for the normality test, Reg 2 and 3 fit the data very well; The fitted values from Reg 3 in Fig 7(a) further illustrates this.

Reg 2 and 3 as well as other regressions we tried show that the lagged debt ratio, [6] GDP growth rate, interest rate, inflation rate, rate of change of the exchange rate and public employment proportion are very robust determinants of the debt ratio; their coefficients remain roughly the same in different regression specifications. As expected, enhancing GDP growth is the most effective way to lower the debt burden. The negative effect of the interest rate indicates that borrowing cost effect dominates the debt repayment effect. Higher inflation seems to help in reducing the debt burden probably through increased tax revenue resulting from rising product prices and nominal wages. The exchange rate depreciation obviously increases the debt burden.

The coefficients of public employment, young and old population proportions have to be interpreted carefully since they are in log form. These coefficients need to be divided by 100 so that they show the percentage point increase in the debt ratio as a result of one percent increase in these proportions. It is also worth noting that despite the secular decline in the young proportion while the debt ratio has been rising, the regression provides the expected positive sign. The relative effect of these variables on the debt ratio will be explained shortly.

Quality adjusted roads show an important unexpected effect. Road expenditure is expected to increase the debt burden. But it entails an indirect growth effect as well. The net effect depends on how these effects offset each other. Although the road coefficients in Reg 2 are statistically insignificant probably because of these offsetting effects, they are suggestive. The positive coefficients upto lag 2 indicate that improving roads increases the debt burden in the short run. The negative coefficient at lag 3, which is statistically significant at the 10% level in Reg 3, indicates that the growth effect dominates in the long run and helps lowering the debt burden. This indicates that borrowing for essential infrastructure development pays off in the long run mostly through indirect growth effects. In a panel setting we observed similar results for OECD countries and Chinese provinces (Abeysinghe et. al. 2019a, b).

To assess the relative contribution of each variable to change the direction of the debt ratio, the last column of Table 2 shows the coefficient times the change in each variable summed over 2002-2017 during which the debt ratio has trended downward. It is the young and old population proportions that have generated the largest effects. The steady drop in the young proportion has lowered the debt ratio by 17 percentage points while the sharper increase (Fig 6(c)) in the old proportion has raised the debt ratio by 19 points. The net effect of the two population proportions is to increase the debt burden as a result of the dominating effect of the

[6] The lagged dependent variable captures both the dynamics and the effect of relevant omitted variables.

aging population. GDP growth has helped in lowering the debt ratio by 4 points. Improvement of roads have also lowered the debt ratio by a similar magnitude. It is also worth highlighting the lagged effect of debt; when the debt ratio is falling the lagged effect accelerates the process because of the reduced debt servicing obligations. The exchange rate effect over this period shows that even mild appreciations of the rupee from time to time can lower the debt ratio by a small amount.

Table 2. Segmented trends and predictors of the total debt ratio

	Reg1		Reg2		Reg 3			
	Coeff	p-value	Coeff	p-value	Coeff	p-value	Sum trend coeff	Sum effect 2002-2017
t	3.08	0.000	4.63	0.008	4.66	0.006	4.66	
t 1971	-7.03	0.000	-0.92	0.750	-1.53	0.570	3.14	
t 1975	7.11	0.000	1.35	0.489	1.56	0.402	4.70	
t 1989	-4.52	0.000	0.26	0.905	0.02	0.992	4.72	
t 1997	4.15	0.000	3.19	0.022	3.35	0.011	8.07	
t 2002	-5.99	0.000	-12.16	0.003	-11.80	0.003	-3.73	
t 2014	8.69	0.000	9.27	0.020	7.87	0.004	4.13	
Debt (t-1)			0.35	0.008	0.32	0.008		-5.83
GDP (real) growth %			-1.00	0.019	-0.91	0.011		-4.19
Interest rate %			-4.18	0.001	-4.08	0.000		2.98
Inflation rate %			-0.26	0.060	-0.25	0.046		1.65
US$ ex rate % change			0.17	0.005	0.17	0.003		-1.89
log(public emp % of pop)			51.85	0.034	49.02	0.031		2.86
log(yng pop<15, % of pop)			439.08	0.071	419.93	0.071		-17.04
log(old pop>64, % of pop)			85.14	0.062	96.08	0.022		19.21
Q adj road length gr%			0.01	0.950				
Q adj road length gr% (t-1)			0.10	0.518				
Q adj road length gr% (t-2)			0.07	0.644				
Q adj road length gr% (t-3)			-0.16	0.302	-0.22	0.098		-4.24
Constant	35.09	0.000	-1788	0.056	-1727	0.054		
Effective Sample period	1960-17				1964-17			
Rsq	0.94		0.96		0.96			
AR 1-2 F test	2.71	0.077	0.41	0.666	0.37	0.694		
ARCH 1 F test	0.37	0.544	0.81	0.373	0.71	0.403		
Hetero BPG F test	0.61	0.765	1.11	0.386	1.47	0.165		
Normality JB Chi2 test	14.28	0.001	6.96	0.031	5.99	0.050		

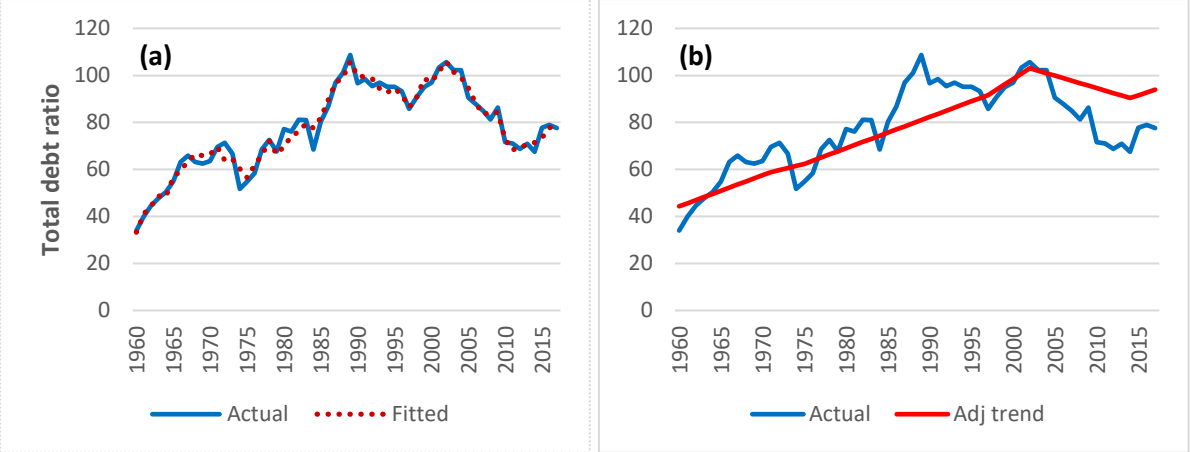

Figure 7. (a) Debt ratio with fitted values from Reg 3 in Table 3, (b) debt ratio with adjusted trend values from the trend coefficients of the same model

After removing the effect of the basic predictors of government revenue and expenditure, thereby of the debt ratio, we obtain the adjusted debt trends and they are plotted in Fig 7(b). The adjusted trends show a single unsustainable upward trend of the debt ratio from 1960 to 2002; the trend segments in Fig 5(d) virtually disappear. The downward trend after 2002 is a lot flatter than that of the actual debt ratio. If the basic variables fully explain the trend, then the adjusted trend coefficients turn zero and the trend line simply reduces to a flat line represented by the constant term of the regression. Although the debt trend turns in a sustainable direction after 2002, it turns upwards again after 2014 with about 4 percentage point (sum of trend coefficients) rise in the debt ratio.

4. Is debt driven by excessive welfare spending?

It is difficult to define what should constitute welfare spending (Arthur, 2015). To some mere government "handouts" may qualify as welfare spending, but for others it may include government subsidies in different services as well. The definition could also vary from country to country. But in the case of Sri Lanka welfare expenditure is available as a separate category under social services. Using different government expenditure categories, we can investigate what expenditure components drive the adjusted trends shown in Figure 7(b). Government recurrent expenditure is classified as follows:

General Public Services
- Civil Administration
- Defence
- Public Order and Safety

Social Services
- Education
- Health

Welfare
Community Services
Economic Services
Agriculture & Irrigation
Energy and Water Supply
Transport & Communication
Other
Other
Interest Payment
Other

After adding the relevant capital expenditures to these categories, we focus on the following expenditure categories: 1. Welfare, 2. Non-welfare social, 3. Defence, 4. Non-defence public services, 5. Economic services, 6. Interest payments, 7. Principal payments. Data on these categories are available only since 1980. They as a percent of GDP are plotted in Fig 8. In general, both social expenditure and public service expenditure trend downwards since the mid-1990s. Expenditure on economic services also trend downward and stabilizes. Interest and principal payments also trend downward from the early 2000s.

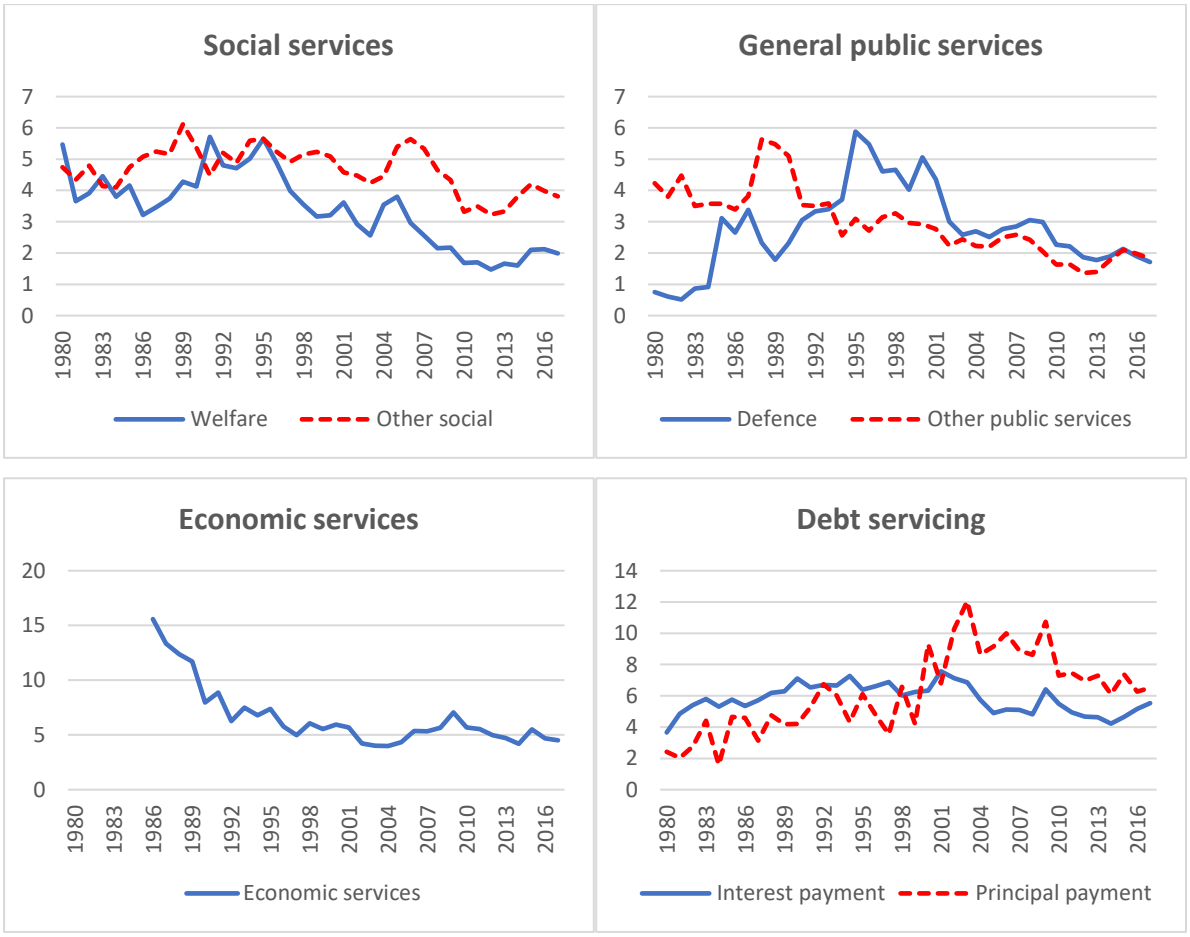

Figure 8. Selected government expenditure categories, % of GDP

To examine how these expenditure components relate to debt trends we utilize scatter plots and simple regressions.[7] Figures 9-12 show the scatter plots together with fitted lines with debt ratio or debt-ratio trends as the dependent variable. The left panel is simply the plot of the actual debt ratio against each of these components. They are shown only as a descriptive exercise; they are not suitable for making any inference about unsustainable spending. They all show positive relationships between the debt ratio and the expenditure category. The right panels of these figures show the relationship between adjusted trend values and the expenditure categories. They in general show, except for debt repayments, a discernible shift occurring around 1997. We, therefore, split the sample into two periods, 1980-96 and 1997-17 and fit the following regression:

$$y_t = \delta_0 + \delta_1 Dum_t + \beta_1 x_t + \beta_2 x_t Dum_t + u_t \qquad (6)$$

where *y* represents the values of the adjusted debt trend, *x* the expenditure ratio and Dum is a dummy variable that take value 0 over 1981-1996 and 1 over 1997-17, and *u* is the error term (1980 is dropped because it creates an outlier effect). After running the regression we get the slope value $\hat{\beta}_1$ for the first period and $\hat{\beta}_1 + \hat{\beta}_2$ for the second period. Note that the second period straddles between unsustainable and sustainable trend segments. The fitted regression lines are shown in the right panels of the figures. Table 3 presents the estimated slope coefficients with corresponding p-values pertaining to the t-statistics.

[7] We tried multiple linear regressions as well, but collinearity among these variables does not render meaningful results in the short sample we have.

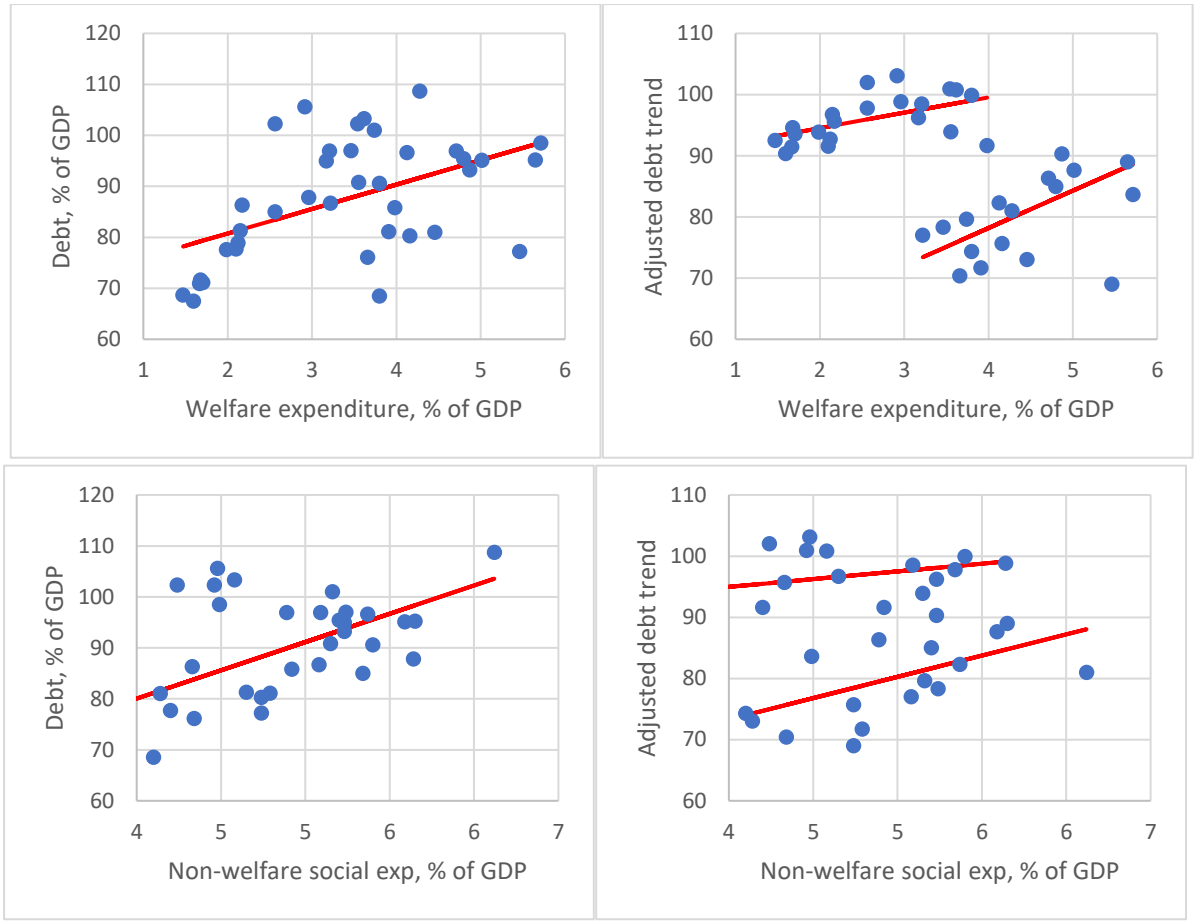

Figure 9. Relationship between welfare and non-welfare social spending and debt ratio (left panel) and adjusted debt trend (right panel) over 1980-2017

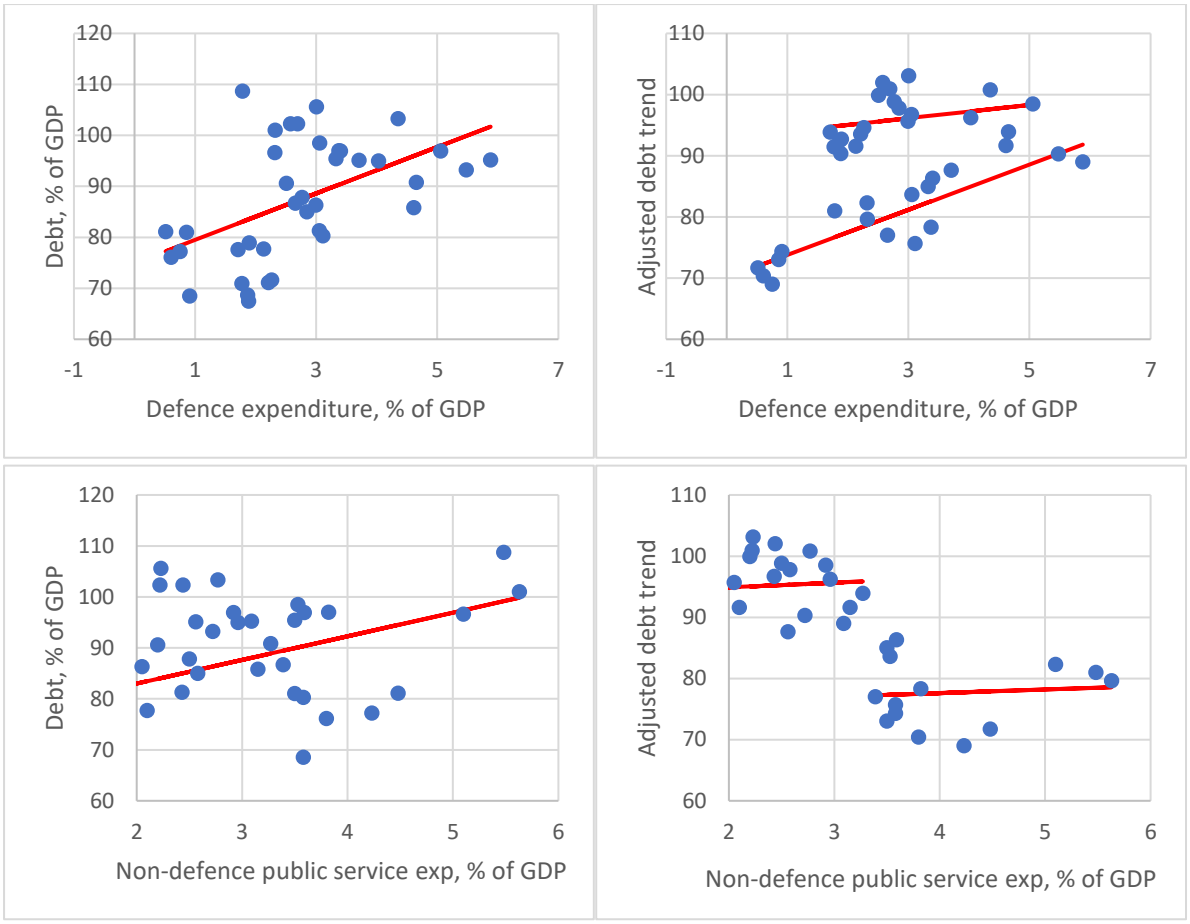

Figure 10. Relationship between defence and non-defence public services spending and debt ratio (left panel) and adjusted debt trend (right panel) over 1980-2017

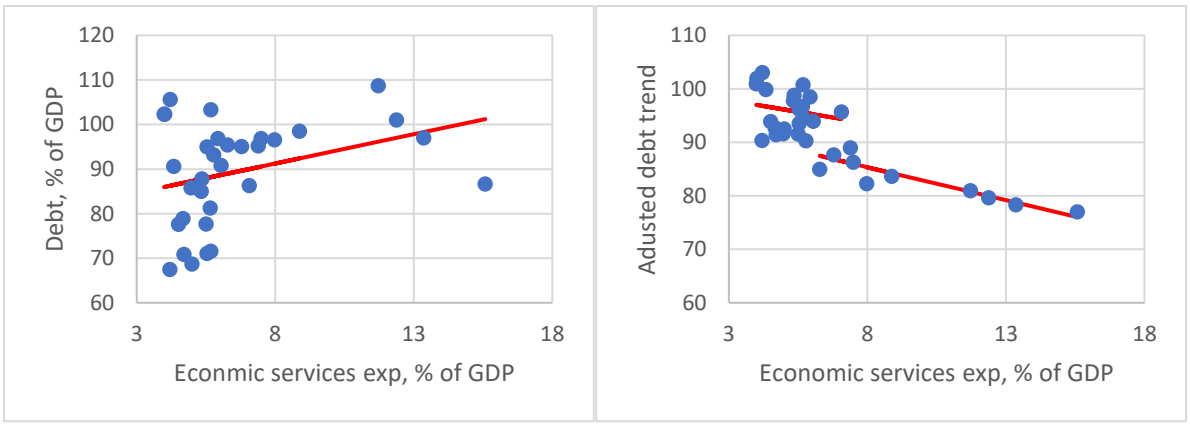

Figure 11. Relationship between economic services spending and debt ratio (left panel) and adjusted debt trend (right panel) over 1986-2017

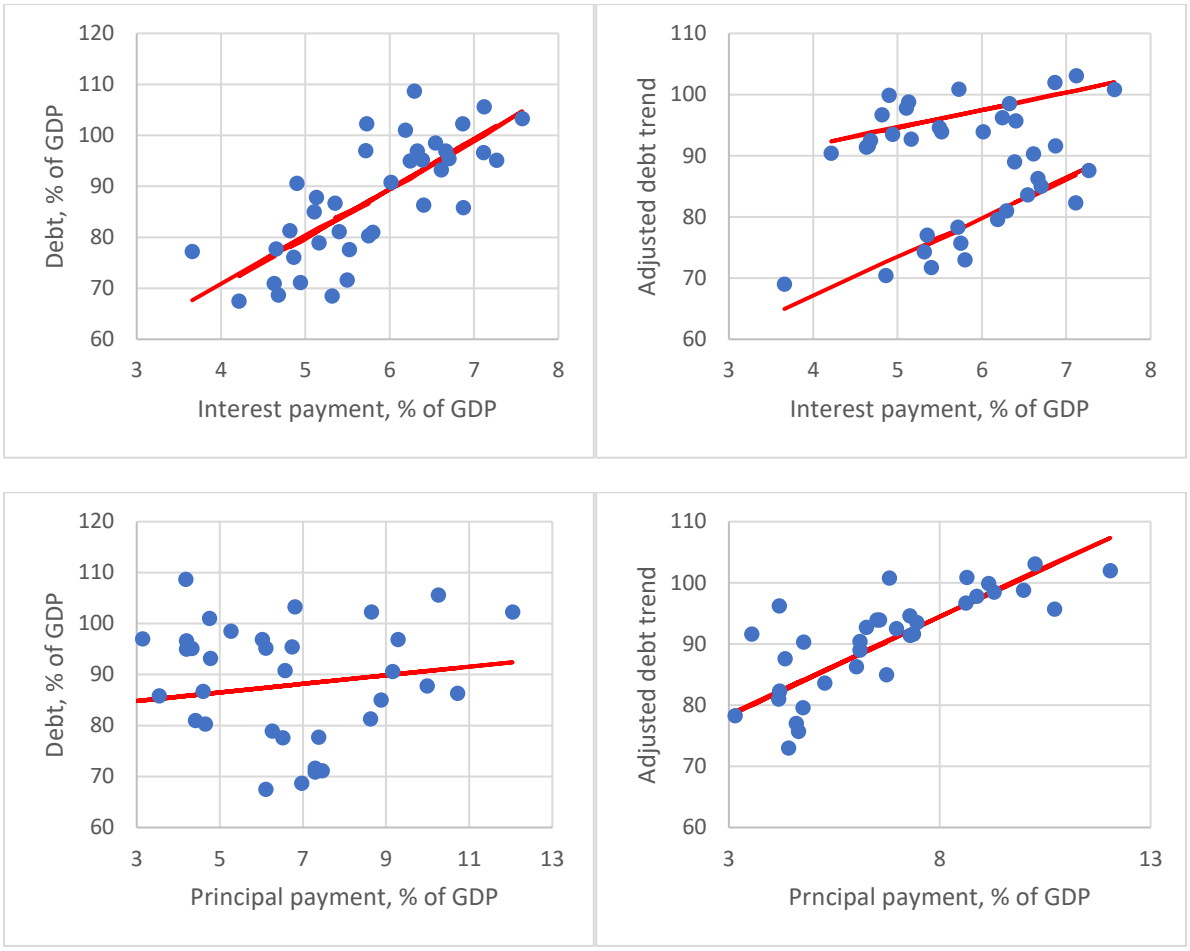

Figure 12. Relationship between interest payments and principal payments and debt ratio (left panel) and adjusted debt trend (right panel) over 1980-2017

Table 3. Slope coefficients from regression of debt ratios on each of the expenditure ratios

	Debt ratio	Debt ratio trend, Model (6)	
	1980-17	1981-1996	1997-17
Welfare services	4.81	6.21	2.51
	(0.002)	(0.001)	(0.027)
Non-welfare social services	11.09	6.95	2.52
	(0.000)	(0.011)	(0.059)
Defence	4.55	3.70	1.09
	(0.001)	(0.000)	(0.165)
Non-defence public services	4.64	0.588	0.76
	(0.008)	(0.336)	(0.685)
Economic services	1.31	-1.23	-0.86
	(0.071)	(0.000)	(0.449)
Interest payments	9.51	6.83	**2.85**
	(0.000)	(0.000)	(0.001)
Principal payments	0.85	**3.22**	
	(0.266)	(0.000)	

Note: Numbers in parentheses are p-values for t-statistics

Figure 9 shows the split sample fits (right panel) for welfare and non-welfare social expenditures. The upper line corresponds to the period after 1997. Both welfare and non-welfare expenditures show a substantially reduced slope; the slope has dropped from about 6-7 percentage point increase in the debt trend to about 2.5 points after 1997. (see Table 3).

Figure 10 shows the split sample fits for defence and non-defence expenditures on public services. Non-defence public service expenditure does not show any systematic relationship with debt trends over both periods. Interetingly, defence expenditure, which was responsible for about 3.7 percentage point increase to the debt trend in the 1980-96 period, does not pick up a significant tab in the more recent period. Figure 11 and Table 3 show that expenditure on economic services is totally undrelated to unsustainable debt trends. This is a bit strange because we expect the government borrowing for infrastructure development to have a significant effect on debt trends.

What is most noteworthy is how interest and principal payments contribute to unsustainable debt trends (Figure 12, Table 3). Principal payments do not show a split sample effect. In the recent sample period both interest payments and principal payments have become the dominant determinants of unsustainable debt trends, each contributing about 3 percentage points to debt trends. We expect principal payments to lower the debt ratio. Therefore, we ran a number of regressions to assertain what we observe is a robust relationship. In fact, it is. Given the perptual budget deficit, the debt repayments has to be done by borrowing. Overall, although social spending still accounts for some unsustainable debt trends, it is the interest payments and principal payments that drive unsustainable debt trends. This is a scenario of "debt begets debt".

5. Social services: quality compromised

Above results attest to that inflexible social expenditures have been replaced by inflexible debt service payments. Political swings between socialist and capitalist regimes between 1948 and 1977 retarded economic growth substantially. Although the main political parties of the country have converged in maintaining a private sector driven open economy after 1977 the LTTE war for nearly three decades since 1983 took a very heavy toll on the economy and society. Social services that have been delivered on borrowed money have suffered in terms of both quality and quantity.

The two most prominent social services are education and health. For a contrast Figure 13 shows education and health expenditure (both recurrent and capital) as a percent of GDP for Sri Lanka and Singapore. Three year moving average is taken to smoothen year to year fluctuations and highlight the trend. At the outset it should be emphasized that similar magnitudes of these numbers are misleading because Singapore's GDP base in a common currency is substantially larger than that of Sri Lanka; 1% of GDP for the two countries amount to very different outcomes. Nevertheless, the trends in these numbers are indicative of the widening quality gap in these fields between the two countries.

Education expenditure ratio in Sri Lanka has trended downward whereas in Singapore the trend has been upward before it stabilizes around 3%. The health expenditure ratio in Sri Lanka has trended downward slightly till about 2002 and then fluctuated with a downward trend. In Singapore the trend has been upward. These expenditures include development (capital) expenditures which tend to be lumpy. It is the development expenditure that ensures better quality human and physical capital. Just casual observations are sufficient to see how quality has suffered in Sri Lanka in both fields.

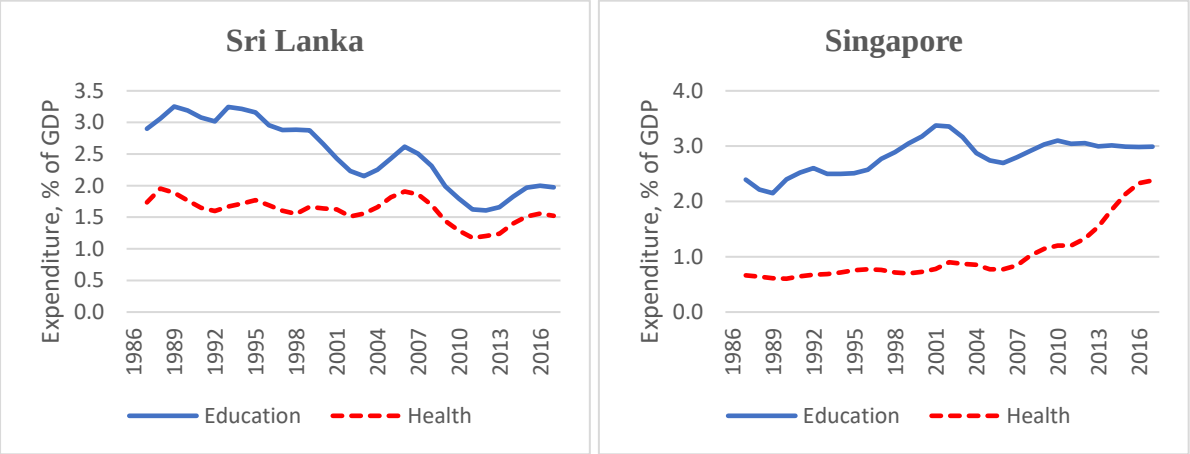

Figure 13. Expenditure (both recurrent and capital) on education and health, % of GDP (3-year moving average)

As for education, Liyanage (2014) has discussed in detail the drop in the quality for various reasons including financial constraints. By 2017 less than 7% of the Sri Lankan labour force had a university degree. In contrast, in Singapore 34% of the labour force was degree holders. Table 4 highlights a further contrast in education between Sri Lanka and Singapore. In Singapore nearly 35% of university enrolment is in engineering; in Sri Lanka this number is mere 6.4%. Still in Sri Lanka university enrolment is dominated by arts courses. This reflects

the lack of facilities for other disciplines in rural areas. ADB (2016) provides an extensive assessment of areas where Sri Lankan education system is lagging.

Table 4. Enrolment in university first degree courses (percentage distribution)

Singapore	1995-2013	**Sri Lanka**	2010-2014
Engineering	34.6	Arts	30.1
Humanities & Social Sciences	17.1	Sciences	19.7
Sciences	11.7	Management	17.7
Business & Admin	11.4	Engineering	6.4
Accountancy	6.4	Medicine, Dent, Vet	6.0
Information Technology	5.5	Computer/ICT	5.3
Medicine, Dent, Health Sci	4.2	Agriculture	5.1
Architecture & bldg	3.4	Para med, Ind Med	4.4
Educ, App Arts, Service	2.3	Commerce	2.3
Law	2.2	Architecture	1.6
Mass Com	1.2	Law	1.5
		Fashion	0.4

In the field of healthcare, overcrowding in public hospitals is a common sight. Although we do not have data on how the patient numbers per physican or nurse has increased over time, Table 5 provides an international comparison based on a couple of commonly used crude measures of overcrowding. They are the number of physicians per 1000 population and the number of nurses and midwives per 1000 population. The welfare oriented Scandinavian countries are the best performers on this metric. Even China with more than one billion people is performing better than Sri Lanka. These are crude measures, including public health expenditure ratio, because Singapore that operates on its own unique health model is among the top ranks in the world in terms of health outcomes though the measures in Table 5 indicate otherwise (WHO, 2000, EIU 2014, Abeysinghe 2019). Note that overcrowding affects the most professonally qualified physicians because of fatigue and burnout (Shanafelt, et. al. 2012, Patel, 2018).

Casual observations show that quality of infrastructure and aminities has not improved in many public hospitals across Sri Lanka; if anything the quality has deteriorted. The lack of test equipments and qualified professonal services means that critical patients have to be transferred to urban hospitals with long delays at much risk to the patients. Increasing demand for private hospitals is a good indicator of deteriorating physical quality of public hospitals even in Colombo though professional services in public hospitals are belived to be better.

Table 5. Number of physicians, nurses & midwives per 1000 population

	Norway	Sweden	Denmark	Japan	S Korea	Singapore	China	Sri Lanka
Physicians	4.41	4.11	3.65	2.30	2.23	1.91	1.49	0.73
Nurses& midwives	17.41	11.89	16.41	10.80	5.67	5.65	1.85	1.75

Note: Data from online sources: https://www.indexmundi.com/g/r.aspx?c=ce&v=2226, 2010-14, accessed on Aug 3, 2019.

6. Policy discussion

Sri Lankan welfare state was exceptional for a low-income country. However, insufficient economic growth and perpetual budget deficits have led to a mounting debt problem in the country. In the foregoing analysis we have adopted a two-step approach to examine to what extent welfare spending has contributed to debt unsustainability. The first step was to remove the effect of some basic predictors of government revenue and expenditure, thereby of the debt ratio. The second step was to relate debt trends (trends not explained by the basic predictors) to different government expenditure components expressed as a percent of GDP. This analysis shows that social spending, both welfare and non-welfare, is not the major culprit that drive unsustainable debt trends at present. The culprit is debt servicing (interest and principal payments). Basically, inflexible social spending has given way to inflexible debt service payments creating a situation of "debt begets debt".

Welfare expenditure as a proportion of GDP has declined steadily as a result of shifting away from universal food subsidy to means-tested subsidies for the poor. Difficulties of targeting the subsidies to the most deserving is well documented. Even the education and health expenditure proportions of GDP have trended downward over the years. Cutting down development expenditures in these fields results in deteriorating human and physical capital. Good example is public healthcare. Despite the public perception that professional care in public hospitals is better than that of private hospitals, even the middle-income people choose private hospitals because of better facilities and less crowding.

The basic predictors reveal some interesting observations that contain policy implications. On a cumulative basis, young and old population proportions generate the largest effects on the debt ratio. As far as the debt problem is concerned the declining young population proportion is a blessing in disguise. The debt burden resulting from the aging population gets largely offset by the declining young population proportion. Nevertheless, the rapidly aging population has

a dominating effect and the net outcome will be to increase the debt burden. However, old age dependency is manageable if savings for retirement increases resulting from sustained economic growth (Abeysinghe, 2019).

On a cumulative basis, the results show that good economic growth is the best way to lower the debt burden. Interestingly, quality-adjusted road network also seems to help in lowering the debt burden with a lag. The effect of the road network highlights an important effect hitherto overlooked in debt analyses. In general, what it shows is that improvements to the essential infrastructure of a country may increase the debt burden in the short run, but in the long run the indirect growth effects kick in and lower the debt burden.

The panacea for the country's debt problem, therefore, is to increase government revenue, not to cut government expenditure, especially essential infrastructure and capital expenditures. There are other ways to increase government revenue without having to increase the tax rates. Some quick thoughts are jotted down below. 1. Central Bank report of 2018 mentions the problem of tax avoidance and evasion. Indirect evidence indicates that the problem is pervasive. In Singapore corporate income tax has been the highest contributor to government revenue (22.2% on average during 2010-17).[8] In Sri Lanka this has been less than 10% (9.5% on average during 2010-17). Such a large discrepancy exists despite the Sri Lankan corporate tax rate being much higher than that of Singapore (standard rate of 28% in Sri Lanka vs 17% in Singapore since 2010). The low corporate tax revenue in Sri Lanka is partly due to the small size of the corporate sector in the country. But tax avoidance and evasion is very likely to be the main reason for the low tax revenue from this sector. Closing tax loopholes may increase tax revenue substantially. 2. Some expenditures that accrue to the private sector can be diverted to the public sector. Healthcare is a good example. Three possible suggestions are: (i) Start paying wards in public hospitals, (ii) Start hospital-run pharmacies in public hospitals, and (iii) Introduce a small user fee on patients. These ideas can be elaborated in a separate paper.

[8] It should be noted that in Singapore the Government has introduced a new revenue component, upto 50% of investment returns from accumulated foreign reserves. As of 2016/17 this component contributed the largest proportion to government revenue.

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