Gamani Corea Foundation

Lee Kuan Yew School of Public Policy
Asia Competitiveness Institute

**Collaborative Research Project**

# Disparities of Subnational Economies of Sri Lanka
## Launching the District Development Index (DDI)


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# Contents

# Executive Summary

Regular assessment of regional disparities is essential for an evolving policy framework aimed at balanced regional development. In Sri Lanka, because of data constraints, subnational assessments are often carried out at the provincial level. Such aggregate analyses may overlook intra-provincial disparities. This exercise lays the foundation for a district level analysis.

## Methodology

The basic analytical framework of the exercise is similar to that of the Asia Competitiveness Institute, National University of Singapore. In this framework the analysis is carried out under four environments, Macroeconomic Stability, Government & Institutional Setting, Financial Business & Manpower Conditions, Quality of Life & Infrastructure Development. What is novel in our study is the District Development Index (DDI) that helps in assessing convergence or divergence of districts relative to a base year.

After studying more than 100 indicators, the study narrowed them down to 53 indicators based on quality-quantity trade-off. The indicators are standardized and aggregated into successive levels of sub-environments, environments, and overall. District scores and ranks (both standard and DDI) constitute the basic units of the analysis.

Driven by data constraints the initial analysis covers the years 2012, 2016, 2019 with some extension to 2020, 2021. DDI-2016 uses 2012 as the base year and DDI-2019 uses 2016 as the base year. Rank correlation between the district ranks of the base year (standard ranks) and the reference year (DDI ranks) conveys the information on convergence or divergence. Negative rank correlation (subject to another condition) indicates that the worst performing districts in the base year have improved the most in the reference year.

## Results

1. Gross Regional Domestic Product (GRDP) over 2010-2019 at the district level shows the existence and persistence of substantial intra-provincial disparities especially in the Northern, North-Central, and North-Western Provinces.
2. Overall standard ranking (scores aggregated over all the indicators) shows the unsurprising result that the districts of the Western Province staying at the top (Colombo leading) in 2012, 2016, and 2019. The top seven also includes Kurunegala, Kandy, Galle, and Anuradhapura. The bottom nine includes the districts of the Northern Province (excluding Jaffna), Uva Province, and the Eastern Province. The remaining nine districts are in the middle.
3. DDI scores indicate progressive convergence over both periods 2012-16 and 2016-19 with weaker improvement over the latter. These results are, however, subject to ‘fallacy of aggregates’.

4. Disaggregating to the level of four environments shows progressive divergence in Macroeconomic Stability, and Government & Institutional Setting over 2012-16 and regressive convergence in Government & Institutional Setting over 2016-19. The latter is a result of a substantial drop in the allocation of capital expenditure to provincial councils in 2019. The combined effect is to produce the overall result mentioned under point 3 above.
5. Progressive convergence is observed in Quality of Life & Infrastructure Development under both periods with 2012-16 showing stronger results.
6. Disaggregating further to sub-environment level (education, healthcare, income distribution, infrastructure, labour market, labour productivity) shows stronger performance over the period 2012-16.
7. Agriculture labour productivity conundrum: Unlike Industry and Service sectors, labour productivity of the Agriculture sector has been very low and stagnant over the observed years 2010-19 across all districts except for Colombo and Gampaha. This appears to be related to pricing of the agricultural products that requires a deeper analysis.

## Pandemic 2020-2021 and economic crisis 2022

Data needed for the full analysis under the four environments is not available. The district level analysis was carried out only under Macroeconomic Stability. An aggregate account of the economic crisis is provided in brief.

8. Although the GDP growth rebounded in 2021, growth of per capita GRDP at the district level shows a substantial contraction in 2020 without much growth in 2021. It is very likely that this effect may have fallen disproportionately on vulnerable low-income groups.
9. DDI scores (2020 and 2021) show regressive convergence of macroeconomic conditions with 19 districts in 2020 performing worse than 2019 and 16 districts in 2021 performing worse than 2019.
10. Economic crisis started to surface with social and political unrest since Mar 2022. Sparks of the crisis stayed hidden for long time. Persistent twin deficits since 1956 amply demonstrates living beyond one's means. The crisis is an opportune time to introduce bitter pills to cure the patient.

## Acknowledgements

We thank Paul Cheung for proposing to rope in Sri Lanka to the nexus of ACI studies on subnational economies. Zhang Xuyao deserves a special thank for his valuable comments and discussions on the methodology. Other ACI staff members also promptly helped when necessary. Our thanks are also due to Godfrey Gunatilleke, Lloyd Fernando and Harsha Aturupane for reading through the drafts and sharing their valuable thoughts on the exercise. We also benefitted from informal discussions with many on various issues that we came across while the study was going on.

## List of Abbreviations

| | |
|---|---|
| ACI | Asia Competitiveness Institute |
| DDI | District Development Index |
| GRDP | Gross Regional Domestic Product |
| HDI | Human Development Index |
| HIES | Household Income and Expenditure Survey |
| IMD | Institute for Management Development |
| IMR | Infant Mortality Rate |
| LTTE | Liberation Tigers of Tamil Eelam |
| NUS | National University of Singapore |
| SDI | Subnational Development Index |
| WEF | World Economic Forum |

## List of Province and Districts of Sri Lanka (as listed in Central Bank reports)

**Western Province**
1. Colombo
2. Gampaha
3. Kalutara

**Central Province**
4. Kandy
5. Matale
6. Nuwara Eliya

**Southern Province**
7. Galle
8. Matara
9. Hambantota

**Northern Province**
10. Jaffna
11. Kilinochchi
12. Mannar
13. Vavuniya
14. Mullaitivu

**Eastern Province**
15. Batticaloa
16. Ampara
17. Trincomalee

**North Western Province**
18. Kurunegala
19. Puttalam

**North Central Province**
20. Anuradhapura
21. Polonnaruwa

**Uva Province**
22. Badulla
23. Monaragala

**Sabaragamuwa Province**
24. Rathnapura
25. Kegalle

## List of Figures and Tables

# 1. Introduction

Balanced regional development of Sri Lanka has been a priority policy consideration over many decades, even before independence in 1948. The Finance Commission was established in 1987 to make recommendations to the government for fund allocation for balanced development across provinces (Finance Commission, 2021). Intentions, however, have not translated into actions in effective ways to reduce regional disparities.[1] As history bears evidence, excessive disparities lead to discontent and disruptive conflicts and turmoil. A regular assessment of regional disparities is essential for an evolving policy framework. Because of data constraints, disparities at subnational level in Sri Lanka are often assessed at the provincial level that tend to overlook intra-provincial disparities.[2] Widening gap in Gross Regional Domestic Product (GRDP) between the hub district and the rest within a province like the Northern province can be seen in Figure 4. Broad-brush policy measures that may direct investment to the hubs of the provinces may further aggravate intra-provincial disparities.

The objective this exercise is to lay the foundation for a district level analysis based on a large set of indicators at successive levels of aggregation. This requires a substantial effort in converting provincial level data to district level and hopefully this would be a catalyst for the government authorities to start compiling data at the district level.

Section 2 provides a brief literature review. In Section 3 we present part of the methodology. What is novel is the District Development Index. The methods we developed to convert provincial level data to district level and some data cleaning methodologies are presented in Appendix 1. The results of the analysis and the key findings are summarized in Sections 4, 5, and 6. Some recommendations are provided in Section 7 with the hope of generating further discussion. Readers who are not interested in mathematical details, may skip Section 3.2.

[1] Sakalasooriya (2021) provides a historical account of regional development programmes and some old literature analyzing these schemes.
[2] Wijerathna (2014) and the Finance Commission (2021) provide analyses at the provincial level.

## 2. A brief literature review

The analytical framework of this exercise is similar, with some variations, to the subnational competitiveness ranking framework of the Asia Competitiveness Institute (ACI), National University of Singapore (Sumedha et al. 2021; Zhang et al., 2021). The ACI has conducted sub-national level studies annually on China, India, and Indonesia since 2013. Although subnational level competitiveness studies are sparse, there are a large number of global and regional level ranking studies that focus on various aspects.

Michael Porter's magnum opus 'The competitive Advantage of Nations' (Porter, 1990) popularized the idea of competitive advantage and Porter envisioned that this is a move beyond the dominant theory of comparative advantage. On the surface of it, competitive advantage sounds like a zero-sum game (cut-throat competition) which is not the case with comparative advantage that leads to win-win outcomes. As with many other theories that appear to be rivals initially, complementarity between these two theories emerges stronger when one examines the factors that determine competitive advantage. As the Global Competitiveness Report (World Economic Forum, 2019) emphasizes, competition means improving efficiency and total factor productivity, factors that are not easily accounted for in a standard production function specification. This is what underlies competitiveness ranking studies.

Ranking studies with some overlapping features relevant to our study include Human Development Index (HDI) by United Nations Development Program, World Competitiveness Ranking by Institute for Management Development, Global Competitiveness Index by World Economic Forum, Doing Business by World Bank, Environmental Performance Index by Yale Center for Environmental Law and Policy, and Global Food Security Index by Economist Intelligence.

Among these, two ranking studies that are directly relevant to our study: 1. the World Competitiveness Yearbook compiled by IMD (International Institute for Management Development, 2020) and 2. the Global Competitiveness Report compiled by WEF (World Economic Forum, 2019). Their methodologies have evolved over time. Both exercises utilize a large number of indicators that are transformed into index values at successive levels of

aggregation (averaging). Both studies utilize publicly available data and some survey-based data for the indicators.

The IMD ranking exercise divides the national economy into four main competitiveness factors: 1. Economic performance, 2. Government efficiency, 3. Business efficiency, and 4. Infrastructure. Each of these is again divided into five sub-factors and each sub-factor includes a large number of criteria (indicator variables). The indicator variables are converted to standardized scores and averaged (simple average with equal weights) over sub-factors, factors, and overall to derive competitiveness rankings. The relevant index values are converted to range between 0 (worst performing economy) and 100 (best performing economy). This study does not include Sri Lanka.

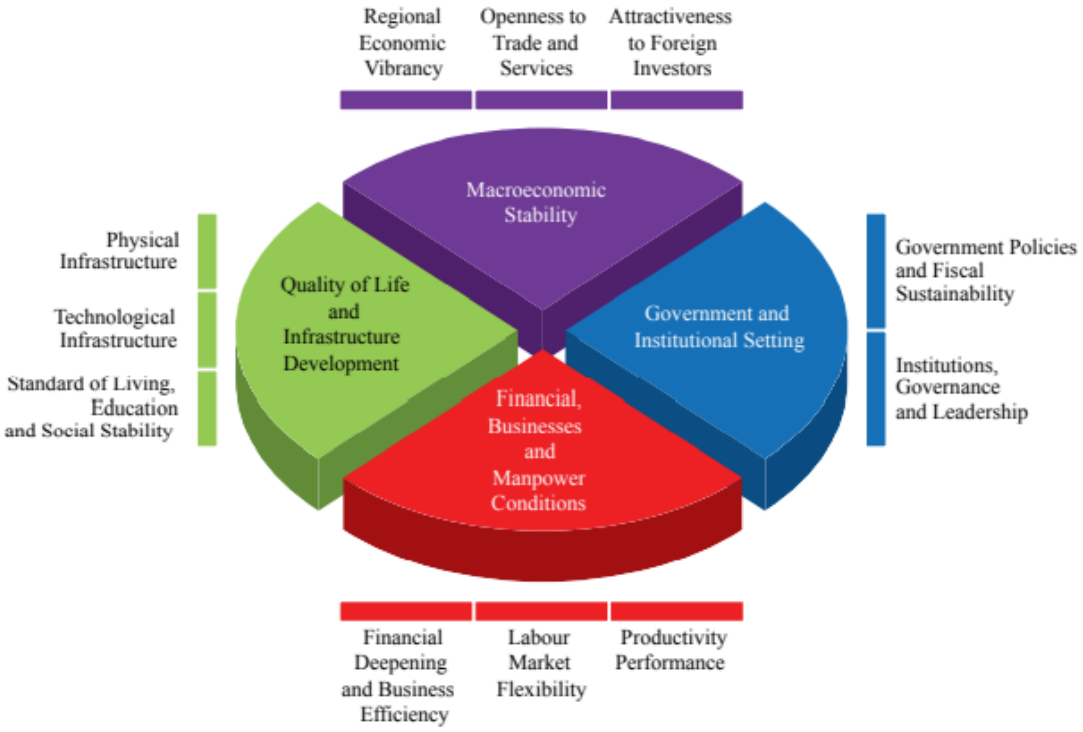
The WEF ranking divides the national economy into four areas each consisting of a number of pillars: 1. Enabling environment consisting of 4 pillars (Institutions, Infrastructure, ICT adoption, Macroeconomic stability), 2. Human capital consisting of 2 pillars (Health, Skills), 3. Markets consisting of 4 pillars (Product market, Labour market, Financial system, Market size), and 4. Innovation ecosystem consisting of 2 pillars (Business dynamism, Innovation capability). All the indicator variables in each pillar are converted to scores that range between 0 and 100 using the min-max transformation. The target values for minimum and maximum are set subjectively or through statistical analyses. Any indicator value outside the target range is constrained to sit on the target value. This may not necessarily be appropriate in certain cases. Simple averaging is used at successive levels of aggregation. This study includes Sri Lanka.

# 3. Methodology

## 3.1 Environments, Sub-environments and Indicators

For a comprehensive and disaggregated analysis, the ACI methodology divides the economy into four environments and eleven sub-environments. Each sub-environment includes an unequal number of indicators depending on the data availability. The four environments and their sub-environments are depicted in Figure 1. After collecting and compiling data for more than 100 indicators we narrowed them down to 53 indicators based on quality-quantity trade-off discussed later. Some indicators are combined to form a single indicator. The list of indicators under each category and data sources is given in Appendix 2.

**Figure 1. The ACI framework of analysis: 4 environments and 11 sub-environments**




Source: Asia Competitiveness Institute, National University of Singapore

In this framework Macroeconomic Stability focuses on aggregate economic activity. Given the severe data constraint even at the provincial level, we have indicators only for the sub-environment

Regional Economic Vibrancy. This is measured by 6 indicators, district level GRDP and growth, per capita GRDP and Sector GRDP (Agriculture, Industry, Service).

Financial, Business and Manpower Conditions focuses more on micro aspects of economic activity. In total there are 12 indicators for the three sub-environments. For the sub-environment Financial Deepening and Business Efficiency we have only two indicators (number of bank offices and population per office) which are clearly not sufficient. Six indicators represent the sub-environment Labour Market Flexibility. This includes variables like male and female labour force participation and unemployment rate. Because of the lack of data on wages, we use 'household mean monthly per capita income' as a proxy. The sub-environment Productivity Performance is measured by labour productivity (overall and of the three major sectors). "Among productivity measures, labour productivity takes a prominent place for a number of reasons. First, improving living standards requires sustained growth in labour productivity. Second, from time immemorial man has used tools and knowhow to improve his productivity. Therefore, other factors of production (physical capital, human capital, innovation) play complementary roles in the task of improving labour productivity. Third, the competitiveness of modern economies depends on to what extent improvements in labour productivity could counter rising labour costs." (Abeysinghe, 2020)

For Government and Institutional Setting, we have some data at the district level only for the sub-environment Government Policies and Fiscal Sustainability. For this there are only five indicators covering government revenue, expenditure and budget balance. Indicators for Fiscal Sustainability remain to be constructed. It should be noted that in Sri Lanka fiscal operations are heavily centralized with the central government. Provincial level revenue and grants as a proportion of central government revenue and grants has been on average 15.4% annually over the period 2010-2019. Provincial level expenditure as a proportion of central government total expenditure has been on average 10.6% annually over the period 2010-2019.

Quality of Life and Infrastructure Development is an important area because the end-result expected from various economic activities and policy actions is to improve the quality of life. Infrastructure development is part of this process. In total we have 25 indicators in this environment. For Physical Infrastructure we have 5 indicators but for Technology Infrastructure only 2. We include an additional category, income distribution, which is not in the ACI framework.

Income distribution is an important consideration for Social Stability. To capture a range of aspects of income distribution we use 7 indicators constructed out of 11 indicators. Healthcare aspects of the population is captured by 6 indicators (constructed out of 8) that includes the availability of not only the general medical practitioners but also the specialist doctors. Infant Mortality Rate (IMR) is also included since it is a comprehensive measure of healthcare of a country or a region. Education is measured by 3 indicators that can capture both quality and quantity (see Section 5.2.1).

Sri Lanka has a large informal sector. This is captured indirectly through some indicators in the four environments. For example, the spread of bank branches and population per branch, ownerships of household equipment like TVs and phones, and poverty head count are some such indicators. We will discuss more on the indicators later in the relevant section.

In selecting the indicators, we were conscious of the quality-quantity trade-off; a larger quantity of an indicator is not necessarily better. For example, the student-teacher ratio is a quantity measure, it does not tell much about the quality of teaching and learning. In certain categories, including education, we selected a set of indicators that can account for quality as well. However, in certain cases, because of the lack of data at the subnational level, we have to depend only on quantity measures. Good example is road density. Sri Lanka already has a high density of roads. Therefore, increasing the road density further may not necessarily be a good thing if the road quality is poor. In a separate study Abeysinghe (2021) used an indirect measure to obtain quality-adjusted road length. Since bad roads affect the vehicle's suspension system the most, he used import cost of spare parts for the suspension system as a ratio of total vehicle import cost. This cost ratio shows a substantial drop since 2009 when the road quality started to improve. Such data are not available at the subnational level, therefore we cannot obtain quality-adjust road density.

Although data for some indicators are available at the district level, some are available only at the provincial level. Even at the district level, some data inconsistencies resulting from changes in data collection methods or aggregation methods need fixing. Some missing values need to be estimated. Appendix 1 provides a detailed account of the data adjustment methods that we followed. Some indicators for the study are available only in the triennial Household Income and Expenditure Survey (HIES). Prior to 2012, the HIES does not include Northern and Eastern provinces because of the 27-year LTTE war that ended in 2009. Therefore, in this foundational study we carry out

the study in detail for the years 2012, 2016, and 2019 using 2012 and 2016 as base years. The Covid-19 pandemic since 2020 and the ensuing economic and political crisis have wreaked havoc across all sectors of the economy. Unfortunately, we do not have sufficient data to examine this crucial period. We examine this period more qualitatively.

## 3.2 District Development Index (DDI)[3]

The indicator variables are available in different units such as rupees and kilometers and not amenable for aggregation. Following the methodology of ACI, we convert all the basic indicator variables into standardized scores (z-scores) before aggregating them for index construction and subnational rankings.

Although ranking over different years provides useful insights, the nature of ranking is such that when one unit goes up the rank another has to go down. Nevertheless, if some regions stay persistently low ranked year after year this is a cause for concern. However, if the ranking moves up and down year after year, extracting useful information from such ranks would be difficult. Therefore, we add another feature to the methodology to assess the progress and convergence of the subnational economies over different years. In other words, we want to see whether the subnational economies move up the ladder over the years and converge. For this, we do another standardization using a base-year method.

Let $X_{ij}$ be the *j*th indicator for the subnational economy (district) *i*, ($i = 1, 2, ..., N$ ). The base-year (year 0) standardized score for this indicator is

$$z_{0,ij} = \frac{X_{0,ij} - \mu_{0,j}}{\sigma_{0,j}} \ , \ E(z_{0,ij}) = 0, \ Var(z_{0,ij}) = 1 , \qquad (1)$$

where $\mu_{0,j}$ and $\sigma_{0,j}$ are estimated over the *N* subnational economies.

For the next reference year, year 1, use the same base year mean $\mu_{0,j}$ and standard deviation $\sigma_{0,j}$ and obtain the standardized score as:

[3] As a general term this may be called Subnational Development Index (SDI)

$$z_{1,ij} = \frac{X_{1,ij} - \mu_{0,j}}{\sigma_{0,j}}. \quad (2)$$

If the subnational economy *i* has improved its performance on indicator *j* in year 1 then $z_{1,ij} - z_{0,ij} > 0$. If the momentum is continued even the negative *z* scores in the base year will turn positive over time. Therefore, the key indicator of improvement or deterioration at the subnational level is

$$z_{1,ij} - z_{0,ij} \quad (3)$$

A positive value of (3) indicates improvement from the base year and a negative value deterioration.

If the subnational units in general have performed better in year 1 on this indicator, then $\mu_{1,j} - \mu_{0,j} > 0$. It is also possible that $\sigma_{1,j} < \sigma_{0,j}$. Under these conditions and given that $X_{0,ij}$ and $X_{1,ij}$ are likely to be highly correlated, it is not difficult to verify that

$$E(z_{1,ij} - z_{0,ij}) = E(z_{1,ij}) = \frac{E(X_{1,ij}) - \mu_{0,j}}{\sigma_{0,j}} = \frac{\mu_{1,j} - \mu_{0,j}}{\sigma_{0,j}} > 0 \quad (4)$$

$$Var(z_{1,ij} - z_{0,ij}) \approx Var(z_{1,ij}) = \frac{Var(X_{1,ij})}{\sigma_{0,j}^2} = \frac{\sigma_{1,j}^2}{\sigma_{0,j}^2} < 1. \quad (5)$$

These are aggregate indicators of improvement.

A measure of convergence is the rank correlation between rank($z_{0,ij}$) and rank($z_{1,ij} - z_{0,ij}$) where the rank is over the N subnational economies. A negative relation between the two ranks indicates an overall convergence on the *j*th indicator. It is important to note that convergence can occur in both positive and negative ways. A good example is income distribution. A convergence towards income equality can occur when everyone moves up the ladder to the same rung (equal prosperity) or falls towards the bottom (equal poverty). Therefore, a negative rank correlation together with a positive mean value of the index ($z_{1,ij} - z_{0,ij}$) is an indicator of **progressive convergence** and a negative rank correlation with a negative mean value of the index is an indicator of **regressive convergence**. A graphical presentation of the ranks reveals how individual subnational economies

have converged or diverged on the *j*th indicator. **Since ($z_{1,ij} - z_{0,ij}$) contains information on both progress and convergence, this constitutes the basis of our DDI.**

### 3.2.1 Aggregation

After obtaining the z-scores using the means and standard deviations of the reference year and the base year we have to aggregate the relevant indicators to sub-environment, environment, and overall levels. The aggregation has to be done carefully to avoid ranking distortions at different levels of aggregation.

Suppose there are two sub-environments in a given environment, one with k1 indicators and the other with k2 indicators. Then the weighted average of the standardized scores (z) of the *i*th subnational economy for a given year are:

$$Z_i^{(1)} = \sum_{j=1}^{k1} w_j^{(1)} z_{ij}^{(1)} \quad , \quad Z_i^{(2)} = \sum_{j=1}^{k2} w_j^{(2)} z_{ij}^{(2)} \tag{6}$$

where the super-scripts (1) and (2) refer to the two sub-environments and the weights (*w*) sum to unity. In the case of simple averaging $w_j^{(1)} = 1/k1$ and $w_j^{(2)} = 1/k2$.

One way to aggregate the two sub-environments is:

$$W^{(1)} Z_i^{(1)} + W^{(2)} Z_i^{(2)} = \sum_{j=1}^{k1} W^{(1)} w_j^{(1)} z_{ij}^{(1)} + \sum_{j=1}^{k2} W^{(2)} w_j^{(2)} z_{ij}^{(2)} \tag{7}$$

In the case of simple averaging $W^{(1)} = W^{(2)} = 1/2$.

Note that

$$W^{(1)} \sum_{j=1}^{k1} w_j^{(1)} + W^{(2)} \sum_{j=1}^{k2} w_j^{(2)} = W^{(1)} + W^{(2)} = 1 \tag{8}$$

$$E(W^{(1)} Z_i^{(1)} + W^{(2)} Z_i^{(2)}) = 0 \tag{8}$$

$$Var(W^{(1)} Z_i^{(1)} + W^{(2)} Z_i^{(2)}) \leq 1 \tag{9}$$

The variance equals unity only if the variables are perfectly correlated, otherwise the variance is less than unity. Note that even with simple averaging the weights are not the same in (7) when k1≠k2. In our analysis we notice that averaging as in (7) can lead to ranking distortions of the DDI. This problem can be avoided if the simple average is taken over all the k1+k2=k indicators. This assigns equal weights to all the indicators in the two groups.

In the ACI methodology ranking based on simple averages as in (7) and weighted averages with wights based on the Shapley value method find that the results are very similar. As an alternative we considered using weights based on Factor Analysis, factor loadings converted to weights that sum to unity. Figure 2 shows the ranking based on equal weights and Factor weights for income distribution with 7 indicators. The two rankings are closely related though some differences occur. For income distribution indicators, one Factor was sufficient to capture the correlation structure of the variables. However, if more than one factor is needed then ambiguities arise regarding the construction of weights. Moreover, some sub-environments include only two or three indicators in which case Factor method does not work well. We, therefore, use only the simple averages in this study.

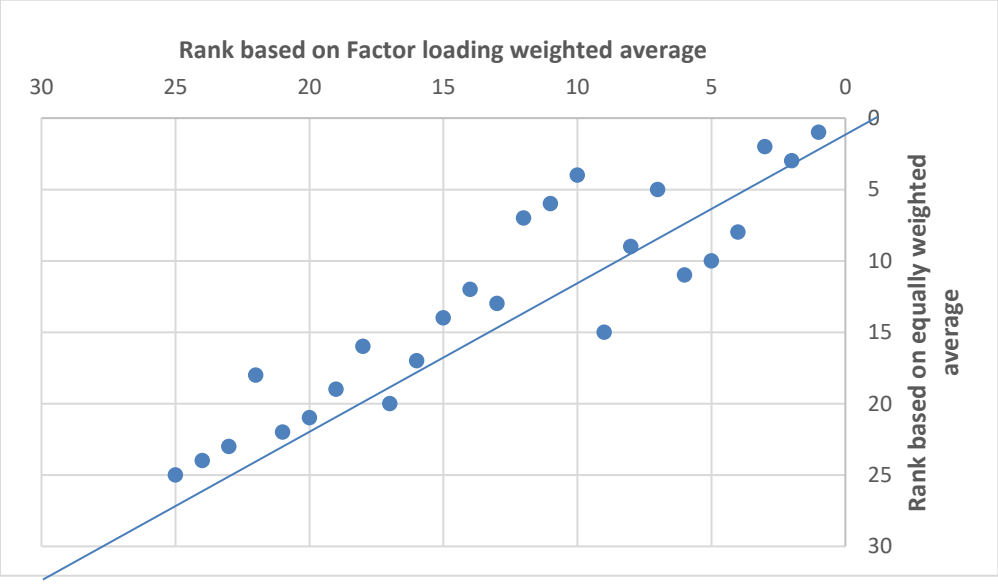
The aggregation methodology we adopt is as follows. Based on the example above, obtain $Z_i^{(1)}$ and $Z_i^{(2)}$ using simple averages (equal weights) and re-standardize them to set their variances to unity. The re-standardized values, $Z_i^{*(1)}$ and $Z_i^{*(2)}$ , are the indices of the two sub-environments that we rank and compare over different years. Note that rank($Z_i$)=rank($Z_i^*$). To obtain the index at the environment level we take the simple average of all the k1+k2 standardized indicators. If this value is indicated by $ZZ_i$, its re-standardized value $ZZ_i^*$ is the index we use at the environment level. To derive the overall index, we take the simple average of all the standardized scores of the four environments and re-standardize it to set its variance to unity. The DDI based on (3) at the aggregate level is simply, for example, $Z_{1,i}^{(1)} - Z_{0,i}^{(1)}$, where the subscripts (1) and (0) refer to the reference year and the base year.[4]

It should be noted that there is a possibility that the values of an indicator may be roughly similar across all N subnational units resulting in a very small standard deviation. This will produce

[4] Note that although the re-standardized values represent the final index, they are not used in the aggregation process.

extreme z-scores and affects both the standard ranking and DDI ranking at different levels of aggregation. Moreover, DDI scores get further magnified when there is a large improvement of the specific indicator in the reference year. Therefore, it is important to examine the z-scores of each indicator carefully for extreme values. The standard normal distribution range -4 to +4 may be used as a guide. When z-scores are outside this range, it is advisable to check whether this is a result of a lack of variability of the values of the indicator or due to the skewness of the distribution. If it is due to the lack of variability, the indicator needs to be replaced or dropped. In the empirical exercise, we did not observe extreme z-scores that could be attributed to very low standard deviations

**Figure 2. Rank of income distribution indicators averaged using different weighting methods**




Note: Axis values are reversed because lower the number the better the ranking
Source: Authors' calculations

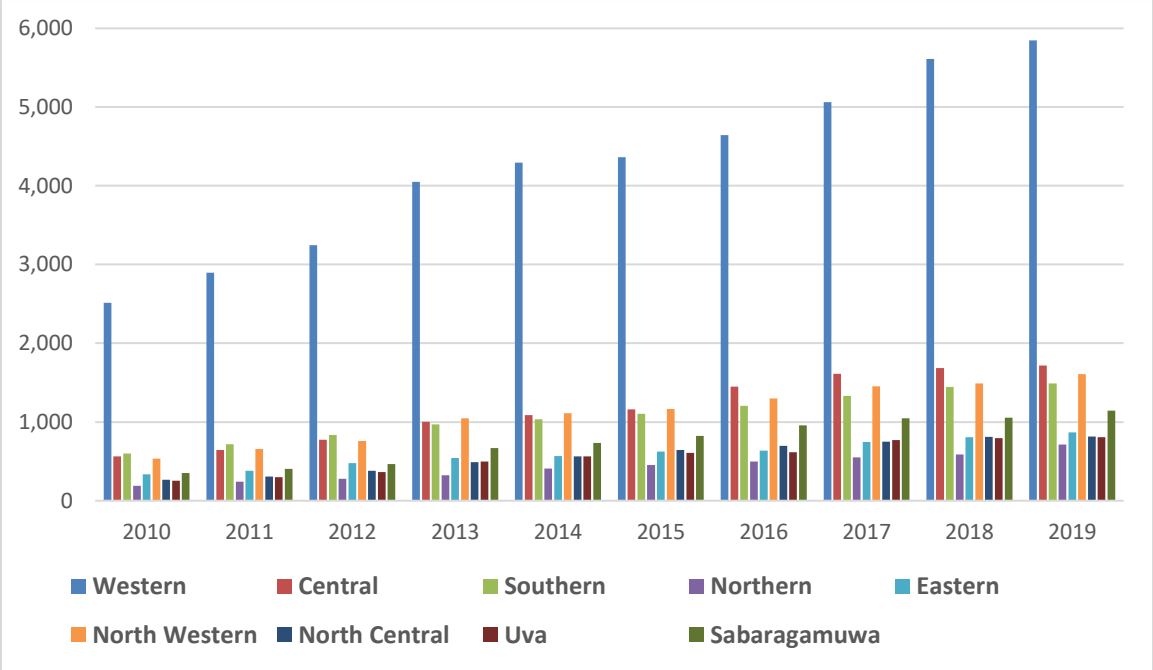
# 4. Some salient features at the subnational level

## 4.1 Inter-provincial disparities

Figure 3 shows the provincial GRDP over the years 2010-2019. Despite the upward trend of GRDP over this decade, the general pattern of provincial performance has not changed much. The

dominance of the Western province with other provinces standing at a substantial distance is the key feature of provincial performance. Central, Sothern, and North-Western provinces are in the second rank. Sabaragamuwa province is in the third rank while the remaining provinces of Northern, Eastern, North-Central, and Uva are in the fourth rank in terms of GRDP.

**Figure 3. Provincial GRDP (nominal Rs bn)**

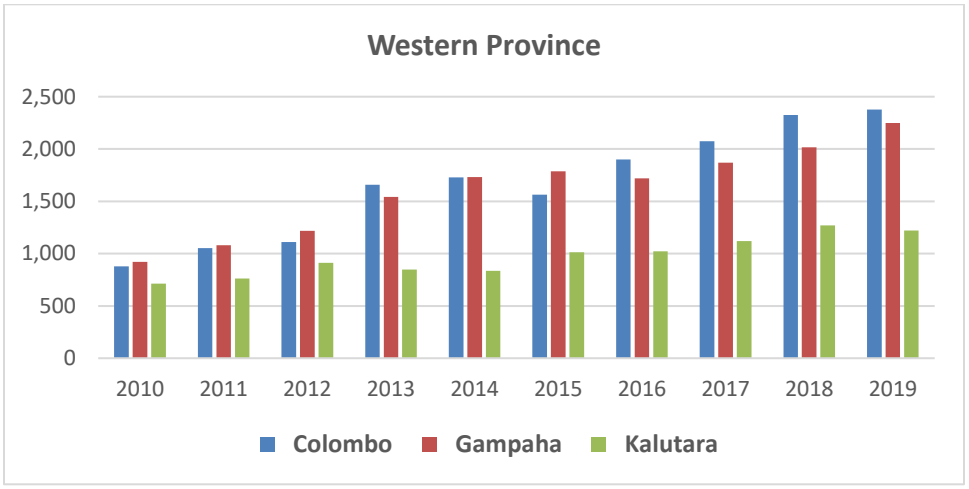


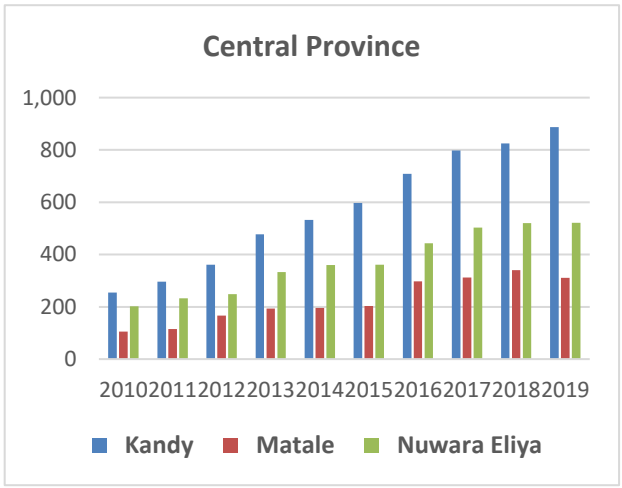

Data source: Central Bank

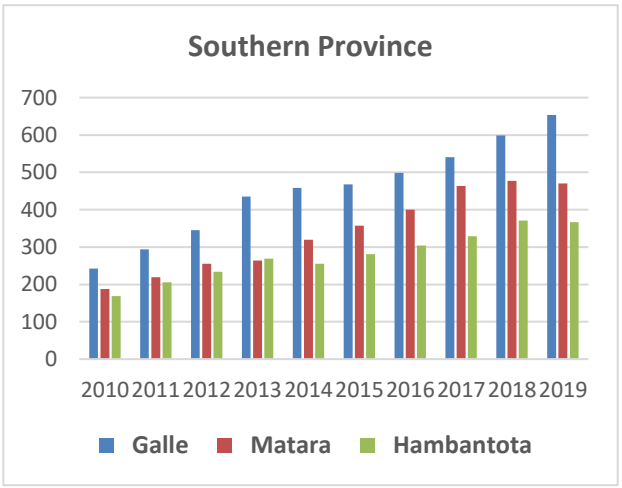
## 4.2 Intra-provincial disparities

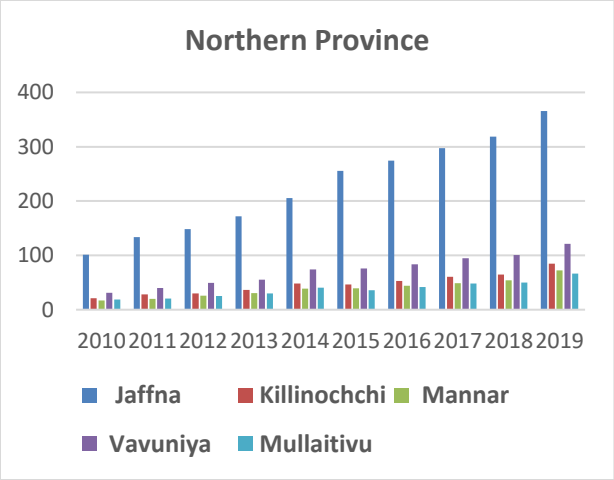
As we have pointed out earlier, the provincial level performance hides intra-provincial disparities. Figure 4 shows the district level GRDP for each province. Because of the unique position of the Western province and for a better graphical presentation the Western province graph is placed differently. Substantial disparities between districts can be seen in provinces like the Northern, North-Western and North-Central.

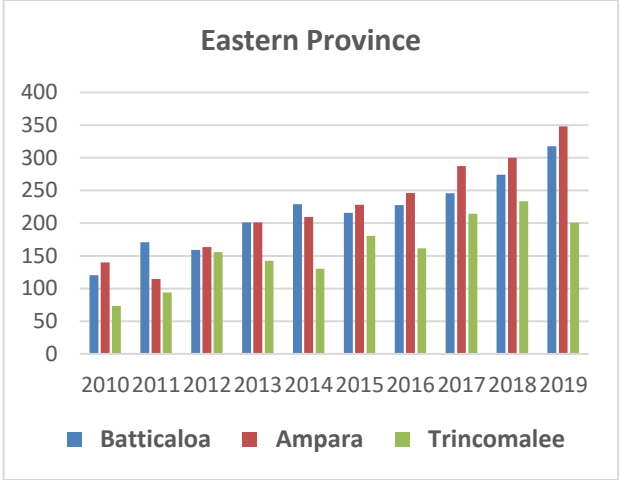
**Figure 4. District level GRDP (nominal Rs bn) by province**

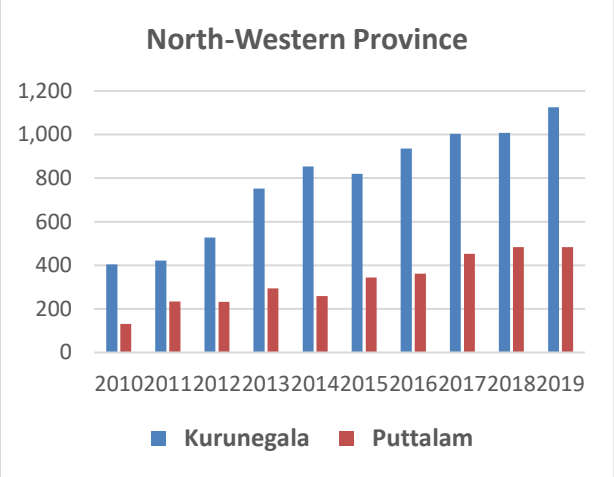


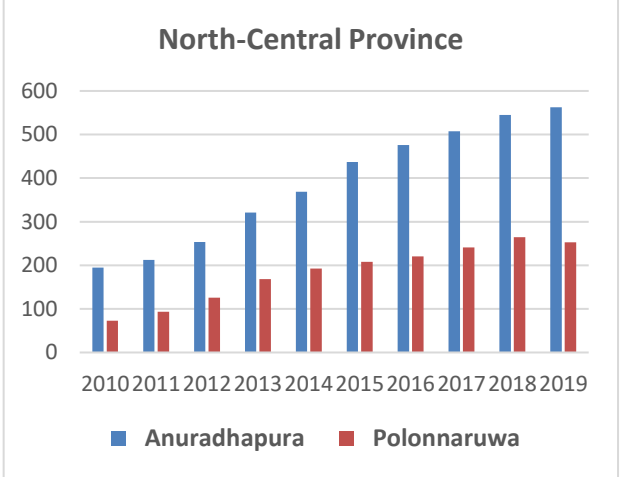



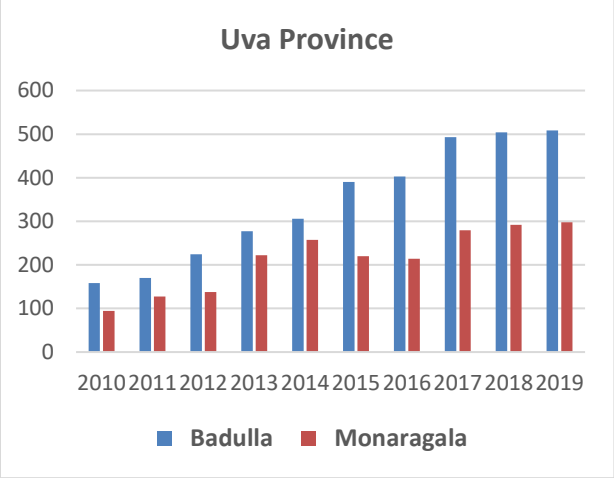



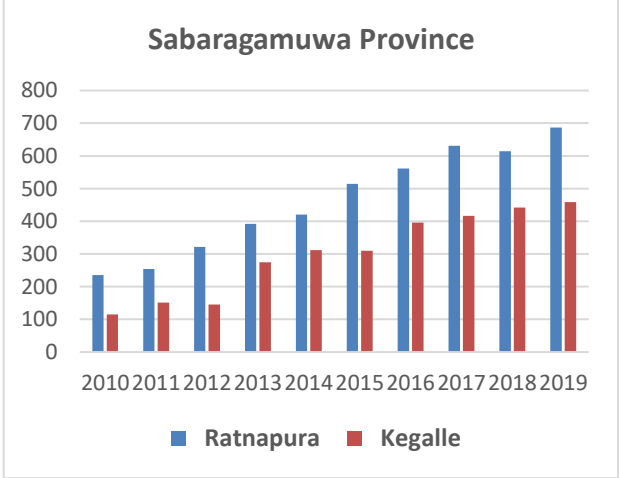



Note: Vertical scales in the graphs are not the same
Source: Authors' calculation based on provincial data from the Central Bank

# 5. District level ranks, scores and the key findings

This section includes a large number of tables and graphs that require interpretting the results from the newly introduced DDI. Instead of repeating the notes under each table and graph the following is the guide for interpretation:

Negative rank correlation with positve Mean DDI: Progressive convergence
Negative rank correlation with negative Mean DDI: Regressive convergence
Positive rank correlation with positve Mean DDI: Progressive divergence
Positive rank correlation with negative Mean DDI: Regressive divergence
Zero rank correlation and zero Mean DDI: Status Quo

Note that convergence or divergence is relative to the base year. A rank correlation of -1 is a perfect scenario which shows the base-year rank is completely reserved in terms of improvement rank; the distict ranked 25 in the base year is ranked 1 in terms of improvement in the referenc year. In this exercise we do not make an attempt to perform statistical significance tests on these rank correlations and Mean DDIs. We simply make a subjective comparison of the magnitude of the numbers over the two periods 2012-16 and 2016-19.

Further note that in the tables, non-DDI scores are the familiar scores that focus on each year separately. Since two types of scores are involved, we differentiate them by reffering them as standard scores (non-DDI scores) and DDI scores. For non-DDI scores the mean value is zero and the districts with negative scores are the below-average performers. As for DDI scores, negative values indicate deterioration of the corresponding district relative to the base year. The following notes are also not repeated.

In Figures, Axis values are reversed because lower the number the better the ranking

In tables, Disricts are ordered based on 2012 rank.

Source: Authors' calculations

## 5.1 Ovearll performance

Table 1 presents the overall district level ranks and scores for 2012, 2016, 2019, DDI-2016 (Base 2012) and DDI-2019 (Base 2016). Figure 6 shows a plot of standard ranks for 2012, 2016, and 2019. Figure 7 conveys the information on convergence or divergence of the districts. We can discern the following observations from these tables and grpahs.

1. The standard ranking of disctricts in 2012, 2016 and 2019 has remained very similar with the districts in the Western province staying at the top with Colombo leading. Kurunegala, Kandy, Galle, and Anuradhapura are also in the top seven list in the three years. These districts record positive scores well above zero (roughly on or above 0.5). The districts of the Northern and Eastern provinces, excluding Jaffna, are at the bottom. The bottom also includes Badulla and Moneragala. The bottom nine districts record scores well below zero (roughly on or below -0.5). Mannar shows a substantial improvement in 2019; however, until new evidence is collected we place Mannar also in the bottom nine districts. Figure 5 shows the colour-coded map of the districts with green showing the top seven, red the bottom nine and amber the remaining nine districts.
2. The DDI-2016 records all positive values indicating that all the districts have improved over the base year 2012. However, DDI-2019 shows 6 districts with negative values showing deterioation compared to the base 2016.
3. Negative rank correlations with positive mean DDI values in Figure 8 shows that there has been progressive convergence of the districts over both 2012-2016 and 2016-2019 periods though mean improvement over 2016-19 is weaker. Based on this information one may conclude that over the period 2016-19 there has been stronger convergece with weaker improvement. However, we have to bear in mind the ‘fallacy of aggregates’. More informative pictures emerges when we examine the results of the disaggregated categories under different environemnts.

**Figure 5. Map showing overall standing of districts of Sri Lanka**

**(Top 7 Green, Middle 9 Amber, Bottom 9 Red)**

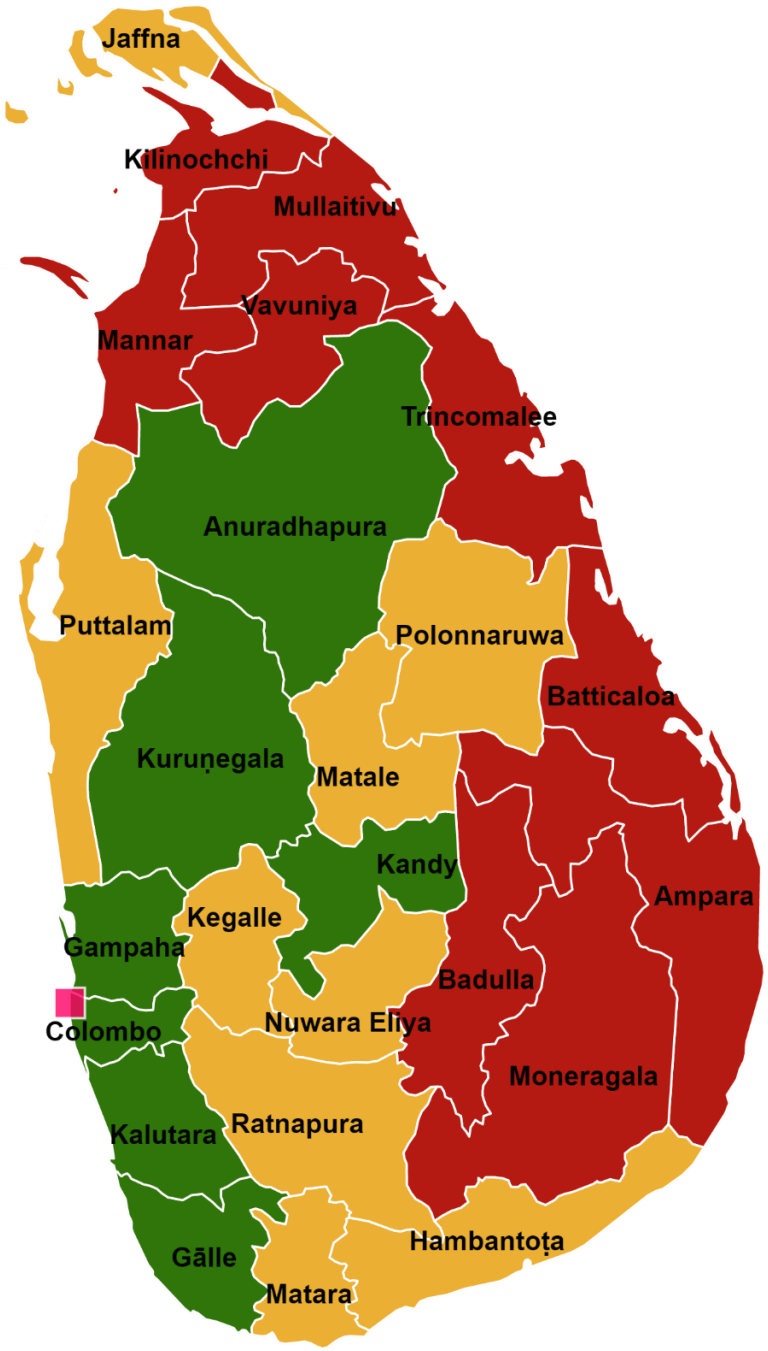


**Figure 6. District standard ranks 2012, 2016, 2019**

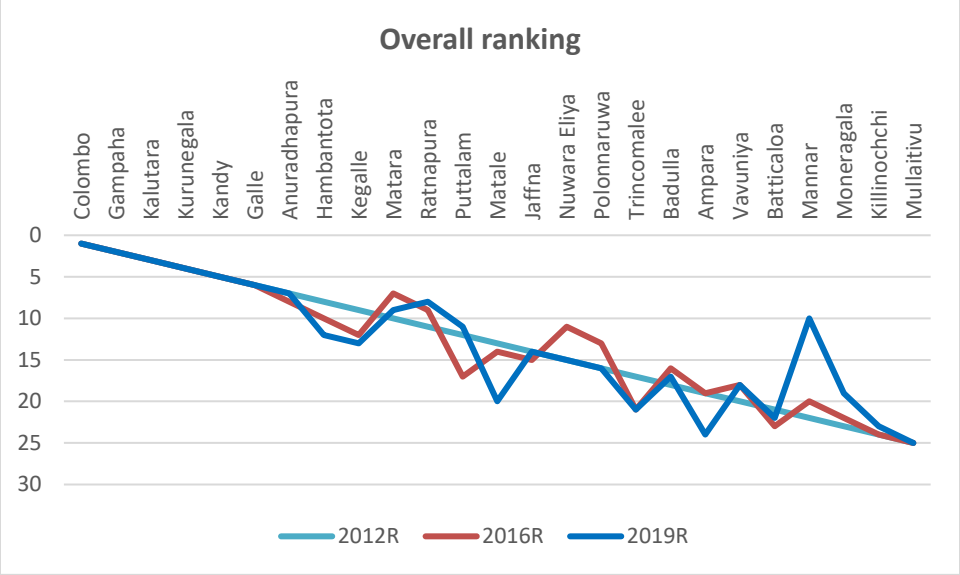
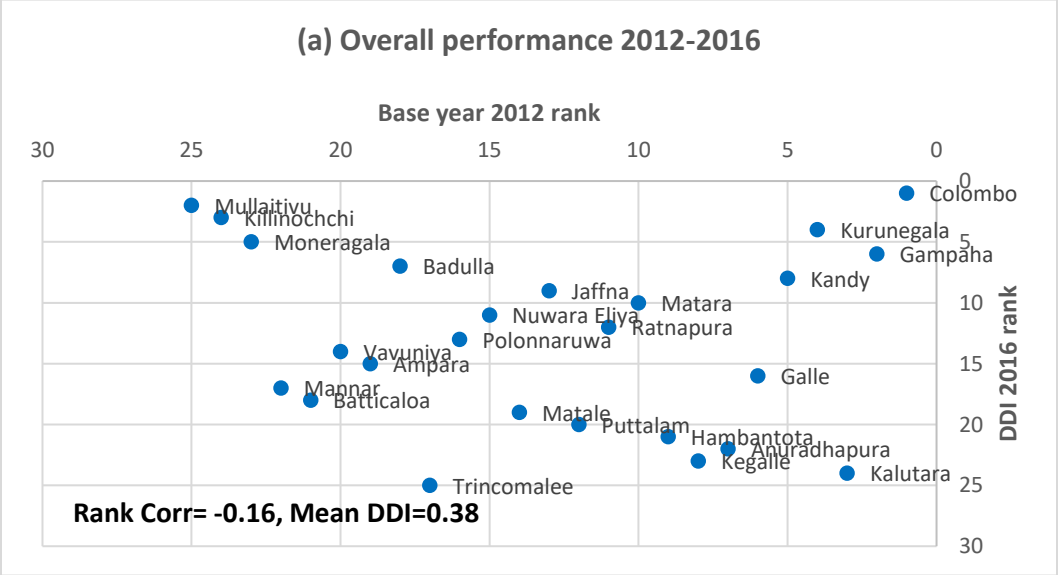
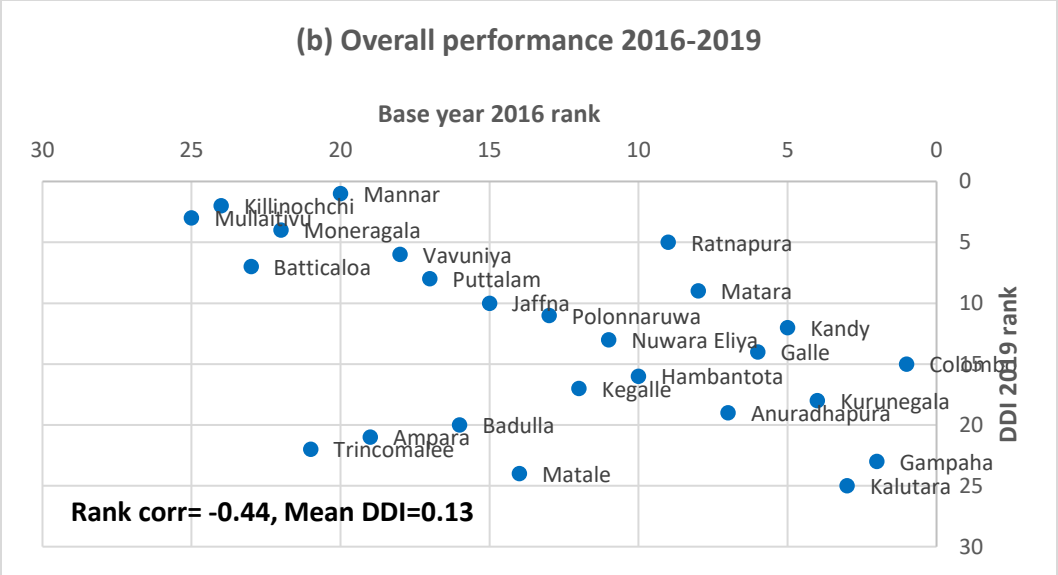



**Figure 7. District convergence/divergence 2016 and 2019**




(b) Overall performance 2016-2019
Base year 2016 rank
30
25
20
15
10
5
0
DDI 2019 rank
0
5
10
15
20
25
30
Mannar
Killinochchi
Mullaitivu
Moneragala
Vavuniya
Batticaloa
Puttalam
Jaffna
Ratnapura
Matara
Polonnaruwa
Nuwara Eliya
Kandy
Galle
Colombo
Hambantota
Kegalle
Kurunegala
Anuradhapura
Badulla
Ampara
Trincomalee
Matale
Gampaha
Kalutara
Rank corr= -0.44, Mean DDI=0.13

## Table 1. Overall performance: Ranks and Scores of the 25 districts

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Colombo | 1 | 1 | 1 | 1 | 11 | 2.449 | 2.880 | 2.846 | 0.763 | 0.120 |
| Gampaha | 2 | 2 | 2 | 6 | 21 | 2.146 | 2.147 | 2.098 | 0.502 | -0.035 |
| Kalutara | 3 | 3 | 3 | 24 | 24 | 1.431 | 1.056 | 0.899 | 0.225 | -0.176 |
| Kurunegala | 4 | 4 | 4 | 5 | 18 | 0.712 | 0.853 | 0.835 | 0.508 | 0.042 |
| Kandy | 5 | 5 | 5 | 8 | 12 | 0.583 | 0.633 | 0.729 | 0.410 | 0.099 |
| Galle | 6 | 6 | 6 | 18 | 15 | 0.580 | 0.619 | 0.707 | 0.306 | 0.064 |
| Anuradhapura | 7 | 8 | 7 | 23 | 19 | 0.515 | 0.206 | 0.422 | 0.245 | 0.018 |
| Hambantota | 8 | 10 | 12 | 21 | 17 | 0.061 | 0.035 | 0.001 | 0.267 | 0.043 |
| Kegalle | 9 | 12 | 13 | 22 | 16 | 0.055 | -0.116 | -0.113 | 0.245 | 0.047 |
| Matara | 10 | 7 | 9 | 11 | 9 | 0.018 | 0.210 | 0.216 | 0.384 | 0.160 |
| Ratnapura | 11 | 9 | 8 | 14 | 5 | -0.005 | 0.051 | 0.275 | 0.352 | 0.250 |
| Puttalam | 12 | 17 | 11 | 20 | 8 | -0.091 | -0.368 | 0.009 | 0.282 | 0.172 |
| Matale | 13 | 14 | 20 | 19 | 25 | -0.097 | -0.133 | -0.864 | 0.302 | -0.181 |
| Jaffna | 14 | 15 | 14 | 10 | 10 | -0.107 | -0.139 | -0.237 | 0.389 | 0.129 |
| Nuwara Eliya | 15 | 11 | 15 | 9 | 14 | -0.138 | -0.062 | -0.261 | 0.400 | 0.077 |
| Polonnaruwa | 16 | 13 | 16 | 12 | 13 | -0.225 | -0.122 | -0.384 | 0.365 | 0.097 |
| Trincomalee | 17 | 21 | 21 | 25 | 23 | -0.250 | -0.885 | -0.878 | 0.139 | -0.100 |
| Badulla | 18 | 16 | 17 | 7 | 20 | -0.306 | -0.200 | -0.500 | 0.455 | -0.014 |
| Ampara | 19 | 19 | 24 | 15 | 22 | -0.507 | -0.628 | -1.008 | 0.335 | -0.048 |
| Vavuniya | 20 | 18 | 18 | 13 | 6 | -0.567 | -0.478 | -0.598 | 0.359 | 0.209 |
| Batticaloa | 21 | 23 | 22 | 17 | 7 | -0.724 | -1.006 | -0.899 | 0.321 | 0.181 |
| Mannar | 22 | 20 | 10 | 16 | 1 | -0.741 | -0.692 | 0.152 | 0.327 | 0.642 |
| Moneragala | 23 | 22 | 19 | 4 | 4 | -1.194 | -0.907 | -0.789 | 0.508 | 0.321 |
| Killinochchi | 24 | 24 | 23 | 3 | 2 | -1.594 | -1.307 | -0.975 | 0.520 | 0.587 |
| Mullaitivu | 25 | 25 | 25 | 2 | 3 | -2.005 | -1.646 | -1.683 | 0.534 | 0.423 |
| Mean | | | | | | 0 | 0 | 0 | 0.378 | 0.125 |
| SD | | | | | | 1 | 1 | 1 | 0.130 | 0.203 |

Note: Refer to the opening notes of Section 5.

## 5.2 Four environments and sub-environments

Aggregation and averaging may hide some salient features of the components. This is what we referred to above as the 'fallacy of aggregates'. Examining the results under the four environments and sub-environments reveal some important features that got ironed in the overall picture. For the ease of reading, we place the main tables of the four environments (Tables 3-6) at the end of this section.

Unlike the overall non-DDI rankings, these rankings at the environment level jump around quite a bit especially under Government & Institutional Setting, and Financial Business & Manpower Conditions. This is where extracting useful information from standard yearly rankings becomes difficult and the relative rankings based on DDI become more informative. For this reason DDI based results are summarized in Table 2 including sub-environments. Figure 8 presents the scatter plots of DDIs of the four environments. The key findings from the four environments are summarized below.

1. Mean DDIs in Table 2 shows stronger performance in all four environments over the period 2012-16. However, over this period, under Macroeconomic Stability and Government & Institutional Setting progressive divergence seems to have occurred as indicated by positive rank correlations and scatter plots of Figure 8.
2. During 2016-19, the Mean DDI for Government & Institutional Setting has turned negative with a larger magnitude. Combined with the corresponding negative rank correlation indicate regressive convergence of the districts under Government & Institutional Setting. The main reason for this unwanted result is a substantial drop in the allocation of Government capital expenditure to provincial councils over this period. This is evident in Figure 9.[5]
3. The combined effect the above two effects is to produce the results that we observe at the overall level that could lead to misleading inference about convergence over the two periods. This is a manifestation of 'fallacy of aggregates'.
4. As we stated earlier, improving the quality of life has to be the end result of the policies aimed at the other three environments. Table 2 and Figure 8 show progressive convergence

[5] Capital expenditure tends to be lumpy. To avoid its distortionary effect on our results, we will consider an alternative way of incorporating capital expenditure into the analysis.

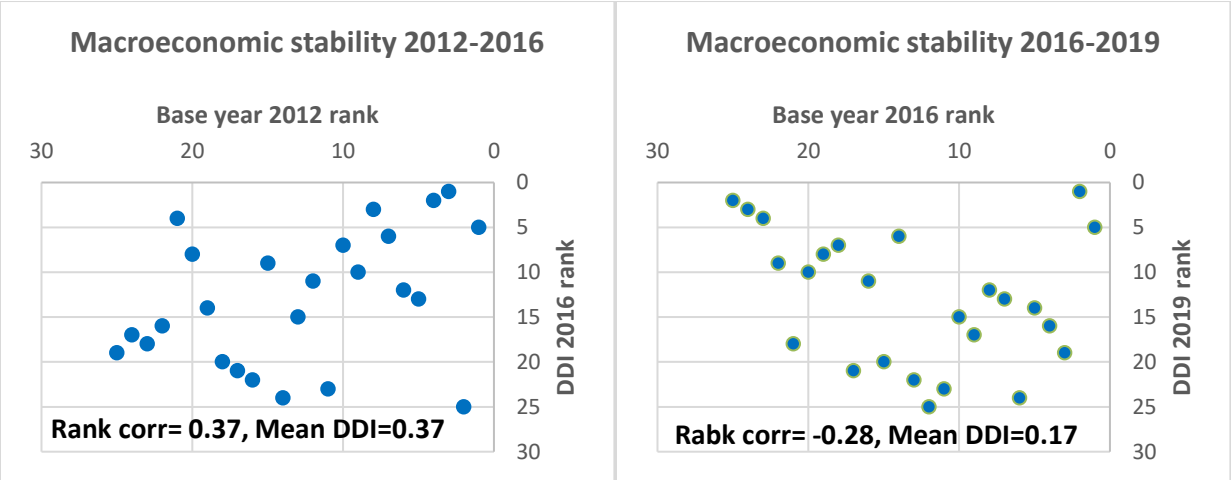
in Quality of Life & Infrastructure Development under both periods with 2012-16 showing stronger results.

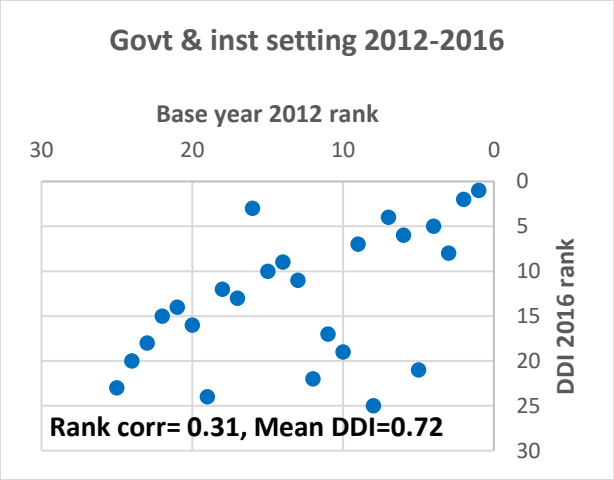
**Table 2. Indicators of convergence and progress**

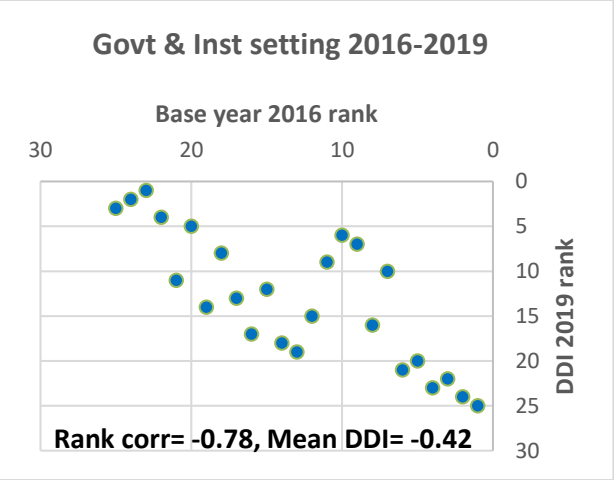
| | Rank correlation | | Mean DDI | |
|---|---|---|---|---|
| | **2012-16** | **2016-19** | **2012-16** | **2016-19** |
| **Overall** | -0.16 | -0.44 | 0.38 | 0.13 |
| **Four environments** | | | | |
| Macroeconomic Stability | **0.37** | -0.28 | 0.37 | 0.17 |
| Government & Institutional Setting | **0.31** | -0.78 | 0.72 | **-0.42** |
| Financial, Biz, & Manpower conditions | -0.18 | -0.65 | 0.33 | 0.11 |
| Quality of Life & Infrastructure Dev | -0.77 | -0.36 | 0.35 | 0.21 |
| **Selected sub-environments** | | | | |
| Education | -0.60 | -0.49 | 0.59 | 0.88 |
| Healthcare | -0.67 | -0.06 | 0.29 | -0.04 |
| Income Distribution | -0.70 | -0.13 | 0.43 | 0.19 |
| Infrastructure, Physical | -0.003 | -0.17 | 0.05 | 0.05 |
| Infrastructure, Technological | -0.84 | -0.22 | 0.70 | 0.60 |
| Labour market | -0.24 | -0.39 | 0.27 | 0.03 |
| Labour Productivity, Agriculture | -0.04 | 0.24 | -0.03 | 0.32 |
| Labour Productivity, Industry | -0.43 | -0.27 | 0.21 | 0.10 |
| Labour Productivity, Service | -0.47 | -0.47 | 1.18 | 0.31 |

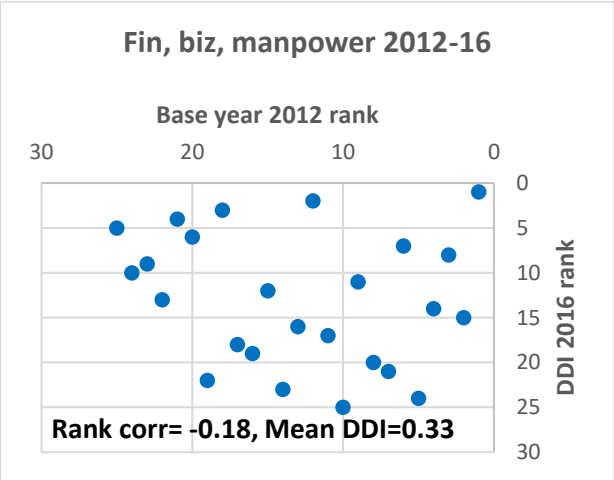
Note: See interpretational notes at the beginning of Section 5.

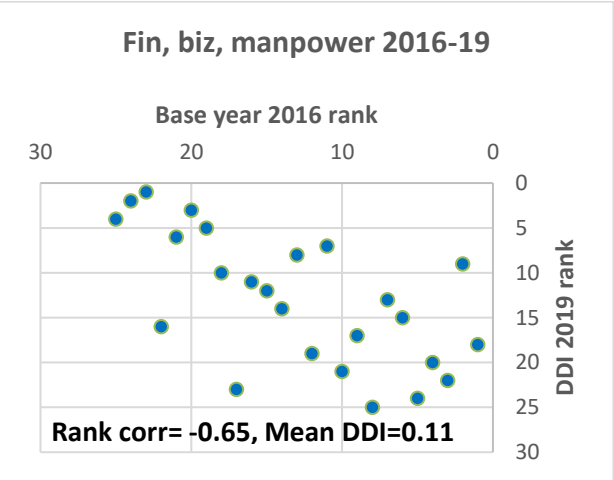
**Figure 8. District convergence/divergence 2016, 2019 in Four Environments**

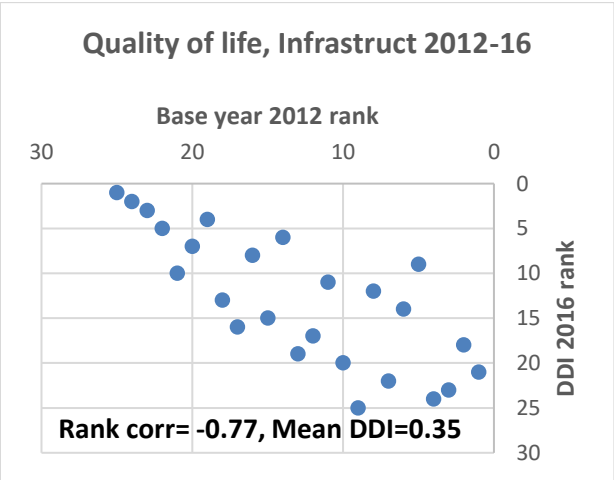



Govt & inst setting 2012-2016
Base year 2012 rank
30
20
10
0
0
5
10
15
20
25
30
DDI 2016 rank
Rank corr= 0.31, Mean DDI=0.72


Govt & Inst setting 2016-2019
Base year 2016 rank
30
20
10
0
0
5
10
15
20
25
30
DDI 2019 rank
Rank corr= -0.78, Mean DDI= -0.42


Fin, biz, manpower 2012-16
Base year 2012 rank
30
20
10
0
0
5
10
15
20
25
30
DDI 2016 rank
Rank corr= -0.18, Mean DDI=0.33


Fin, biz, manpower 2016-19
Base year 2016 rank
30
20
10
0
0
5
10
15
20
25
30
DDI 2019 rank
Rank corr= -0.65, Mean DDI=0.11


Quality of life, Infrastruct 2012-16
Base year 2012 rank
30
20
10
0
0
5
10
15
20
25
30
DDI 2016 rank
Rank corr= -0.77, Mean DDI=0.35

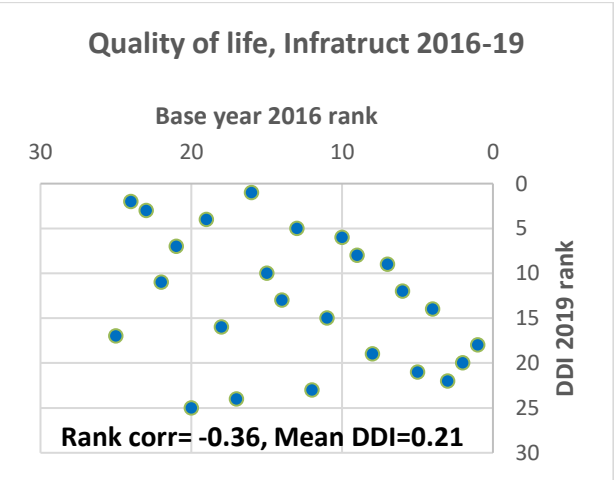
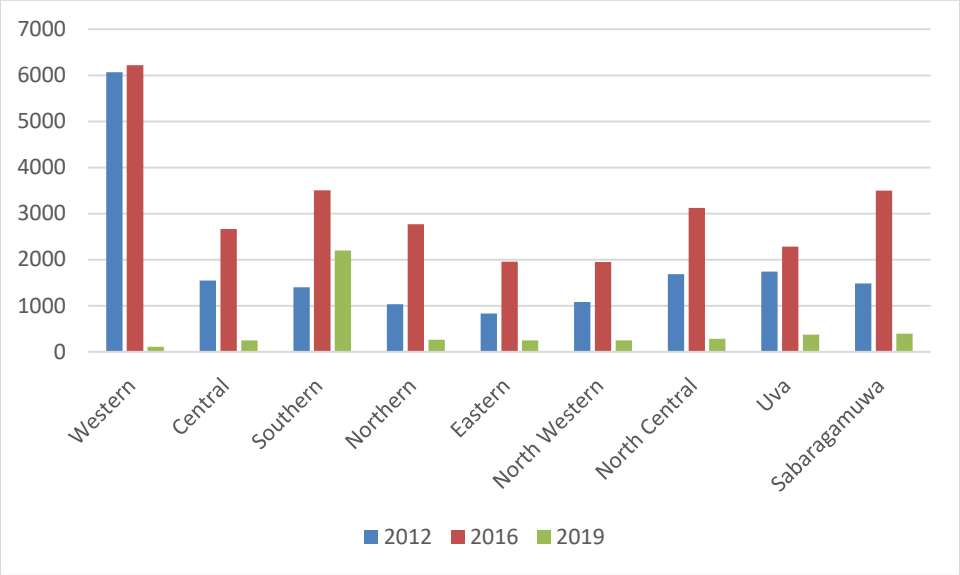

Quality of life, Infratruct 2016-19
Base year 2016 rank
30
20
10
0
0
5
10
15
20
25
30
DDI 2019 rank
Rank corr= -0.36, Mean DDI=0.21

**Figure 9. Government capital expenditure allocation to provincial councils**



## Table 3. Macroeconomic Stability: Ranks and Scores

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Gampaha | 1 | 2 | 2 | 5 | 1 | 2.506 | 2.303 | 2.568 | 0.644 | 0.471 |
| Kalutara | 2 | 3 | 4 | 25 | 19 | 2.315 | 1.378 | 1.222 | -0.252 | 0.057 |
| Colombo | 3 | 1 | 1 | 1 | 5 | 2.056 | 2.690 | 2.776 | 1.395 | 0.324 |
| Kurunegala | 4 | 4 | 3 | 2 | 16 | 1.082 | 1.369 | 1.345 | 0.813 | 0.138 |
| Ratnapura | 5 | 7 | 7 | 13 | 13 | 0.259 | 0.197 | 0.172 | 0.357 | 0.146 |
| Galle | 6 | 8 | 6 | 12 | 12 | 0.241 | 0.192 | 0.242 | 0.360 | 0.200 |
| Nuwara Eliya | 7 | 6 | 9 | 6 | 24 | 0.144 | 0.364 | 0.082 | 0.539 | -0.086 |
| Kandy | 8 | 5 | 5 | 3 | 14 | 0.044 | 0.377 | 0.329 | 0.737 | 0.143 |
| Badulla | 9 | 10 | 10 | 10 | 15 | 0.012 | 0.074 | 0.062 | 0.412 | 0.139 |
| Anuradhapura | 10 | 9 | 8 | 7 | 17 | -0.018 | 0.181 | 0.096 | 0.537 | 0.082 |
| Hambantota | 11 | 13 | 15 | 23 | 22 | -0.032 | -0.283 | -0.467 | 0.098 | 0.004 |
| Matara | 12 | 11 | 12 | 11 | 23 | -0.110 | -0.038 | -0.235 | 0.412 | -0.008 |
| Puttalam | 13 | 14 | 11 | 15 | 6 | -0.241 | -0.314 | -0.150 | 0.267 | 0.298 |
| Trincomalee | 14 | 21 | 25 | 24 | 18 | -0.275 | -0.836 | -0.955 | -0.215 | 0.063 |
| Matale | 15 | 12 | 19 | 9 | 25 | -0.370 | -0.191 | -0.623 | 0.426 | -0.203 |
| Moneragala | 16 | 18 | 14 | 22 | 7 | -0.417 | -0.602 | -0.447 | 0.114 | 0.284 |
| Batticaloa | 17 | 19 | 17 | 21 | 8 | -0.468 | -0.641 | -0.520 | 0.135 | 0.260 |
| Ampara | 18 | 20 | 18 | 20 | 10 | -0.495 | -0.680 | -0.573 | 0.145 | 0.252 |
| Polonnaruwa | 19 | 17 | 20 | 14 | 21 | -0.549 | -0.525 | -0.673 | 0.272 | 0.033 |
| Jaffna | 20 | 16 | 13 | 8 | 11 | -0.607 | -0.388 | -0.291 | 0.478 | 0.235 |
| Kegalle | 21 | 15 | 16 | 4 | 20 | -0.800 | -0.352 | -0.504 | 0.705 | 0.044 |
| Vavuniya | 22 | 22 | 21 | 16 | 9 | -0.963 | -0.937 | -0.812 | 0.225 | 0.259 |
| Mullaitivu | 23 | 24 | 22 | 18 | 3 | -1.091 | -1.104 | -0.862 | 0.176 | 0.356 |
| Killinochchi | 24 | 23 | 23 | 17 | 4 | -1.097 | -1.085 | -0.873 | 0.202 | 0.332 |
| Mannar | 25 | 25 | 24 | 19 | 2 | -1.124 | -1.150 | -0.910 | 0.170 | 0.357 |
| Mean | | | | | | 0 | 0 | 0 | 0.366 | 0.167 |
| SD | | | | | | 1 | 1 | 1 | 0.339 | 0.158 |

## Table 4. Government and Institutional Setting: Ranks and Scores

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Colombo | 1 | 1 | 10 | 1 | 25 | 2.219 | 2.646 | 0.343 | 2.872 | -2.545 |
| Gampaha | 2 | 2 | 11 | 2 | 24 | 2.188 | 2.607 | 0.312 | 2.842 | -2.523 |
| Anuradhapura | 3 | 6 | 7 | 13 | 21 | 1.410 | 0.658 | 0.913 | 0.472 | -0.549 |
| Kurunegala | 4 | 3 | 2 | 5 | 22 | 1.254 | 1.087 | 1.578 | 1.328 | -0.655 |
| Ratnapura | 5 | 9 | 3 | 24 | 7 | 1.027 | 0.235 | 1.218 | -0.053 | -0.078 |
| Kalutara | 6 | 5 | 19 | 3 | 23 | 0.480 | 0.704 | -0.826 | 1.514 | -1.342 |
| Kegalle | 7 | 11 | 9 | 25 | 6 | 0.462 | -0.167 | 0.410 | -0.054 | -0.066 |
| Kandy | 8 | 4 | 5 | 6 | 20 | 0.439 | 0.722 | 1.112 | 1.294 | -0.523 |
| Galle | 9 | 10 | 1 | 23 | 9 | 0.242 | -0.156 | 1.649 | -0.014 | -0.092 |
| Badulla | 10 | 7 | 6 | 7 | 16 | 0.054 | 0.346 | 1.102 | 0.998 | -0.232 |
| Polonnaruwa | 11 | 18 | 18 | 20 | 17 | -0.098 | -0.463 | -0.693 | 0.217 | -0.258 |
| Matara | 12 | 16 | 8 | 22 | 8 | -0.153 | -0.449 | 0.760 | -0.002 | -0.083 |
| Puttalam | 13 | 13 | 15 | 10 | 19 | -0.175 | -0.241 | -0.328 | 0.646 | -0.304 |
| Ampara | 14 | 12 | 13 | 9 | 15 | -0.218 | -0.206 | -0.037 | 0.674 | -0.201 |
| Batticaloa | 15 | 17 | 17 | 12 | 13 | -0.452 | -0.461 | -0.474 | 0.526 | -0.165 |
| Nuwara Eliya | 16 | 14 | 16 | 8 | 18 | -0.471 | -0.320 | -0.436 | 0.679 | -0.274 |
| Hambantota | 17 | 20 | 12 | 21 | 5 | -0.494 | -0.705 | 0.087 | 0.006 | -0.046 |
| Jaffna | 18 | 8 | 4 | 4 | 10 | -0.538 | 0.340 | 1.157 | 1.429 | -0.106 |
| Moneragala | 19 | 15 | 14 | 11 | 12 | -0.616 | -0.446 | -0.302 | 0.566 | -0.127 |
| Trincomalee | 20 | 21 | 20 | 16 | 11 | -0.729 | -0.725 | -0.899 | 0.395 | -0.117 |
| Matale | 21 | 19 | 21 | 14 | 14 | -0.784 | -0.685 | -0.974 | 0.461 | -0.186 |
| Vavuniya | 22 | 22 | 22 | 15 | 4 | -1.179 | -0.913 | -1.113 | 0.436 | -0.026 |
| Killinochchi | 23 | 23 | 23 | 17 | 1 | -1.271 | -1.092 | -1.431 | 0.294 | -0.012 |
| Mannar | 24 | 24 | 24 | 18 | 2 | -1.292 | -1.140 | -1.527 | 0.254 | -0.013 |
| Mullaitivu | 25 | 25 | 25 | 19 | 3 | -1.305 | -1.173 | -1.601 | 0.226 | -0.018 |
| Mean | | | | | | 0 | 0 | 0 | 0.720 | -0.422 |
| SD | | | | | | 1 | 1 | 1 | 0.793 | 0.697 |

## Table 5. Financial, Business & Manpower Conditions: Ranks and Scores

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Colombo | 1 | 1 | 1 | 1 | 18 | 3.695 | 3.824 | 3.774 | 0.892 | -0.009 |
| Kalutara | 2 | 3 | 3 | 15 | 22 | 1.397 | 1.179 | 0.792 | 0.288 | -0.101 |
| Gampaha | 3 | 2 | 2 | 8 | 9 | 1.368 | 1.310 | 1.541 | 0.432 | 0.172 |
| Nuwara Eliya | 4 | 6 | 4 | 14 | 15 | 0.710 | 0.523 | 0.598 | 0.295 | 0.026 |
| Trincomalee | 5 | 16 | 21 | 24 | 11 | 0.428 | -0.479 | -0.631 | -0.047 | 0.124 |
| Anuradhapura | 6 | 4 | 6 | 7 | 20 | 0.236 | 0.579 | 0.324 | 0.474 | -0.053 |
| Batticaloa | 7 | 15 | 18 | 21 | 12 | 0.122 | -0.431 | -0.462 | 0.096 | 0.117 |
| Galle | 8 | 14 | 17 | 20 | 14 | 0.009 | -0.266 | -0.457 | 0.202 | 0.051 |
| Matale | 9 | 8 | 23 | 11 | 25 | -0.030 | 0.069 | -1.006 | 0.370 | -0.337 |
| Mullaitivu | 10 | 23 | 5 | 25 | 1 | -0.066 | -0.850 | 0.435 | -0.091 | 0.679 |
| Hambantota | 11 | 12 | 20 | 17 | 19 | -0.080 | -0.257 | -0.582 | 0.230 | -0.013 |
| Polonnaruwa | 12 | 5 | 11 | 2 | 24 | -0.126 | 0.566 | -0.084 | 0.600 | -0.185 |
| Vavuniya | 13 | 13 | 13 | 16 | 8 | -0.150 | -0.258 | -0.191 | 0.271 | 0.180 |
| Killinochchi | 14 | 24 | 7 | 23 | 2 | -0.294 | -0.914 | 0.304 | 0.011 | 0.657 |
| Puttalam | 15 | 11 | 10 | 12 | 7 | -0.298 | -0.188 | -0.039 | 0.345 | 0.207 |
| Moneragala | 16 | 19 | 12 | 19 | 5 | -0.338 | -0.501 | -0.113 | 0.218 | 0.258 |
| Mannar | 17 | 20 | 8 | 18 | 3 | -0.431 | -0.584 | 0.252 | 0.228 | 0.491 |
| Badulla | 18 | 7 | 9 | 3 | 13 | -0.482 | 0.108 | 0.114 | 0.583 | 0.093 |
| Ampara | 19 | 25 | 22 | 22 | 4 | -0.565 | -1.060 | -0.849 | 0.075 | 0.279 |
| Kurunegala | 20 | 10 | 16 | 6 | 21 | -0.582 | -0.027 | -0.387 | 0.523 | -0.054 |
| Kandy | 21 | 9 | 14 | 4 | 17 | -0.649 | -0.012 | -0.259 | 0.566 | 0.021 |
| Ratnapura | 22 | 18 | 15 | 13 | 10 | -0.667 | -0.496 | -0.374 | 0.316 | 0.135 |
| Jaffna | 23 | 21 | 19 | 9 | 6 | -0.876 | -0.613 | -0.540 | 0.431 | 0.220 |
| Kegalle | 24 | 22 | 24 | 10 | 16 | -1.161 | -0.734 | -1.035 | 0.411 | 0.024 |
| Matara | 25 | 17 | 25 | 5 | 23 | -1.171 | -0.488 | -1.126 | 0.548 | -0.128 |
| Mean | | | | | | 0 | 0 | 0 | 0.331 | 0.114 |
| SD | | | | | | 1 | 1 | 1 | 0.227 | 0.237 |

## Table 6. Quality of Life & Infrastructure Development: Ranks and Scores

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Gampaha | 1 | 2 | 2 | 21 | 20 | 1.725 | 1.906 | 1.728 | 0.118 | 0.104 |
| Colombo | 2 | 1 | 1 | 18 | 18 | 1.514 | 1.943 | 1.880 | 0.215 | 0.124 |
| Kandy | 3 | 4 | 3 | 23 | 14 | 1.066 | 0.897 | 0.984 | 0.116 | 0.170 |
| Kalutara | 4 | 7 | 5 | 24 | 9 | 0.956 | 0.754 | 0.815 | 0.078 | 0.224 |
| Galle | 5 | 3 | 4 | 9 | 22 | 0.800 | 1.353 | 0.969 | 0.400 | 0.014 |
| Kurunegala | 6 | 5 | 8 | 14 | 21 | 0.764 | 0.836 | 0.739 | 0.300 | 0.038 |
| Kegalle | 7 | 9 | 10 | 22 | 8 | 0.671 | 0.330 | 0.393 | 0.117 | 0.231 |
| Matara | 8 | 6 | 6 | 12 | 12 | 0.512 | 0.826 | 0.807 | 0.361 | 0.208 |
| Anuradhapura | 9 | 13 | 11 | 25 | 5 | 0.478 | -0.161 | 0.344 | 0.032 | 0.395 |
| Jaffna | 10 | 11 | 15 | 20 | 15 | 0.438 | 0.075 | -0.254 | 0.177 | 0.133 |
| Hambantota | 11 | 8 | 9 | 11 | 19 | 0.230 | 0.538 | 0.425 | 0.365 | 0.116 |
| Matale | 12 | 12 | 17 | 17 | 23 | 0.121 | -0.007 | -0.555 | 0.216 | -0.063 |
| Puttalam | 13 | 19 | 13 | 19 | 4 | 0.071 | -0.443 | 0.151 | 0.194 | 0.458 |
| Ratnapura | 14 | 10 | 12 | 6 | 6 | -0.045 | 0.200 | 0.326 | 0.437 | 0.334 |
| Polonnaruwa | 15 | 15 | 14 | 15 | 10 | -0.121 | -0.173 | -0.209 | 0.291 | 0.224 |
| Vavuniya | 16 | 14 | 16 | 8 | 13 | -0.322 | -0.166 | -0.382 | 0.418 | 0.190 |
| Trincomalee | 17 | 21 | 18 | 16 | 7 | -0.327 | -0.972 | -0.633 | 0.262 | 0.333 |
| Badulla | 18 | 20 | 23 | 13 | 25 | -0.329 | -0.597 | -1.106 | 0.309 | -0.149 |
| Ampara | 19 | 17 | 22 | 4 | 24 | -0.409 | -0.392 | -1.057 | 0.449 | -0.126 |
| Mannar | 20 | 16 | 7 | 7 | 1 | -0.427 | -0.274 | 0.773 | 0.421 | 0.865 |
| Nuwara Eliya | 21 | 18 | 19 | 10 | 16 | -0.432 | -0.430 | -0.647 | 0.378 | 0.131 |
| Batticaloa | 22 | 24 | 20 | 5 | 2 | -0.965 | -1.403 | -0.989 | 0.438 | 0.530 |
| Moneragala | 23 | 22 | 21 | 3 | 11 | -1.536 | -1.189 | -1.024 | 0.726 | 0.215 |
| Killinochchi | 24 | 23 | 24 | 2 | 3 | -1.850 | -1.385 | -1.141 | 0.879 | 0.497 |
| Mullaitivu | 25 | 25 | 25 | 1 | 17 | -2.582 | -2.066 | -2.340 | 0.972 | 0.124 |
| Mean | | | | | | 0 | 0 | 0 | 0.347 | 0.213 |
| SD | | | | | | 1 | 1 | 1 | 0.232 | 0.221 |

### 5.2.1 Education

Education and experience are the key determinants of human capital development and upward social mobility. Educational disparities, therefore, need close attention. For education, after considering a number of indicators we settled down to three comprehensive measures: 1. Basic level is measured by the literacy rate, 2. Intermediate level is measured by the proportion of students qualified for GCE (A/L) in the cohort of students who sat for at least 5 subjects in GCE (O/L), and 3. Tertiary level is measured by the proportion of students admitted to university from the cohort of eligible students with 3 passes in GCE (A/L). The second and third measures capture the effects of student-teacher ratio, teacher qualifications and quality of teaching and motivation and dedication of students.

The summary statistics in Table 2 and scatter plots of Figure 10 show strong progressive convergence of the districts over both 2012-16 and 2016-19 periods though the numbers indicate some differences. Nevertheless, what is most noteworthy is that the standard ranking of the districts has remained very similar in 2012, 2016, and 2019 with Colombo at the top and Nuwara Eliya at the bottom (Figure 11). Badulla and Monaragala are also systematically at the bottom. It is worth examining Table 7 scores closely. The standard scores of Colombo are substantially higher than the rest indicating the privilege position Colombo enjoys despite various policy measures such as the district quota system in university admissions.

**Figure 10. District convergence/divergence 2016, 2019 in Education**

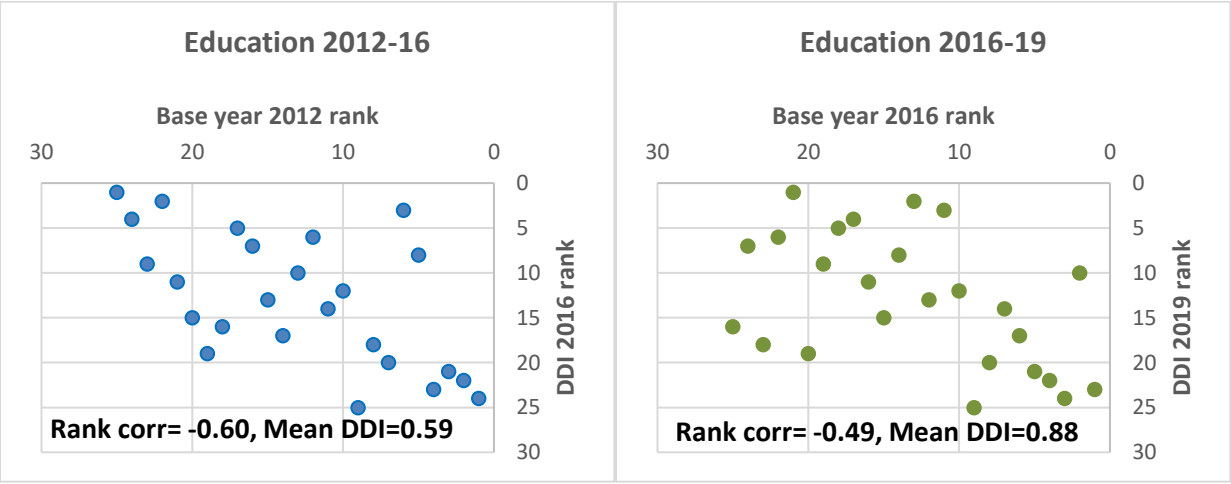
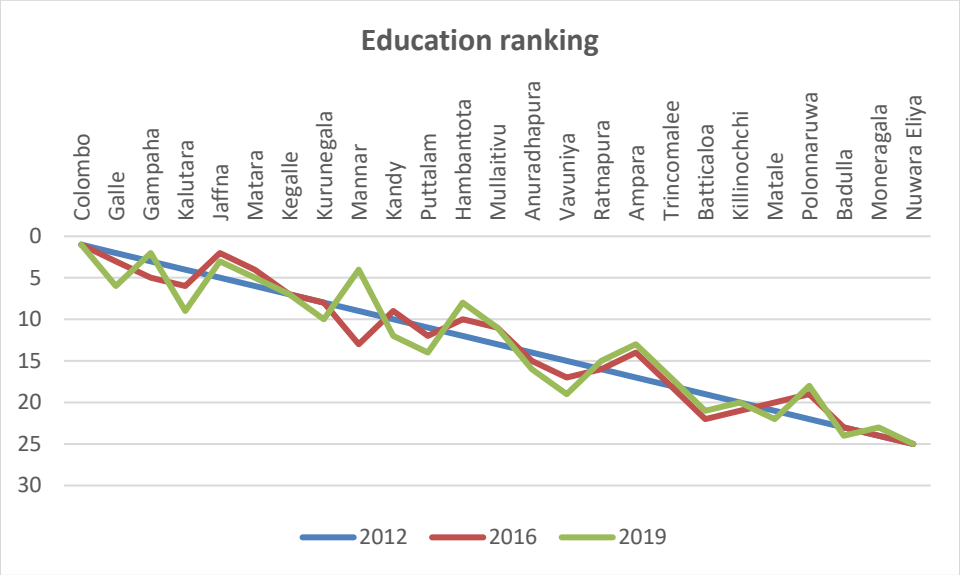


**Figure 11. District ranks on education 2012, 2016, 2019**



## Table 7. Education: Ranks and Scores

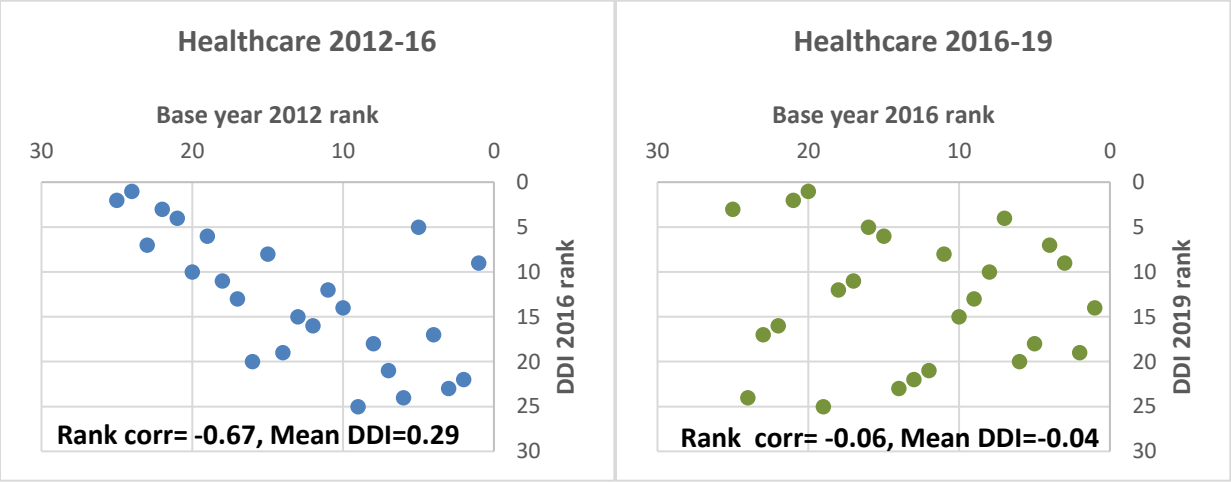
| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Colombo | 1 | 1 | 1 | 24 | 23 | 2.402 | 2.210 | 2.021 | 0.217 | 0.506 |
| Galle | 2 | 3 | 6 | 22 | 24 | 1.531 | 1.394 | 0.895 | 0.358 | 0.474 |
| Gampaha | 3 | 5 | 2 | 21 | 21 | 1.280 | 1.239 | 1.155 | 0.376 | 0.549 |
| Kalutara | 4 | 6 | 9 | 23 | 17 | 1.005 | 0.682 | 0.549 | 0.255 | 0.628 |
| Jaffna | 5 | 2 | 3 | 8 | 10 | 1.000 | 1.475 | 1.138 | 0.720 | 0.865 |
| Matara | 6 | 4 | 5 | 3 | 22 | 0.744 | 1.249 | 1.036 | 0.847 | 0.543 |
| Kegalle | 7 | 7 | 7 | 20 | 14 | 0.540 | 0.413 | 0.792 | 0.404 | 0.723 |
| Kurunegala | 8 | 8 | 10 | 18 | 20 | 0.471 | 0.411 | 0.512 | 0.482 | 0.607 |
| Mannar | 9 | 13 | 4 | 25 | 2 | 0.407 | -0.215 | 1.137 | 0.182 | 1.836 |
| Kandy | 10 | 9 | 12 | 12 | 25 | 0.209 | 0.363 | 0.045 | 0.638 | 0.408 |
| Puttalam | 11 | 12 | 14 | 14 | 13 | 0.147 | 0.136 | -0.217 | 0.568 | 0.744 |
| Hambantota | 12 | 10 | 8 | 6 | 12 | 0.073 | 0.330 | 0.657 | 0.765 | 0.794 |
| Mullaitivu | 13 | 11 | 11 | 10 | 3 | 0.041 | 0.281 | 0.476 | 0.704 | 1.583 |
| Anuradhapura | 14 | 15 | 16 | 17 | 15 | -0.141 | -0.237 | -0.310 | 0.511 | 0.667 |
| Vavuniya | 15 | 17 | 19 | 13 | 4 | -0.345 | -0.506 | -0.659 | 0.616 | 1.330 |
| Ratnapura | 16 | 16 | 15 | 7 | 11 | -0.414 | -0.310 | -0.266 | 0.722 | 0.848 |
| Ampara | 17 | 14 | 13 | 5 | 8 | -0.425 | -0.222 | -0.155 | 0.769 | 0.881 |
| Trincomalee | 18 | 18 | 17 | 16 | 5 | -0.429 | -0.570 | -0.379 | 0.525 | 1.270 |
| Batticaloa | 19 | 22 | 21 | 19 | 6 | -0.718 | -1.193 | -1.150 | 0.465 | 1.222 |
| Killinochchi | 20 | 21 | 20 | 15 | 1 | -0.922 | -1.171 | -0.713 | 0.561 | 1.937 |
| Matale | 21 | 20 | 22 | 11 | 19 | -0.981 | -1.038 | -1.170 | 0.640 | 0.614 |
| Polonnaruwa | 22 | 19 | 18 | 2 | 9 | -1.018 | -0.619 | -0.627 | 0.932 | 0.866 |
| Badulla | 23 | 23 | 24 | 9 | 18 | -1.201 | -1.264 | -1.484 | 0.710 | 0.626 |
| Moneragala | 24 | 24 | 23 | 4 | 7 | -1.350 | -1.265 | -1.276 | 0.774 | 0.900 |
| Nuwara Eliya | 25 | 25 | 25 | 1 | 16 | -1.904 | -1.573 | -2.007 | 0.986 | 0.655 |
| Mean | | | | | | 0 | 0 | 0 | 0.589 | 0.883 |
| SD | | | | | | 1 | 1 | 1 | 0.214 | 0.417 |

### 5.2.2 Healthcare

For a comprehensive coverage of healthcare related aspects, we need a large number of indicators. We use only seven indicators that can account for both quantity and quality (see Appendix 2). Standard variables like the number of patients per physician and the number of patients per nurse are quantity indicators. The ratio of number of specialists to total medical officers account for quality. The Infant Mortality Rate (IMR) is one of the best indicators of development of a country or a subnational region. It represents both the mother's health and the quality of the healthcare system. In Sri Lanka the IMR is measured based on the place of occurrence, not based on the place of residence. As a result, the IMR is higher in districts with major hospitals, districts like Colombo, Kandy, Jaffna, Batticaloa, Kurunegala, Anuradhapura. This is problematic. Given the importance of this measure, instead of throwing it away we resorted to suing an adjusted IMR (see Appendix 1 Section 3). In addition, we also use variables like availability of drinking water and toilets among our indicators.

Table 8 shows the ranks and scores. Although the standard ranking in years 2012, 2016, 2019 jump around quite bit, it worth noticing the districts that stay at the top and the bottom. Figure 12 shows strong progressive convergence in the period 2012-16. This, however, weakens in the period 2016-19.

**Figure 12. District convergence/divergence 2016, 2019 in Healthcare**



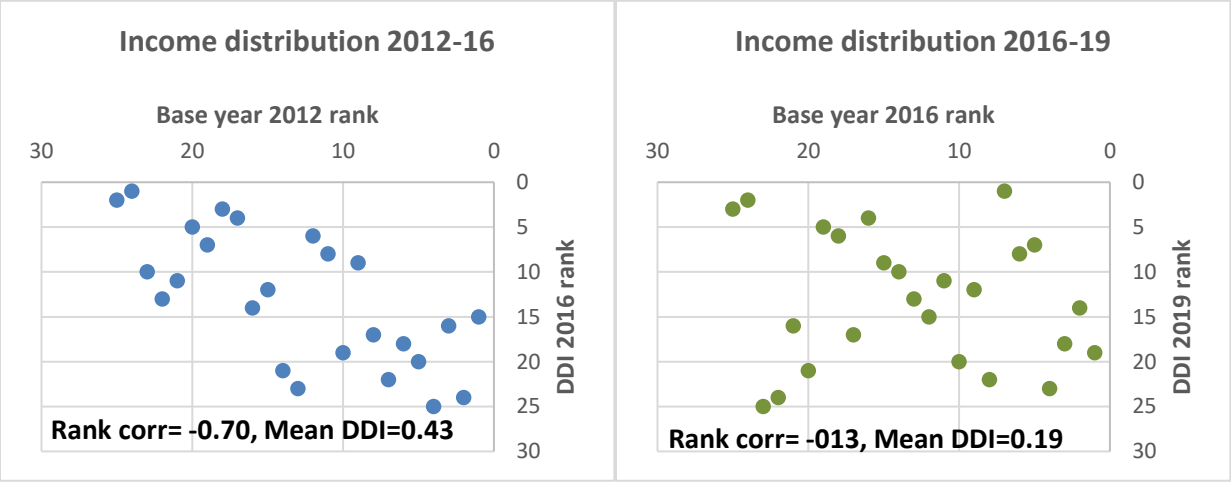
## Table 8. Healthcare: Ranks and Scores

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Colombo | 1 | 1 | 1 | 9 | 14 | 1.302 | 2.310 | 2.082 | 0.299 | -0.060 |
| Gampaha | 2 | 3 | 4 | 22 | 9 | 1.219 | 1.191 | 1.186 | -0.055 | 0.042 |
| Kandy | 3 | 4 | 2 | 23 | 7 | 1.056 | 0.886 | 1.269 | -0.062 | 0.154 |
| Kalutara | 4 | 5 | 6 | 17 | 18 | 0.728 | 0.773 | 0.640 | 0.079 | -0.126 |
| Galle | 5 | 2 | 3 | 5 | 19 | 0.611 | 1.503 | 1.244 | 0.432 | -0.235 |
| Ratnapura | 6 | 11 | 9 | 24 | 8 | 0.591 | 0.088 | 0.329 | -0.112 | 0.064 |
| Kegalle | 7 | 17 | 13 | 21 | 11 | 0.396 | -0.133 | 0.083 | -0.047 | -0.016 |
| Jaffna | 8 | 9 | 16 | 18 | 13 | 0.388 | 0.178 | -0.253 | 0.029 | -0.025 |
| Ampara | 9 | 24 | 24 | 25 | 24 | 0.301 | -1.286 | -2.002 | -0.239 | -0.444 |
| Matara | 10 | 8 | 7 | 14 | 10 | 0.234 | 0.322 | 0.544 | 0.212 | 0.009 |
| Badulla | 11 | 6 | 12 | 12 | 20 | 0.231 | 0.487 | 0.088 | 0.243 | -0.363 |
| Trincomalee | 12 | 22 | 20 | 16 | 16 | 0.179 | -0.816 | -0.503 | 0.099 | -0.077 |
| Kurunegala | 13 | 14 | 19 | 15 | 23 | 0.132 | -0.043 | -0.466 | 0.197 | -0.396 |
| Nuwara Eliya | 14 | 18 | 17 | 19 | 12 | 0.123 | -0.343 | -0.260 | 0.022 | -0.023 |
| Hambantota | 15 | 7 | 5 | 8 | 4 | 0.100 | 0.367 | 0.851 | 0.314 | 0.274 |
| Mannar | 16 | 20 | 8 | 20 | 1 | 0.056 | -0.456 | 0.475 | 0.016 | 0.499 |
| Matale | 17 | 13 | 21 | 13 | 22 | 0.025 | 0.016 | -0.524 | 0.214 | -0.380 |
| Anuradhapura | 18 | 16 | 10 | 11 | 5 | -0.045 | -0.120 | 0.239 | 0.273 | 0.205 |
| Polonnaruwa | 19 | 10 | 14 | 6 | 15 | -0.112 | 0.152 | 0.017 | 0.416 | -0.075 |
| Puttalam | 20 | 21 | 11 | 10 | 2 | -0.205 | -0.662 | 0.184 | 0.275 | 0.484 |
| Batticaloa | 21 | 15 | 15 | 4 | 6 | -0.243 | -0.090 | -0.141 | 0.560 | 0.168 |
| Vavuniya | 22 | 12 | 18 | 3 | 21 | -0.529 | 0.078 | -0.336 | 0.762 | -0.372 |
| Moneragala | 23 | 23 | 22 | 7 | 17 | -0.885 | -1.119 | -0.913 | 0.406 | -0.121 |
| Killinochchi | 24 | 19 | 23 | 1 | 25 | -2.228 | -0.358 | -1.799 | 1.648 | -0.565 |
| Mullaitivu | 25 | 25 | 25 | 2 | 3 | -3.424 | -2.925 | -2.035 | 1.160 | 0.435 |
| | | | | | | 0 | 0 | 0 | 0.286 | -0.038 |
| | | | | | | 1 | 1 | 1 | 0.411 | 0.289 |

### 5.2.3 Income Distribution

Income distribution results based on seven indicators (see Appendix 2) are shown in Table 9. Standard ranking of districts on income distribution does not show a systematic pattern in the three years, 2012, 2016, and 2019. Nevertheless, districts of the Western province are in general the best performers and the districts in Uva province (Badulla, Moneragala), Eastern province (Batticoloa) and Northern province (Killinochchi, Mullaitivu) are systematically the worst performers. If income distribution is measured purely on the basis of income, we expect these districts to have a more equal distribution because of the spread of low income households in these districts. It is the indicators of poverty count that we included in our analysis that place these districts at the bottom. Figure 13 shows progressive convergence in both periods with 2012-16 period showing stronger results.

**Figure 13. District convergence/divergence 2016, 2019 in Income Distribution**



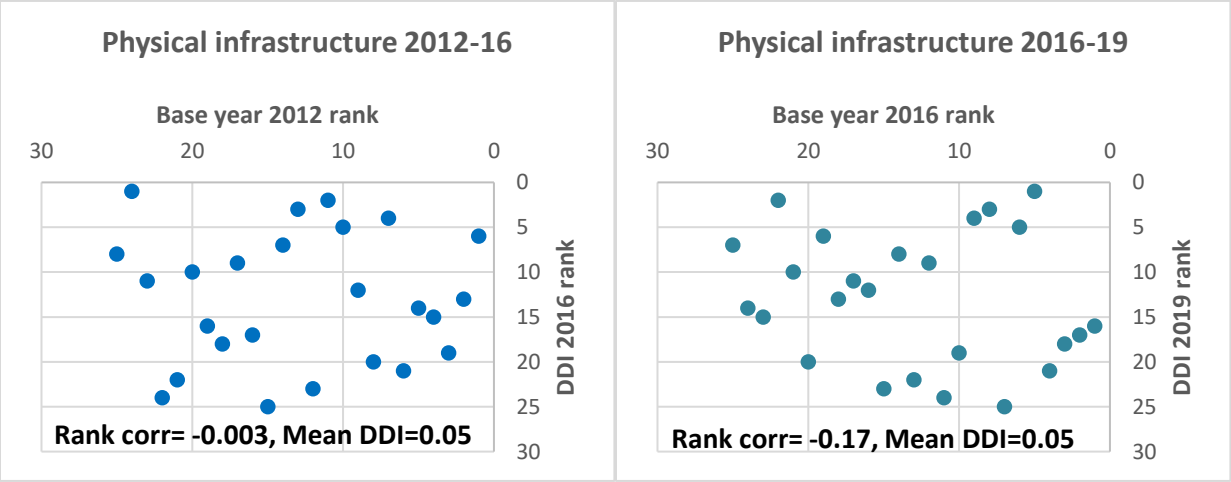
## Table 9. Income Distribution: Ranks and Scores

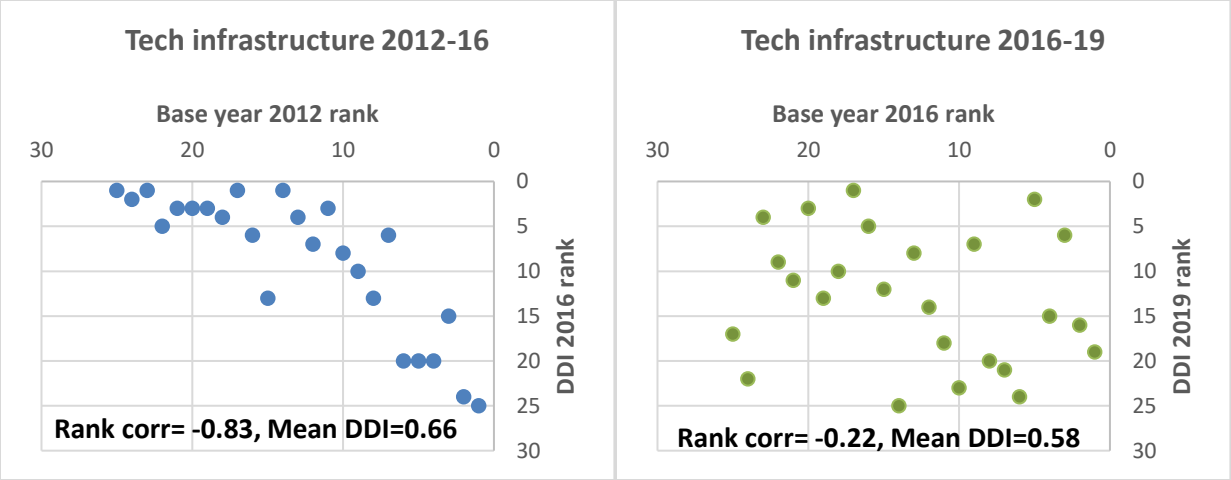
| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) | 2012 | 2016 | 2019 | DDI-2016 (Base 2012) | DDI-2019 (Base 2016) |
| Gampaha | 1 | 1 | 2 | 15 | 19 | 1.459 | 1.855 | 1.351 | 0.261 | -0.051 |
| Kalutara | 2 | 6 | 4 | 24 | 8 | 1.299 | 0.884 | 0.954 | -0.042 | 0.359 |
| Colombo | 3 | 2 | 3 | 16 | 14 | 1.122 | 1.251 | 1.222 | 0.246 | 0.080 |
| Anuradhapura | 4 | 16 | 7 | 25 | 4 | 1.115 | -0.441 | 0.448 | -0.503 | 0.543 |
| Kegalle | 5 | 11 | 8 | 20 | 11 | 0.893 | 0.444 | 0.331 | 0.044 | 0.305 |
| Matale | 6 | 10 | 16 | 18 | 20 | 0.673 | 0.494 | -0.014 | 0.177 | -0.092 |
| Polonnaruwa | 7 | 14 | 13 | 22 | 10 | 0.626 | 0.009 | 0.115 | 0.003 | 0.319 |
| Vavuniya | 8 | 9 | 11 | 17 | 12 | 0.545 | 0.524 | 0.178 | 0.200 | 0.256 |
| Matara | 9 | 5 | 5 | 9 | 7 | 0.491 | 0.915 | 0.950 | 0.473 | 0.398 |
| Kandy | 10 | 13 | 12 | 19 | 13 | 0.486 | 0.069 | 0.140 | 0.148 | 0.115 |
| Hambantota | 11 | 8 | 10 | 8 | 22 | 0.333 | 0.819 | 0.283 | 0.533 | -0.223 |
| Galle | 12 | 3 | 6 | 6 | 18 | 0.282 | 0.938 | 0.553 | 0.642 | -0.023 |
| Puttalam | 13 | 19 | 14 | 23 | 5 | 0.193 | -0.653 | 0.030 | -0.014 | 0.420 |
| Jaffna | 14 | 20 | 22 | 21 | 21 | 0.134 | -0.701 | -0.947 | 0.042 | -0.103 |
| Kurunegala | 15 | 12 | 9 | 12 | 15 | 0.128 | 0.210 | 0.305 | 0.452 | 0.067 |
| Trincomalee | 16 | 18 | 17 | 14 | 6 | -0.183 | -0.518 | -0.130 | 0.365 | 0.419 |
| Ampara | 17 | 4 | 15 | 4 | 23 | -0.229 | 0.930 | -0.003 | 0.911 | -0.446 |
| Mannar | 18 | 7 | 1 | 3 | 1 | -0.286 | 0.861 | 2.025 | 0.954 | 1.472 |
| Nuwara Eliya | 19 | 17 | 23 | 7 | 17 | -0.563 | -0.504 | -1.028 | 0.566 | -0.022 |
| Ratnapura | 20 | 15 | 18 | 5 | 9 | -0.661 | -0.038 | -0.186 | 0.850 | 0.341 |
| Badulla | 21 | 22 | 24 | 11 | 24 | -0.822 | -1.350 | -2.035 | 0.454 | -0.688 |
| Killinochchi | 22 | 24 | 19 | 13 | 2 | -1.224 | -1.911 | -0.595 | 0.436 | 1.018 |
| Batticaloa | 23 | 25 | 20 | 10 | 3 | -1.270 | -1.946 | -0.631 | 0.472 | 0.926 |
| Moneragala | 24 | 21 | 21 | 1 | 16 | -2.249 | -0.710 | -0.790 | 1.605 | 0.034 |
| Mullaitivu | 25 | 23 | 25 | 2 | 25 | -2.288 | -1.433 | -2.528 | 1.375 | -0.719 |
| Mean | | | | | | 0 | 0 | 0 | 0.426 | 0.188 |
| SD | | | | | | 1 | 1 | 1 | 0.460 | 0.491 |

### 5.2.4 Infrastructure

Indicators we use for Physical Infrastructure and Technological Infrastructure (see Appendix 2) do not provide a comprehensive coverage. Moreover, indicators like road density are not quality adjusted and population density and road density require optimal ranges. Given these shortcomings we do not provide a detailed account of Infrastructure. For the sake of completeness, Figure 14 shows the scatter plots of the DDIs over 2012-16 and 2016-19 periods. Physical Infrastructure does not show much progressive convergence over the two periods. However, technological Infrastructure shows stronger progressive convergence over the period 2012-16. Somewhat weaker progressive convergence over the period 2016-19 is understandable. As the use of TVs, computers, mobile phones and other household tech items come to saturation points what happens next would be quality improvements. We do not have sufficient data to obtain quality-adjusted indicators.

**Figure 14. District convergence/divergence 2016, 2019 in Infrastructure**






### 5.2.5 Labour market

Labour market conditions include two sub-groups, labour market flexibility and labour productivity (see Appendix 2). We will discuss the latter in detail in the next section. We do not have good indicators to reflect on labour market flexibility. Nevertheless, we use six indicators, labor force participation rate, unemployment rate, economically active male and female population, proportion of workers who worked 50 or more hours per week, and a wage proxy to represent general labour market conditions. The negative rank correlations in Figure 15 indicate some convergence in both periods but in the period 2016-19 it is more convergence than progress. Table 10 shows the ranks and scores.

**Figure 15. District convergence/divergence 2016, 2019 in Labour Market**

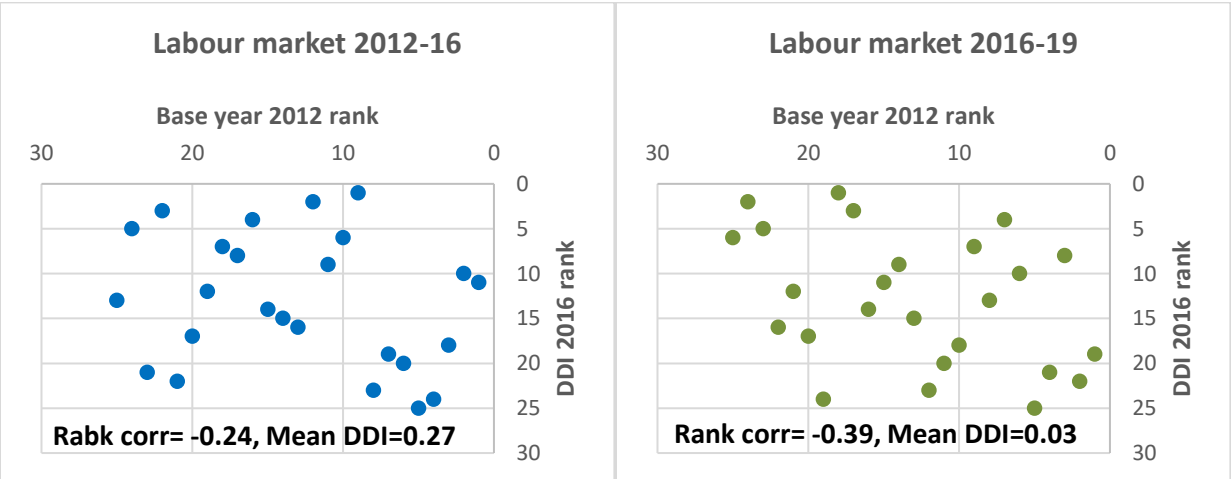


**Table 10. Labour market conditions: Ranks and Scores**

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2016 | 2019 | DDI 2016 (Base 2012) | DDI 2019 (Base 2016) | 2012 | 2016 | 2019 | DDI 2016 (Base 2012) | DDI 2019 (Base 2016) |
| Colombo | 1 | 1 | 1 | 11 | 19 | 2.471 | 2.334 | 1.920 | 0.297 | -0.147 |
| Gampaha | 2 | 3 | 3 | 10 | 8 | 1.206 | 1.261 | 1.383 | 0.330 | 0.087 |
| Anuradhapura | 3 | 6 | 4 | 18 | 10 | 1.082 | 0.961 | 1.236 | 0.212 | 0.065 |
| Moneragala | 4 | 17 | 9 | 24 | 3 | 0.804 | -0.219 | 0.435 | -0.195 | 0.242 |
| Nuwara Eliya | 5 | 18 | 2 | 25 | 1 | 0.692 | -0.333 | 1.425 | -0.230 | 0.682 |
| Badulla | 6 | 8 | 10 | 20 | 13 | 0.675 | 0.261 | 0.326 | 0.066 | 0.042 |
| Ratnapura | 7 | 9 | 8 | 19 | 7 | 0.563 | 0.253 | 0.560 | 0.106 | 0.088 |
| Kegalle | 8 | 15 | 12 | 23 | 11 | 0.556 | -0.127 | -0.005 | -0.026 | 0.065 |
| Kalutara | 9 | 2 | 6 | 1 | 22 | 0.535 | 1.312 | 0.640 | 0.624 | -0.262 |
| Kurunegala | 10 | 5 | 11 | 6 | 25 | 0.490 | 0.999 | 0.215 | 0.483 | -0.352 |
| Puttalam | 11 | 7 | 5 | 9 | 4 | 0.448 | 0.605 | 1.141 | 0.340 | 0.239 |
| Polonnaruwa | 12 | 4 | 7 | 2 | 21 | 0.252 | 1.044 | 0.598 | 0.618 | -0.196 |
| Matale | 13 | 12 | 19 | 16 | 23 | 0.110 | -0.038 | -0.661 | 0.222 | -0.265 |
| Galle | 14 | 13 | 15 | 15 | 15 | 0.076 | -0.063 | -0.136 | 0.225 | 0.009 |
| Hambantota | 15 | 11 | 18 | 14 | 20 | 0.067 | 0.013 | -0.396 | 0.248 | -0.149 |
| Kandy | 16 | 10 | 14 | 4 | 18 | -0.363 | 0.211 | -0.129 | 0.523 | -0.096 |
| Vavuniya | 17 | 16 | 16 | 8 | 14 | -0.499 | -0.146 | -0.201 | 0.425 | 0.020 |
| Trincomalee | 18 | 14 | 13 | 7 | 9 | -0.614 | -0.082 | -0.026 | 0.480 | 0.087 |
| Batticaloa | 19 | 20 | 20 | 12 | 17 | -0.730 | -0.671 | -0.936 | 0.280 | -0.046 |
| Mannar | 20 | 21 | 21 | 17 | 12 | -0.797 | -0.926 | -1.003 | 0.213 | 0.054 |
| Ampara | 21 | 23 | 23 | 22 | 5 | -0.879 | -1.491 | -1.361 | -0.007 | 0.188 |
| Matara | 22 | 19 | 24 | 3 | 24 | -1.285 | -0.534 | -1.524 | 0.600 | -0.347 |
| Jaffna | 23 | 25 | 25 | 21 | 6 | -1.486 | -1.977 | -1.882 | 0.046 | 0.183 |
| Mullaitivu | 24 | 22 | 22 | 5 | 16 | -1.634 | -0.967 | -1.328 | 0.496 | -0.045 |
| Killinochchi | 25 | 24 | 17 | 13 | 2 | -1.740 | -1.680 | -0.288 | 0.259 | 0.664 |
| | | | | | | 0 | 0 | 0 | 0.265 | 0.032 |
| | | | | | | 1 | 1 | 1 | 0.237 | 0.257 |

### 5.2.6 Agriculture labour productivity conundrum

Results presented in Table 2 earlier show progressive convergence in labour productivity in both industry and service sectors. This is not the case, however, in agriculture as further highlighted in Figure 16. To shed further light on this we use additional data.

**Figure 16. District convergence/divergence 2016, 2019 in Labour Productivity**

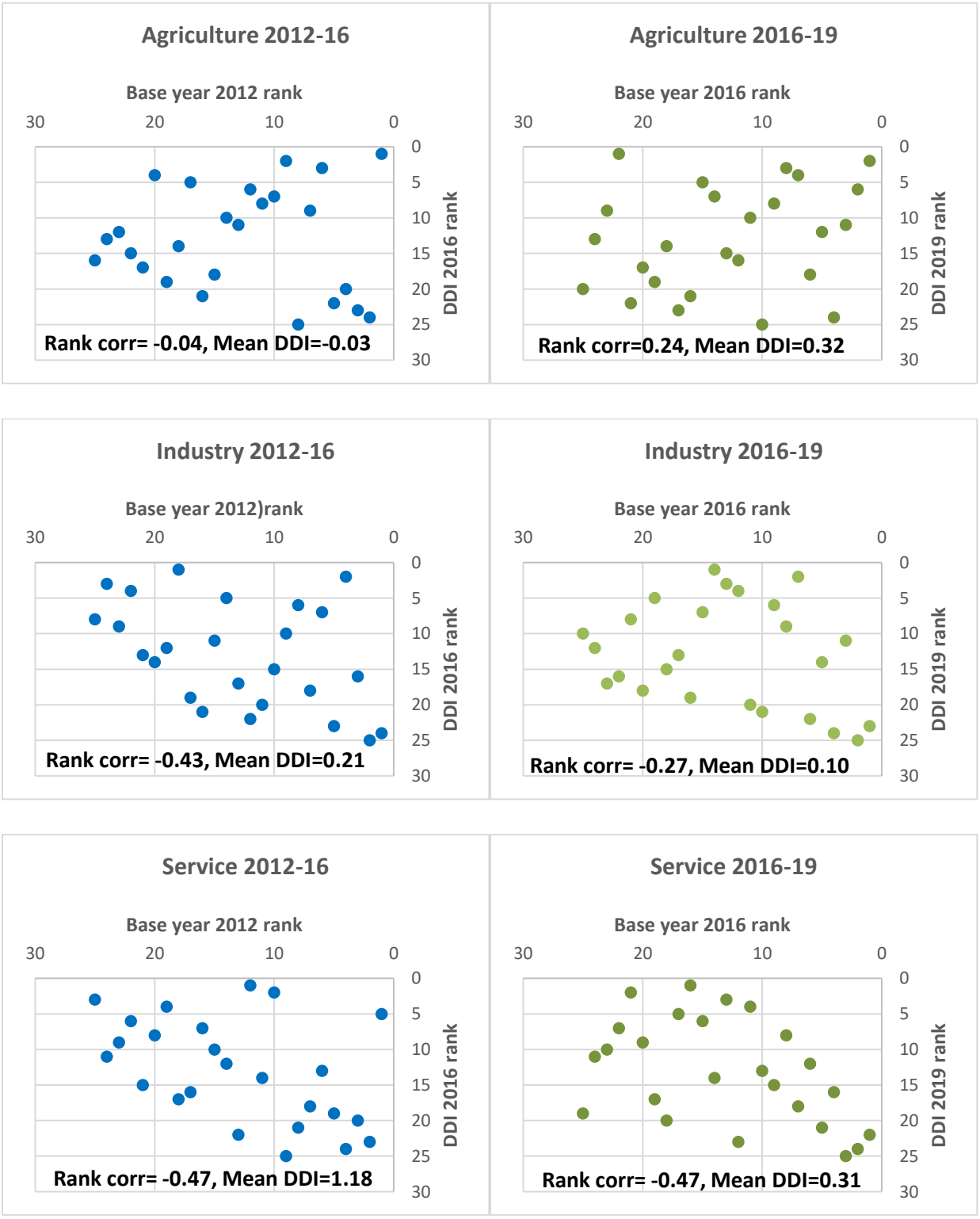
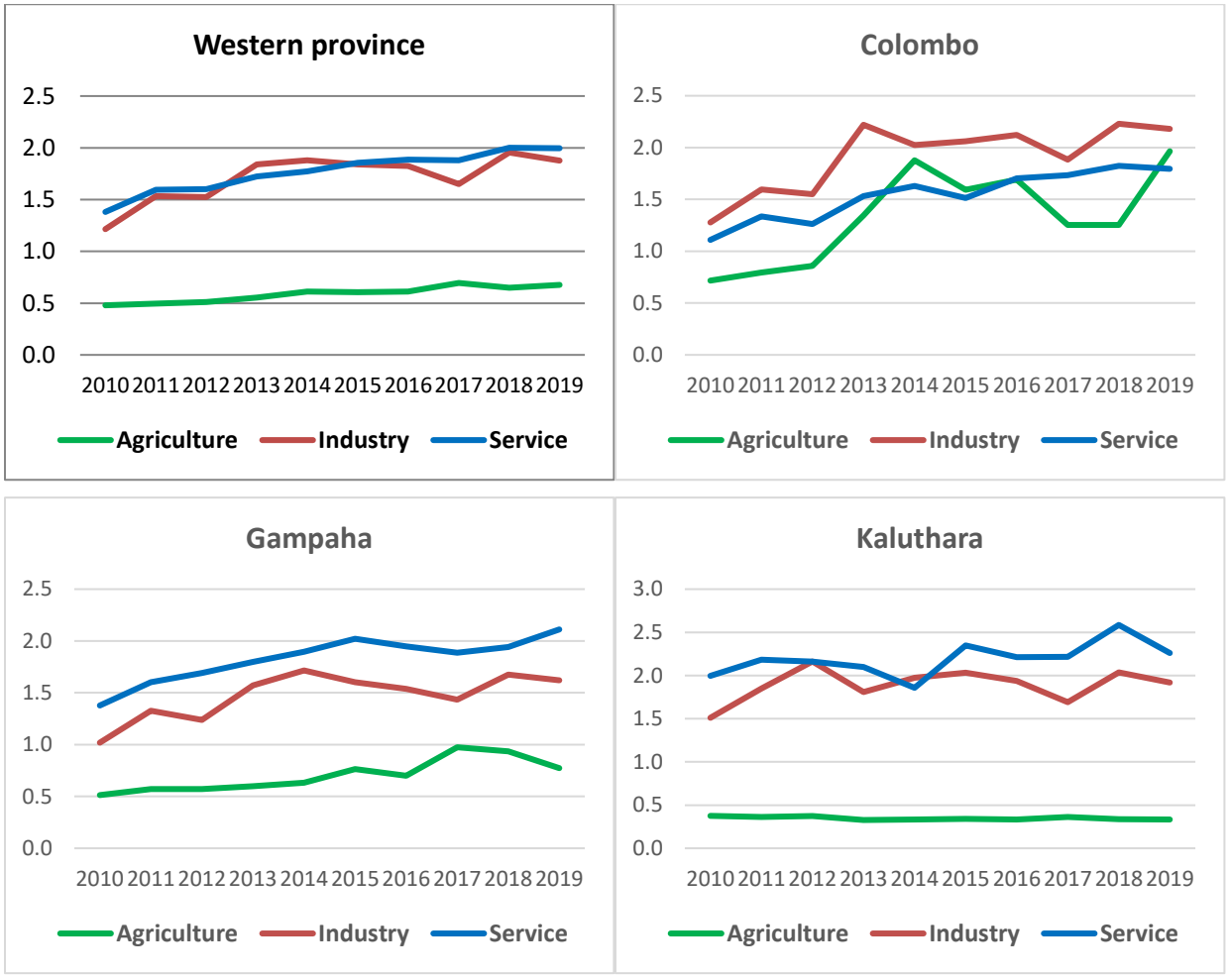
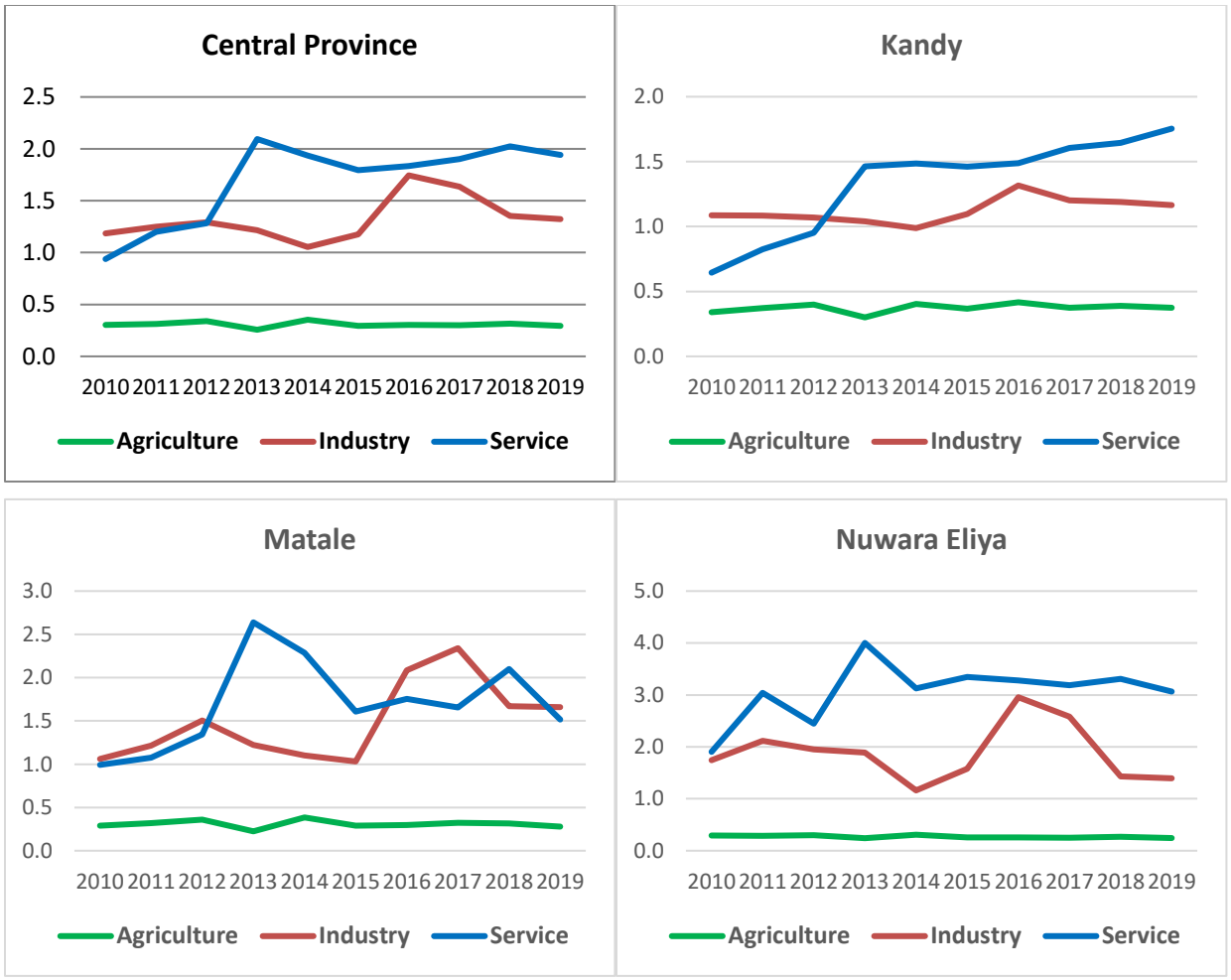


Figure 17 shows labour productivity of Agriculture, Industry, and Service sectors of the Western and Central provinces. Other provinces are not shown because their graphical appearance is roughly similar to that of the Central province. What we notice basically is the relatively very low and stagnant labour productivity of the Agriculture sector across all the districts except for Colombo and Gampaha districts. The Service sector labour productivity is in general the highest followed by the Industry sector. Figure 18 shows the labour productivity of the Agriculture sector by province and district. Except for the Western province, all the other provinces are shown with the same vertical scale for easy comparison. Northern and Eastern provinces show relatively higher labour productivity in Agriculture though substantial district level differences are present. North-Central, Uva, and Sabaragamuwa provinces show lower levels of labour productivity in Agriculture.

The key question is why the Agriculture labour productivity is not only low but also stagnant except for Colombo and Gampaha districts. It is unlikely that it is the lack of productivity enhancing factors such as land, water, technical knowhow etc. that has led to lower labour productivity in Agriculture. The problem seems to lie in the pricing of the agricultural products. The aggregate output or value added is obtained using prevailing prices and then deflated to obtain the constant price output or value added. Measured in value terms, labour productivity measure is nothing but an alternative measure of per-capita income (Abeysinghe, 2020). Low and stagnant labour productivity, therefore, means that the agricultural workers are not getting income levels comparable to Service and Industry workers because the agricultural products are priced lower. The rising agricultural labour productivity in the Colombo district and the Gampaha district to some extent is indicative that the farmers in other districts are not getting a price comparable to Industry and Service sectors. Further thoughts on this are provided in Section 7.

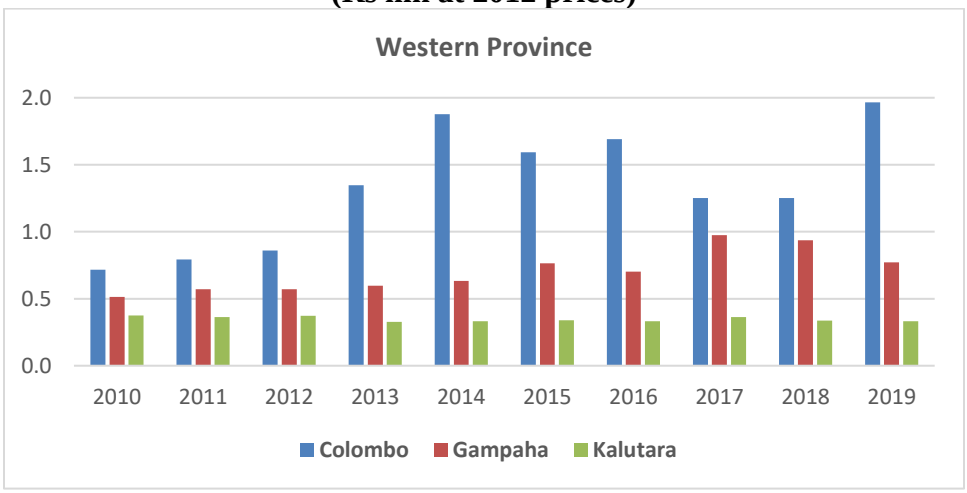
**Figure 17. Labour productivity by major sector of Western and Central provinces (Rs mn at 2012 prices)**

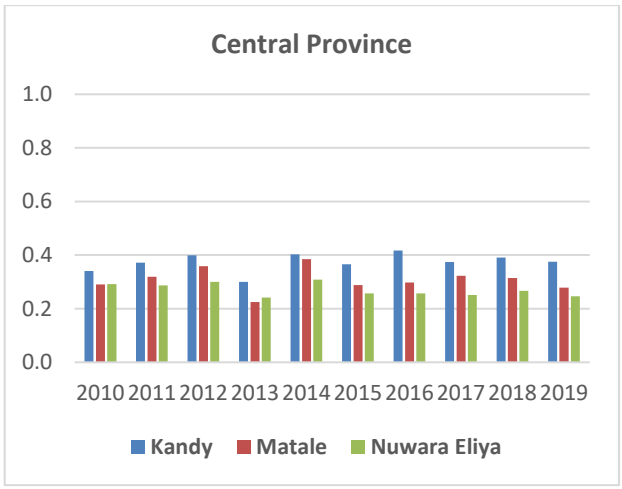


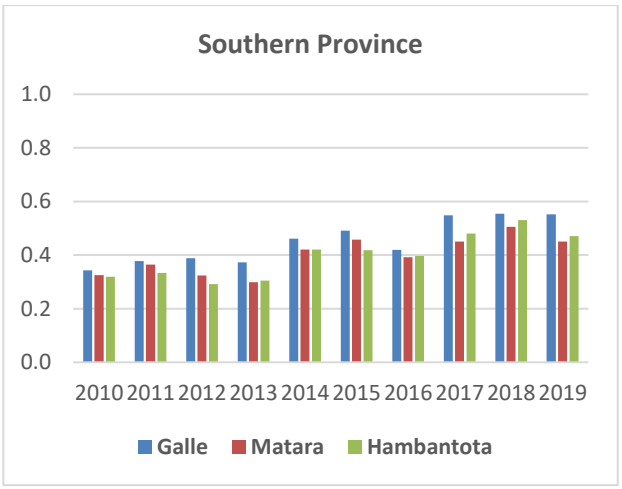


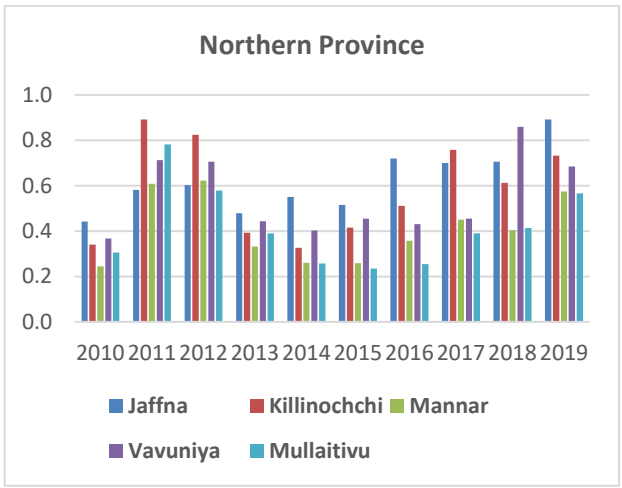

Note: Graphical appearance of other provinces is roughly similar to the Central privince.

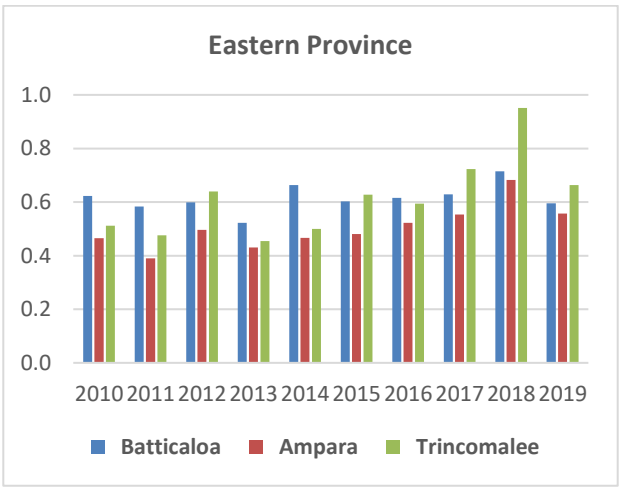
**Figure 18. Labour productivity of the Agriculture sector by province and district (Rs mn at 2012 prices)**

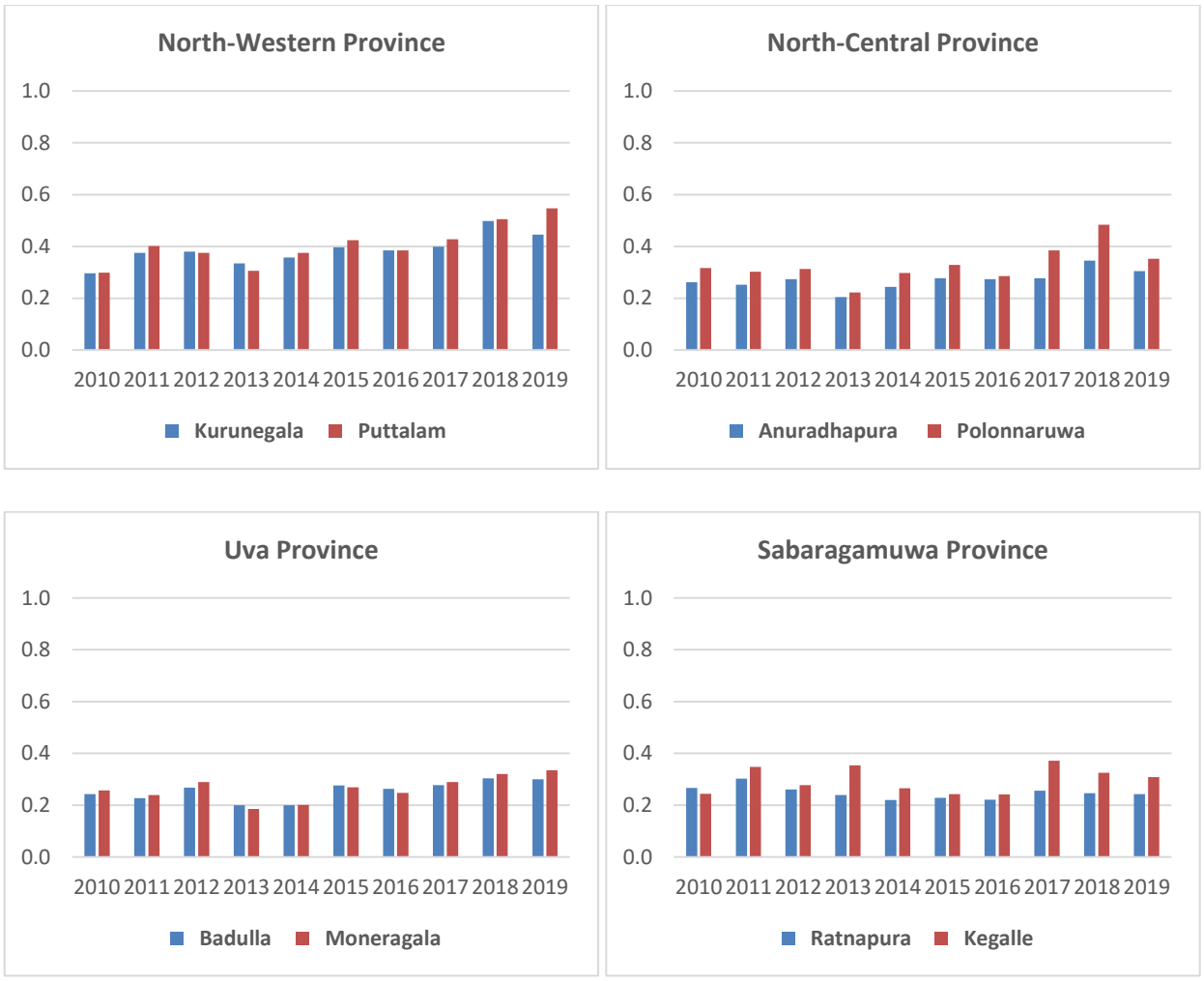




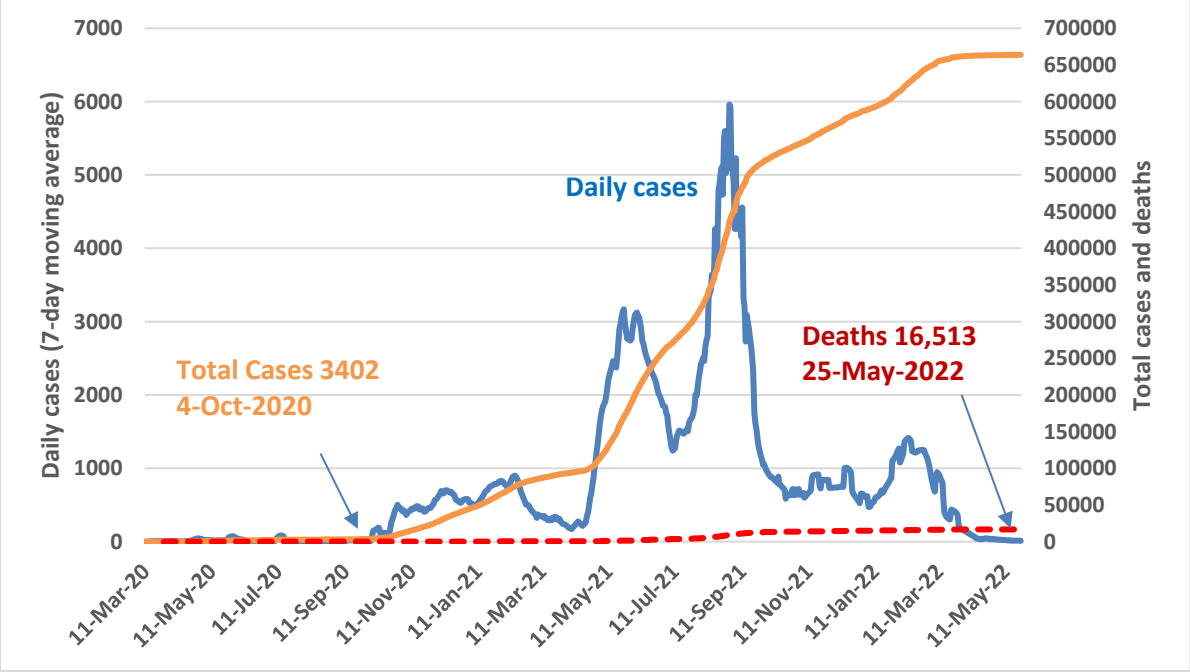

Note: For easy comparison, verticle scale is kept the same for all the provinces except for the Western province.
Source: Authors' calculations.

# 6. Covid-19 pandemic and economic crisis

## 6.1 Pandemic 2020, 2021

Figure 19 shows the unfolding of Covid-19 waves until the daily reported cases started to taper off in Apr-May 2022. The first wave (Mar 11 – Oct 4, 2020) is not visible in the graph because of the dominance of the subsequent waves. (The first case, a Chinese tourist, was detected on Jan 27 2020.) The government contained the first wave in a very impressive manner; the total number of cases by Oct 4 2020 was only 3402 with 13 deaths. However, the subsequent Covid-19 waves emerged with vengeance and the efficacy of managing them got somewhat compromised for various reasons including the fatigue on the part of the care providers. The government started Covid-19 vaccinations in Feb 2021. By May 2022, 97% of the eligible population had received the first dose, 82% the second dose, and 55% the booster dose (Presidential Secretariate online.) This is an impressive achievement for a low-income country. The pandemic control measures and other relief measures had a heavy impact on the government coffers.

**Figure 19. Covid-19 waives (daily cases left scale), total cases and deaths (right scale) (11-Mar-2020 to 25-May-2022)**




Data source: University of Oxford: https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker

Prolonged lockdowns and curfew, both regional and island-wide, to contain the pandemic tattered the livelihood of many. The economy (GDP) contracted by 3.6% in 2020 and rebounded by 3.7% in 2021; rebound is over the low base in 2020. As we know, however, this rebound does not shed light on the living conditions of the most vulnerable segments of the population. There is already a large literature online showing that the pandemic measures have widened the income and wealth gap in many countries.[6] In this regard, Quality of Life sub-environment would be the most informative. Unfortunately, we do not have the data to make a good assessment on how the pandemic and the ensuing crisis affected the quality of life. Nor do we have data for a full analysis either at the district level or the provincial level under all the sub-environments. With some effort, however, we managed to work out district level data under Macroeconomic Stability.[7] These results and fiscal operations at the provincial level are presented in the following two sub-sections.

### 6.1.1 Macroeconomy at district level

Figure 20 plots the growth rate of per capita district GRDP for 2020 and 2021. The contraction in per capita district GRDP in 2020 is lot more pronounced than the 3.6% contraction of overall GDP. Matara, Trincomalee, Anuradhapura, and Polonnaruwa record notable positive growth rates. Jaffna and Rathnapura show very small positive growth rates. Preliminary estimates for 2021 indicate that there was not much improvement in growth rates (2021 growth rates fluctuate around zero). These results are indicative of a drastic fall in income levels of the lower income groups.

Figure 21 shows the scatter plot of DDI-2020 and DDI-2021 under macroeconomic stability against the base year 2019. Visually the scatter plots do not show a relationship between ranks of the base year and that of DDIs. However, rank correlations show a negative relationship. Combined with negative Mean DDIs, these results indicate regressive convergence of districts, which is of course not a desirable outcome. Ranks and scores are in Table 11. The standard ranks

[6] A summary of an IMF study 'The pandemic will leave the poor further disadvantaged' is at https://www.weforum.org/agenda/2020/05/pandemics-poor-rich-economics-coronavirus-covid19.

[7] We used the methods given in Appendix 1 to compile district level data from provincial data for 2020. For 2021 we predicted district GDP by first predicting the right hand side variables by fitting AR(1) models. For population we assumed that the 2021 proportion is the same as 2020 and then worked out district level data from provincial population data.

are roughly similar across all the three years. It should be noted that 2019 itself is a bad year because of the Easter bombing on Apr 21, 2019. DDI-2020 shows that 19 districts out of the 25 are worse off (negative signs) than 2019 and DDI-2021 shows 16 are worse off than 2019.

**Figure 20. Per capita district DRGP growth (%) 2020 and 2021**

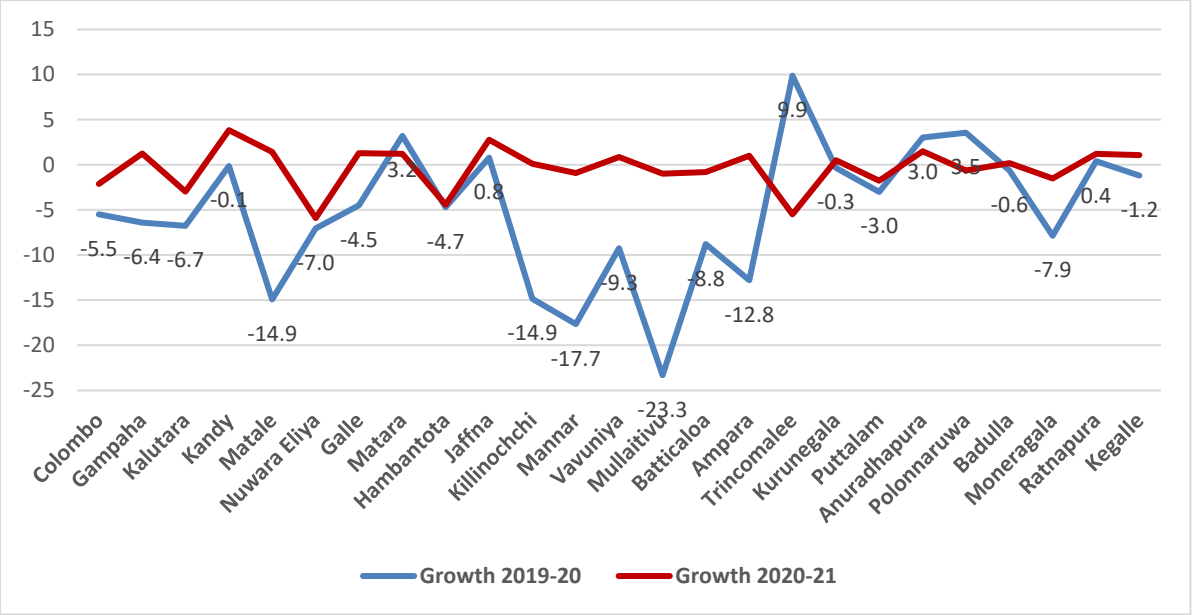



**Figure 21. District convergence/divergence in macroeconomic stability, 2020 2021**

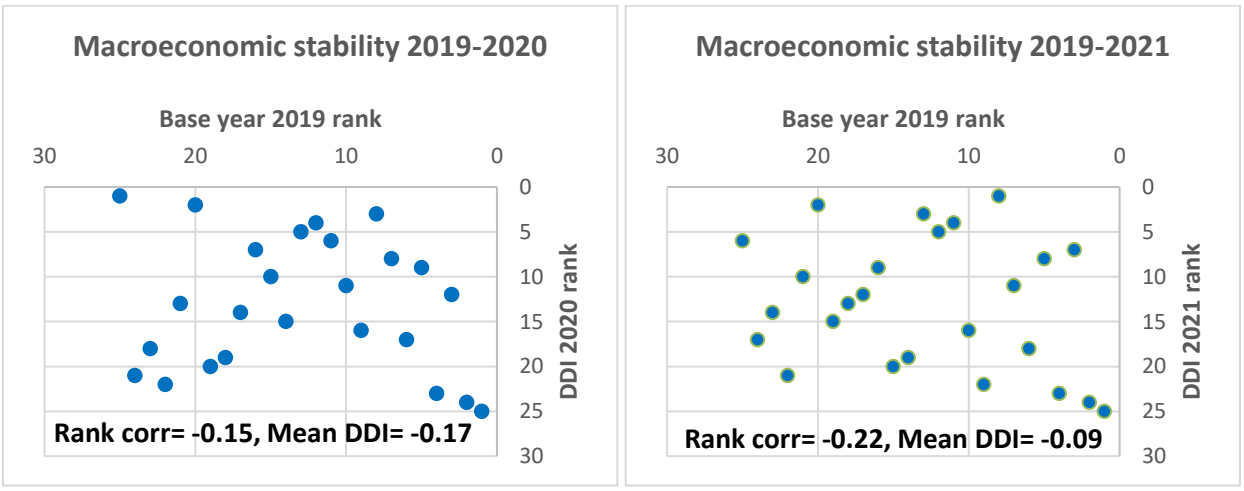


**Table 11. Macroeconomic stability 2020, 2021: Ranks and Scores**

| District | Rank | | | | | Score | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2021 | DDI 2020 (Base 2019) | DDI 2021 (Base 2019) | 2019 | 2020 | 2021 | DDI 2020 (Base 2019) | DDI 2021 (Base 2019) |
| Colombo | 1 | 1 | 2 | 25 | 25 | 2.776 | 2.447 | 2.301 | -0.735 | -0.760 |
| Gampaha | 2 | 2 | 1 | 24 | 24 | 2.568 | 2.192 | 2.554 | -0.733 | -0.583 |
| Kurunegala | 3 | 3 | 3 | 12 | 7 | 1.345 | 1.477 | 1.550 | -0.123 | 0.049 |
| Kalutara | 4 | 4 | 5 | 23 | 23 | 1.222 | 0.997 | 0.781 | -0.490 | -0.470 |
| Kandy | 5 | 6 | 4 | 9 | 8 | 0.329 | 0.551 | 0.908 | -0.072 | 0.046 |
| Galle | 6 | 9 | 8 | 17 | 18 | 0.242 | 0.161 | 0.278 | -0.212 | -0.122 |
| Ratnapura | 7 | 7 | 7 | 8 | 11 | 0.172 | 0.384 | 0.342 | -0.059 | -0.052 |
| Anuradhapura | 8 | 5 | 6 | 3 | 1 | 0.096 | 0.558 | 0.586 | 0.158 | 0.256 |
| Nuwara Eliya | 9 | 12 | 18 | 16 | 22 | 0.082 | 0.001 | -0.656 | -0.203 | -0.296 |
| Badulla | 10 | 8 | 10 | 11 | 16 | 0.062 | 0.182 | 0.038 | -0.086 | -0.088 |
| Puttalam | 11 | 11 | 12 | 6 | 4 | -0.150 | 0.048 | -0.129 | 0.010 | 0.100 |
| Matara | 12 | 10 | 11 | 4 | 5 | -0.235 | 0.121 | 0.022 | 0.068 | 0.063 |
| Jaffna | 13 | 13 | 9 | 5 | 3 | -0.291 | -0.015 | 0.163 | 0.023 | 0.108 |
| Moneragala | 14 | 18 | 20 | 15 | 19 | -0.447 | -0.563 | -0.671 | -0.198 | -0.129 |
| Hambantota | 15 | 17 | 22 | 10 | 20 | -0.467 | -0.396 | -0.934 | -0.079 | -0.134 |
| Kegalle | 16 | 16 | 13 | 7 | 9 | -0.504 | -0.320 | -0.317 | -0.038 | 0.001 |
| Batticaloa | 17 | 19 | 17 | 14 | 12 | -0.520 | -0.654 | -0.538 | -0.188 | -0.070 |
| Ampara | 18 | 21 | 15 | 19 | 13 | -0.573 | -0.900 | -0.476 | -0.290 | -0.071 |
| Matale | 19 | 22 | 16 | 20 | 15 | -0.623 | -0.976 | -0.527 | -0.316 | -0.088 |
| Polonnaruwa | 20 | 14 | 14 | 2 | 2 | -0.673 | -0.125 | -0.381 | 0.229 | 0.231 |
| Vavuniya | 21 | 20 | 19 | 13 | 10 | -0.812 | -0.893 | -0.661 | -0.161 | -0.013 |
| Mullaitivu | 22 | 25 | 24 | 22 | 21 | -0.862 | -1.540 | -1.106 | -0.489 | -0.193 |
| Killinochchi | 23 | 23 | 21 | 18 | 14 | -0.873 | -1.191 | -0.871 | -0.288 | -0.078 |
| Mannar | 24 | 24 | 23 | 21 | 17 | -0.910 | -1.335 | -1.053 | -0.343 | -0.120 |
| Trincomalee | 25 | 15 | 25 | 1 | 6 | -0.955 | -0.211 | -1.202 | 0.329 | 0.057 |
| | | | | | | 0 | 0 | 0 | 0 | 0 |
| | | | | | | 1 | 1 | 1 | 0.260 | 0.232 |

Districts are ranked based on 2019 scores.

### 6.1.2 Fiscal operations at provincial level

Table 12(a) shows provincial level grants (from the central government) and revenue for 2018-2020. Table 12(b) shows provincial level expenditures for the same years. The percentages in year 2018 roughly reflects the pattern that existed since 2010. The years 2019 and 2020 show clear departures from this pattern. From Table 12 we can note the following observations.

Provincial governments, with the exception of the Western province, rely heavily on grants from the central government. Provincial level revenue consists mainly of fees and charges. All the tax revenue accrues to the Central Government. In the pandemic year 2020 revenue generation even in the Western province drops substantially. The percentages in the lower panel of Table 12(a) shows this shift clearly.

Table 12(b) shows the drastic drop in capital expenditure across all the provinces in 2019 and 2020. The drop in 2019 is likely to be a result of fiscal consolidation by the central government to improve its budget balance. The drop in 2020 is a result of the pandemic, the central government diverting funds to manage the pandemic.

**Table 12(a). Provincial grants from central government and revenue (Rs mn)**

| | 2018 | | | 2019 | | | 2020 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Province** | **Grants** | **Rev** | **Total** | **Grants** | **Rev** | **Total** | **Grants** | **Rev** | **Total** |
| Western | 15,472 | 47,109 | 62,581 | 18,621 | 37,026 | 55,647 | 46,322 | 24,437 | 70,759 |
| Central | 27,444 | 7,922 | 35,366 | 31,043 | 5,843 | 36,886 | 36,515 | 4,442 | 40,957 |
| Southern | 25,382 | 8,494 | 33,876 | 26,508 | 6,639 | 33,147 | 33,737 | 5,492 | 39,229 |
| Northern | 21,385 | 4,006 | 25,391 | 23,365 | 3,454 | 26,819 | 27,151 | 2,591 | 29,742 |
| Eastern | 22,632 | 3,839 | 26,471 | 23,346 | 3,090 | 26,436 | 28,796 | 2,167 | 30,963 |
| North Western | 24,263 | 8,553 | 32,816 | 26,591 | 6,770 | 33,361 | 32,130 | 5,618 | 37,748 |
| North Central | 17,155 | 3,961 | 21,116 | 18,334 | 2,659 | 20,993 | 20,664 | 2,542 | 23,206 |
| Uva | 18,651 | 3,707 | 22,358 | 21,000 | 2,784 | 23,784 | 25,206 | 2,025 | 27,231 |
| Sabaragamuwa | 23,708 | 4,030 | 27,738 | 24,745 | 3,773 | 28,518 | 27,829 | 2,930 | 30,759 |
| **All provinces** | **196,092** | **91,621** | **287,713** | **213,553** | **72,038** | **285,591** | **278,350** | **52,244** | **330,594** |
| | | | | **Percentage** | | | | | |
| Western | **24.7** | **75.3** | 100 | **33.5** | **66.5** | 100 | **65.5** | **34.5** | 100 |
| Central | 77.6 | 22.4 | 100 | 84.2 | 15.8 | 100 | 89.2 | 10.8 | 100 |
| Southern | 74.9 | 25.1 | 100 | 80.0 | 20.0 | 100 | 86.0 | 14.0 | 100 |
| Northern | 84.2 | 15.8 | 100 | 87.1 | 12.9 | 100 | 91.3 | 8.7 | 100 |
| Eastern | 85.5 | 14.5 | 100 | 88.3 | 11.7 | 100 | 93.0 | 7.0 | 100 |
| North Western | 73.9 | 26.1 | 100 | 79.7 | 20.3 | 100 | 85.1 | 14.9 | 100 |
| North Central | 81.2 | 18.8 | 100 | 87.3 | 12.7 | 100 | 89.0 | 11.0 | 100 |
| Uva | 83.4 | 16.6 | 100 | 88.3 | 11.7 | 100 | 92.6 | 7.4 | 100 |
| Sabaragamuwa | 85.5 | 14.5 | 100 | 86.8 | 13.2 | 100 | 90.5 | 9.5 | 100 |
| **All provinces** | **68.2** | **31.8** | **100** | **74.8** | **25.2** | **100** | **84.2** | **15.8** | **100** |

**Table 12(b). Provincial capital and recurrent expenditure (Rs mn)**

| | 2018 | | | 2019 | | | 2020 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Province** | **Capital** | **Recurrent** | **Total** | **Capital** | **Recurrent** | **Total** | **Capital** | **Recurrent** | **Total** |
| Western | 10,898 | 55,287 | 66,185 | 111 | 61,380 | 61,491 | 99 | 66,843 | 66,942 |
| Central | 1,922 | 32,278 | 34,200 | 249 | 37,567 | 37,816 | 202 | 39,806 | 40,008 |
| Southern | 4,939 | 29,693 | 34,632 | 2,197 | 33,314 | 35,511 | 1,993 | 37,797 | 39,790 |
| Northern | 2,373 | 22,109 | 24,482 | 265 | 24,463 | 24,728 | 255 | 26,628 | 26,883 |
| Eastern | 1,309 | 24,586 | 25,895 | 248 | 26,012 | 26,260 | 196 | 29,193 | 29,389 |
| North Western | 1,927 | 30,465 | 32,392 | 250 | 34,031 | 34,281 | 130 | 35,338 | 35,468 |
| North Central | 2,863 | 18,090 | 20,953 | 282 | 19,922 | 20,204 | 144 | 21,342 | 21,486 |
| Uva | 2,395 | 20,307 | 22,702 | 372 | 22,749 | 23,121 | 195 | 25,157 | 25,352 |
| Sabaragamuwa | 2,412 | 24,115 | 26,527 | 395 | 27,447 | 27,842 | 313 | 29,975 | 30,288 |
| **All provinces** | **31,038** | **256,930** | **287,968** | **4,369** | **286,885** | **291,254** | **3,527** | **312,079** | **315,606** |
| | | | | **Percentage** | | | | | |
| Western | 16.5 | 83.5 | 100 | 0.2 | 99.8 | 100 | 0.1 | 99.9 | 100 |
| Central | 5.6 | 94.4 | 100 | 0.7 | 99.3 | 100 | 0.5 | 99.5 | 100 |
| Southern | 14.3 | 85.7 | 100 | 6.2 | 93.8 | 100 | 5.0 | 95.0 | 100 |
| Northern | 9.7 | 90.3 | 100 | 1.1 | 98.9 | 100 | 0.9 | 99.1 | 100 |
| Eastern | 5.1 | 94.9 | 100 | 0.9 | 99.1 | 100 | 0.7 | 99.3 | 100 |
| North Western | 5.9 | 94.1 | 100 | 0.7 | 99.3 | 100 | 0.4 | 99.6 | 100 |
| North Central | 13.7 | 86.3 | 100 | 1.4 | 98.6 | 100 | 0.7 | 99.3 | 100 |
| Uva | 10.5 | 89.5 | 100 | 1.6 | 98.4 | 100 | 0.8 | 99.2 | 100 |
| Sabaragamuwa | 9.1 | 90.9 | 100 | 1.4 | 98.6 | 100 | 1.0 | 99.0 | 100 |
| **All provinces** | **9.1** | **90.9** | **100** | **1.4** | **98.6** | **100** | **1.0** | **99.0** | **100** |

Source: Central Bank

## 6.2 Crisis 2022

At the time of writing this report (Apr-May 2022) Sri Lanka is embroiled in an unprecedented economic crisis. Runaway price inflation, power cuts, long queues for fuel and gas, social unrest, political instability and violence are some manifestations of the crisis. These are all linked to one proximate factor, the severe shortage of foreign exchange, commonly referred to as the dollar crisis.

One key foreign exchange supply channel, tourism, dried up because of the pandemic. Tourist arrivals that were recovering after the Easter bombing on Apr 21, 2019 dropped to zero over Apr-Nov 2020. Although the government opened the boarders in 2021 for tourists with some restrictions, tourist arrivals did not pick up, only 194,495 tourists visited the country in 2021.

Tourist earnings dropped from USD 4.3bn in 2018 to 3.9bn in 2019, 682mn in 2020 and 507mn in 2021. Another foreign exchange supply channel is workers' remittances by Sri Lankans working overseas. Interestingly, despite some workers returning to the country during the pandemic and a substantial drop in Sri Lankans leaving for foreign employment,[8] workers' remittances held steady around USD 7bn in 2020. Anecdotal evidence suggests that the offset may have come from an increase in per head quantum of remittances that was necessitated by the hardships faced by the workers' families during the pandemic. However, in 2021 there is a substantial drop in worker remittances to USD 5.5bn, especially in the second half. The Central Bank Annual Report 2021 (Box item 6) attributes this to both a drop in departures for foreign employment and an increase in fund transfers through informal channels due exchange rate differentials in the formal and grey markets. Import expenditures far exceeding foreign exchange earnings,[9] foreign debt servicing and trying to defend the LKR against the USD led to a rapid depletion of foreign reserves of the country. As the differential between the official exchange rate and the black-market rate widened the Central Bank allowed the LKR to float in Mar 2022.

In brief, the severe shortage of foreign exchange caused substantial delays in essential imports. Shortage of fuel and draught conditions affected electricity generation (both thermal and hydro) leading to daily power cuts. Domestic inflationary pressure increased due to supply shortages and demand pressures further aggravated by easy monetary policy (printing money). Imported inflationary pressure increased due to rising oil and other prices in the world market, further aggravated by the Russian war in Ukraine, that was made worse by the depreciation of the domestic currency, especially since Mar 2022. Pent-up pressure erupted in social unrest.

All these developments have to be examined within a broader historical context. It is not just bad luck caused by the Covid-19 pandemic, environmental disaster by the chemical laden X-press Pearl ship breaking down in June 2021 near the Colombo harbour, and droughts and floods but also structural. Sparks of the crisis stayed dormant for decades. Heavy winds of the Covid-19 pandemic and other bad luck events simply exposed the sparks.

[8] Registrations at the Bureau of Foreign Employment have dropped from 203,087 in 2019 to 53,875 in 2020.
[9] Substantial import restrictions the government imposed did not help much.

Figure 22 highlights the key contributory factors that led to the crisis. Panels (a) and (b) show Sri Lanka's twin deficits. Weerakoon et al. (2019) provide a detailed account of the evolution of the twin deficits after 1970. Their empirical analysis suggests that it is the budget deficit that drives the current account deficit, at least in the Sri Lankan context. Figure 21 shows that the demarcation year of persistent twin deficits is 1956.[10] The Sri Lankan welfare state, though started even before independence, was consolidated after 1956 by the center-left ruling parties (Jayasuriya, 2000). Welfare reforms involve heavy political costs and as a result even the center-right parties after 1977 continued with the welfare policies. Obviously, the welfare programs made Sri Lanka an admirable example of a low-income country with development indicators comparable to high-income countries (Abeysinghe, 2021).[11]

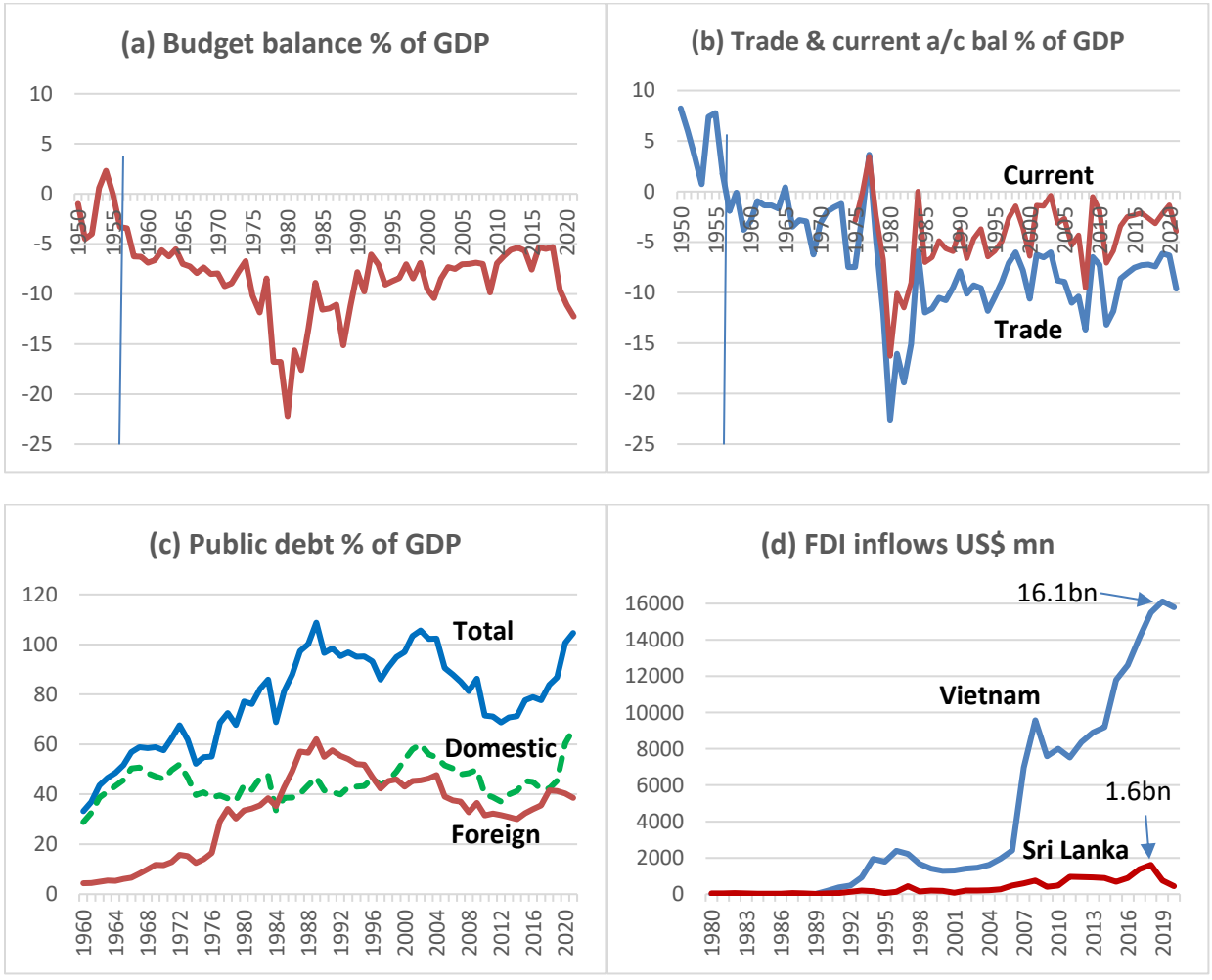
Nevertheless, perpetual twin deficits simply show a classic case of living beyond one's means, not just for a short while but for more than 65 years. This was made possible by the easy availability of loans to the government, both domestic and foreign, Panel (c).[12] What has been going on, therefore, is 'borrow and consume' instead of 'borrow and invest'. As a result, further borrowing is needed for debt servicing leading to a situation of 'debt begets debt' (Abeysinghe, 2021). In government recurrent expenditure, interest payment is the largest expenditure component, more than 38% in both 2020 and 2021.

To make the matters worse, Foreign Direct Investment (FDI) inflows to Sri Lanka has been negligibly small. Panel (d) shows the contrast between Sri Lanka and Viet Nam. Viet Nam policy reforms occurred in 1986 when there was virtually no FDI inflows to Viet Nam, but just within four years FDI inflows jumped to USD 180mn. This increased steadily to reach USD 16.1bn in 2019. In contrast, Sri Lanka policy reforms occurred in 1977 and received only USD 40mn per year between 1979 and 1990. Between 1991 and 2005 there was some increase but stood below USD 200mn per year. Some increase in FDI inflows occur after 2005 but well below expectations, USD 540mn per year over 2005-2010 and a further increase after 2010 to reach USD 1.6bn by 2018, then a substantial drop in 2019 as a result of Easter bombing and the pandemic in 2020.

[10] The only exception was 1977 when trade and current accounts recorded a surplus.
[11] Broadly speaking, Sri Lankan social welfare includes, universal free education, universal free healthcare, universal food subsidy (substantially modified and replaced with means tested cash payments), pension schemes, housing for houseless and land for landless.
[12] In 2021 government foreign debt stood at USD 50.7bn and domestic debt at USD 55.8bn.

Political stability and policy continuity is a key factor in attracting FDI. The LTTE war in Sri Lanka over 1983-2009 may have deterred foreign investors. However, even after 2009 Sr Lanka failed to attract FDI inflows comparable to many other Asian countries. Politically motivated protests against foreign investments in Sri Lanka creates an atmosphere of policy uncertainty. China is an important contrast. China attracts the largest amount of FDI in Asia. Starting with no FDI in 1978 when policy reforms were introduced, FDI inflows to China reached USD 141bn in 2019 and 149bn in 2020. The pandemic did not deter the FDI inflows to China. What these success stories illustrate is that private investors do not care whether the political regime is dictatorial or democratic, investors care more about policy certainty.

**Figure 22. Sri Lanka twin deficits, public debt and FDI inflows**




Data sources: Panels (a)-(c) Central Bank and Peebles (1982). Panel (d) UN/UNCTAD World Investment Report | Annex Tables (unctad.org) May 27 2022.

# 7. Further thoughts and some recommendations

District level disparities summarized in the previous sections will not be repeated here. However, we want to draw specific attention to three areas, Agriculture labour productivity, FDI, and resilient exports earnings.

*Agriculture labour productivity*: Since aggregate output is measured in constant-price value terms, persistently low agriculture labour productivity across the districts indicates that the incomes of famers and other agricultural workers are lower than that of industrial and service sector workers. Concerted effort is needed to uplift the income levels of the agricultural workers. Subsidies and price support schemes are not sustainable. One area to consider is the role of the middleman in agriculture. Often there is a substantial difference in the price a farmer gets and the price at which the product is sold in urban areas. Anecdotally we can notice a vast difference in income levels of atomistic farmers and monopolistic middlemen in agriculture. This is where a well-designed government program is needed to remove the middleman so that farmers could get their products directly to the final destinations and receive a higher price. A well-designed program should include ways to minimize government inefficiencies. One way to minimize inefficiency is to include a performance based earnings component in the salaries of government employees. Another area to consider is export orientation of agriculture. Export-oriented agricultural products may seek a higher price. In particular, in many countries including Sri Lanka, organic agricultural products are lot more expensive than their non-organic counterparts. We will leave these as open questions for discussion.

*FDI inflows*: We have already discussed this in the previous section. It is worth drawing attention to Dr Goh Keng Swee, the first Finance Minister and the economic architect of independent Singapore. He emphasized that non-economic factors matter more than economic factors in the development process (Abeysinghe 2015).[13] Political stability and policy continuity play a key role in attracting FDI.

[13] A video clip on "Singapore's development experience: Lessons for Sri Lanka" by Abeysinghe (2018) is available at: https://www.youtube.com/results?search_query=tilak+abeysinghe .

*Resilient export earnings*: Global supply chain disruptions during the pandemic affected export industries that rely heavily on imported inputs. We noticed this in the case of textile and garment industry, a major export sector, in Sri Lanka. Import content of exports is an important consideration in developing resilient export sectors. Even tourism industry, though direct imported input content is low, is vulnerable to both internal and external shocks. We are planning to carry out a detailed study to assess the direct and indirect import content of different export categories and then come up with recommendations.

# Appendix 1: District level data: Computational methods

Although data for some indicators are available at the district level, some are available only at the provincial level. Even at the district level, some data inconsistencies resulting from changes in data collection methods or aggregation methods need fixing. Some missing values need to be estimated. The following sections describe the data adjustment methods that we followed.

## 1. District GRDP estimation from provincial data

Suppose there are 2 districts in the province. Governed by data constraints, we specify the following regression equations to split the provincial level GRDP to the two districts.

District 1: $Q_{1t} = \beta_0 z_{1t} + \beta_1 Emp_{1t} + \beta_2 Rain_{1t} + \beta_3 Exp_{1t} + \varepsilon_{1t}$ (1)

District 2: $Q_{2t} = \beta_0 z_{2t} + \beta_1 Emp_{2t} + \beta_2 Rain_{2t} + \beta_3 Exp_{2t} + \varepsilon_{2t}$ (2)

Province: $Q_t = \beta_0 + \beta_1 Emp_t + \beta_2 Rain_t + \beta_3 Exp_t + \varepsilon_t$ (3)

where $Q_t = Q_{1t} + Q_{2t}$ is nominal GRDP, $Emp_t = Emp_{1t} + Emp_{2t}$ is employment level $Rain_t = Rain_{1t} + Rain_{2t}$ is rainfall (mm), $Exp_t = Exp_{1t} + Exp_{2t}$ is government recurrent expenditure, $z_{1t}$ and $z_{2t}$ are some proportions such that $z_{1t} + z_{2t} = 1$ and $\varepsilon_t = \varepsilon_{1t} + \varepsilon_{2t}$ is the standard zero mean constant variance disturbance term.

Since GRDP ($Q_t$) is available only at the provincial level the basic regression equation to estimate is (3). Underlying this specification is a production function. Production functions like Cobb-Douglas are expressed in log-linear form for estimation with output (value added) as a function of labor and capital. We resorted to the above specification because the log transformation is not amenable for splitting the predictor variables to district level.[14] After experimenting with a number of variable combinations, we find that the above variables provide a better fit (both in terms of adjusted R-square and data plots in levels and growth rates). We estimate the model using data over the period 2010-2019. The short time span is a result of data constraints that include data

[14] For example, $\beta_1 \ln(Emp_t) = \beta_1 \ln(Emp_{1t} + Emp_{2t}) \neq \beta_1 \ln(Emp_{1t}) + \beta_1 \ln(Emp_{2t})$ .

anomalies such as population showing abrupt shifts around census years that requires further fixing.

In the specification *Emp* captures the labor variable in the production function. Initially we tried to capture the effect of skilled and low-skilled labor by using the population with tertiary level and below tertiary level education. This, however, did not provide a good fit. *Emp* may not capture the informal sector employment fully. We tried population size as a proxy for the informal sector employment; this, however, creates a collinearity problem though R-square improves. Nevertheless, the population effect on production enters through $z_{1t}$ and $z_{2t}$ in (1) and (2) that we measure using the population proportions within the province.[15] This captures the distributional effect of population within the province.

*Rain* and *Exp* are proxies for the capital variable in the production function. Agricultural production depends on the rainfall. Both the lack of rain and excessive rain are disruptive and may render a negative effect on production. If positive and negative effects offset each other, the net effect may turn zero as well. Because of the short time series, we did not try to measure these asymmetric effects. For all the provinces the Rain coefficient estimate is positive and statistically insignificant. Nevertheless, the *Exp* (recurrent expenditure) effect is positive and statistically significant. Both government recurrent and capital expenditure allocations play a critical role in development at the provincial and district level. We capture the effect of capital expenditure through the residual method as described below.

After estimating the $\beta$ coefficients from (3) we use them in (1) and (2) to predict the district level GRDP.[16] Denoting them as $\hat{Q}_{1t}$, $\hat{Q}_{2t}$ we obtain provincial level $\hat{Q}_t = \hat{Q}_{1t} + \hat{Q}_{2t}$ and provincial level residuals $R_t = Q_t - \hat{Q}_t$. We allocate $R_t / 2$ to each district so that the sum of the district level estimated GRDP matches the provincial GRDP. This equal allocation of the residual underlies the assumption that whatever is left out of (3) is common to all the districts within the province. For

[15] For this we also tried household income proportions using Household Income and Expenditure Survey (HIES) data from 2010, 2012 and 2016, linearly interpolated for the other years. This did not work well. Nevertheless, the district ranking based on GRDP estimates and household per capita income time's population remains the same.
[16] This underlies the assumption that the district level differences in GRDP arise only from the levels of the variables, not from $\beta$ coefficients.

example, government capital expenditures to develop provincial road structure and transport and some external factors such as developments in the international market fall under this category.

## 2. District level Agriculture, Industry, Service sector value added estimates from provincial data

In addition to the district level GRDP, the composition of GRDP in terms of sectoral contribution is also highly informative. To obtain sectoral value added estimates we follow the basic methodology outlined above through regressions (1), (2) and (3). However, after experimentation with a number of variable combinations we decided on the following equation at the provincial level for Agriculture and Industry sectors:

Province: $Q_t^S = \beta_0 + \beta_1 GRDP_t + \beta_1 Emp_t^S + \beta_3 Dum_t + \varepsilon_t$ (4)

where $Q_t^S$ is the sector value added in the province, GRDP is the provincial level value added from all the sectors, $Emp_t^S$ is the sector employment in the province and $Dum_t$ is a dummy variable to account for data anomalies. For example, industry value added shows an unusual level shift from 2016 onwards probably because of a change in the data enumeration method. To account for this the dummy takes value 0 over 2010-2015 and 1 from 2016 onwards. The dummy variable speciation varies and was used only when necessary. After estimating (4), the corresponding district level equations are used as in (1) and (2) to obtain the district level Agriculture and Industry value added. For $z_{1t}$ and $z_{2t}$ we use the employment proportion of the districts in the province. The same residual method described in the previous section is used to match the district sum with the provincial values. The district level Service value added is obtained by subtracting the sum of these two sectors from the district GRDP. This ensures the dual requirement that (1). The three sectors sum to district level GRDP, and (2). District sum within the province for each sector is the same as the provincial value. After estimating nominal GDP values, we convert them to constant rupee values using the overall GDP deflator by setting 2012 to the base year.

## 3. Other data adjustments

Regressions (1) and (2) need district level government recurrent expenditure (*Exp*). This is available only at the provincial level. Assuming that recurrent expenditure allocations depend largely on the population size of the district we multiply *Exp* by the district population proportion of the province to split *Exp* to district level. We applied the same method to split government capital expenditure and revenue to district level.

Annual average rainfall data over 2010-2019 was not available for eight districts. We obtained estimates for these districts using a combination of methods. If a province has three districts A, B, C and C is the district without rainfall data and if P is the average rainfall for the province then C was obtained as C = 3P-A-B. If both B and C are missing, then first obtain B = 2P-A and then C = 3P-A-B. If a district has rainfall data for some years we also used regression techniques to finetune the rainfall estimates.

Employment data, though available at the district level, shows a time series mismatch from the Labour Force Survey (LFS) 2015. A short time series of adjusted total employment (whole island) is available in the later reports. We need adjusted employment for the main sectors of Agriculture, Industry, and Service as well. The adjustment was done as follows. If employment of each sector of a given district is E1, E2, E3 and the district total is E=E1+E2+E3. We first obtained the employment shares S1=E1/E, S2=E2/E, S3=E3/E using the data in the previous reports. Then we worked out an adjustment ratio for total employment E. This is the ratio of the whole island employment of old records to new records. If this ratio is R, we obtained adjusted total employment as E_adj=E*R. Then the adjusted sector employment is obtained as E1_adj=S1*E_adj; similarly for the other two sectors.

The Infant Mortality Rate is a very important indicator that reflects both the mother's health and the quality of the healthcare system. In Sri Lanka the IMR is measured based on the place of occurrence, not based on the place of residence. This anomaly leads to misleading inference for districts with major hospitals (Colombo, Kandy, Jaffna, Batticaloa, Kurunegala, Anuradhapura). Given the importance of this measure, instead of throwing it away we resorted to suing an adjusted IMR. For this, after some experimentation we regressed log of infant deaths on log of live births, log of deaths and a dummy that takes value 1 for the above districts and 0 for others. The dummy captures the common effect on the above districts. Then we obtained the predicted infant deaths based on births and deaths (without dummy) and then worked out the IMR by dividing adjusted infant deaths by live births. Surprisingly IMR data are not available after 2015; therefore, we used the 2012 adjusted IMR for 2016 and 2019 as well. Given the low IMR in Sri Lanka variations of the adjusted IMR over these years are likely to be small.

# Appendix 2: Indicator List

| No. | Indicator | Unit | Source | Comment |
|---|---|---|---|---|
| **1. MACROECONOMIC STABILITY** | | | | |
| **1.1** | **Regional Economic Vibrancy** | | | |
| 1.1.1 | Real Gross Regional Domestic Product (GRDP) | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| 1.1.2 | Gross Regional Domestic Product per Capita | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| 1.1.3 | Agriculture GRDP | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| 1.1.4 | Industry GRDP | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| 1.1.5 | Service GRDP | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| **2. GOVERNMENT AND INSTITUTIONAL SETTING** | | | | |
| **2.1** | **Government Policies and Fiscal Sustainability** | | | |
| 2.1.1 | Government capital expenditure | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| 2.1.2 | Government recurrent expenditure | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| 2.1.3 | Government receipts (Grant and Revenue) | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |
| 2.1.4 | Budget deficit | Million Rupees (Base Year 2012) | Authors' calculation based on provincial data from the Central Bank | |

| | | | | |
|---|---|---|---|---|
| **3. FINANCIAL, BUSINESSES AND MANPOWER CONDITIONS** | | | | |
| **3.1** | **Financial Deepening and Business Efficiency** | | | |
| 3.1.1 | Bank Offices | Number | Economic and Social Statistics, Central Bank of Sri Lanka | |
| 3.1.2 | Population Served per Bank Office | Number | Economic and Social Statistics, Central Bank of Sri Lanka | Reverse Indicator |
| **3.2** | **Labor Market Flexibility** | | | |
| 3.2.1 | Labor Force Participation Rate | Percent | Department of Census and Statistics(Labor Force Survey) | |
| 3.2.2 | Unemployment Rate | Percent | Department of Census and Statistics(Labor Force Survey) | Reverse Indicator |
| 3.2.3 | Economically active population (Male) | Percent | Department of Census and Statistics(Labor Force Survey) | |
| 3.2.4 | Economically active population (Female) | Percent | Department of Census and Statistics(Labor Force Survey) | |
| 3.2.5 | Currently employed persons by Hours per week actually worked at the main job (50 & over) | Percent | Department of Census and Statistics(Labor Force Survey) | |
| 3.2.6 | Household Mean Monthly Per Capita Income | Rupees (Base Year 2012) | Department of Census and Statistics (Household Survey) | |
| **3.3** | **Productivity Performance** | | | |
| 3.3.1 | Labor productivity (Overall) | Ratio | Authors' calculation based on Department of Census and Statistics (Labor Force Survey) | |
| 3.3.2 | Labor productivity (Agriculture) | Ratio | Authors' calculation based on Department of Census and Statistics (Labor Force Survey) | |
| 3.3.3 | Labor productivity (Industry) | Ratio | Authors' calculation based on Department of Census and | |

| | | | | |
|---|---|---|---|---|
| | | | Statistics (Labor Force Survey) | |
| 3.3.4 | Labor productivity (Service) | Ratio | Authors' calculation based on Department of Census and Statistics (Labor Force Survey) | |
| **4. QUALITY OF LIFE AND INFRASTRUCTURE DEVELOPMENT** | | | | |
| **4.1** | **Physical Infrastructure** | | | |
| 4.1.1 | Population | Thousand Persons | Economic and Social Statistics, Central Bank of Sri Lanka | |
| 4.1.2 | Population Density | Persons per $km^2$ | Economic and Social Statistics, Central Bank of Sri Lanka | Reverse Indicator |
| 4.1.3 | Length of Roads | km | Economic and Social Statistics, Central Bank of Sri Lanka | Road Density is the indicator |
| 4.1.4 | Land area | $km^2$ | Economic and Social Statistics, Central Bank of Sri Lanka | |
| 4.1.5 | Distribution of Government Medical Institutions (Primary Medical Care Units) | Number | Annual Health Report of Medical Statistics | |
| 4.1.6 | Distribution of Government Medical Institutions (MOH areas) | Number | Annual Health Report of Medical Statistics Unit | |
| **4.2** | **Technological Infrastructure** | | | |
| 4.2.1 | Distribution of households, which owned Radio, Television, Personal Computers, VCD, and DVD players | Percent | Department of Census and Statistics (Household Survey) | |
| 4.2.2 | Distribution of households, which have telephone facilities by type of telephone facility (Fixed only, Mobile only & Fixed and Mobile) | Percent | Department of Census and Statistics (Household Survey) | |
| **4.3** | **Standard of Living, Education and Social Stability** | | | |
| **4.3.1** | **Income Distribution** | | | |

| | | | | |
|---|---|---|---|---|
| 4.3.1.1 | Share of Income Received (Richest 20% ) | Percent | Department of Census and Statistics (Household Survey) | Bottom Share/Top Share is the Indicator |
| 4.3.1.2 | Share of Income Received (Poorest 20% ) | Percent | Department of Census and Statistics (Household Survey) | |
| 4.3.1.3 | Gini coefficient of Mean Household Income | Ratio | Department of Census and Statistics (Household Survey) | Reverse Indicator |
| 4.3.1.4 | Average Monthly Household Expenditure on Food | Rupees (Base Year 2012) | Department of Census and Statistics (Household Survey) | NonFood exp to Food exp ratio is the Indicator |
| 4.3.1.5 | Average Monthly Household Expenditure on Non-Food | Rupees (Base Year 2012) | Department of Census and Statistics (Household Survey) | |
| 4.3.1.6 | Mean Monthly Household Per Capita Income | Rupees (Base Year 2012) | Department of Census and Statistics (Household Survey) | Median/ Mean is the Indicator |
| 4.3.1.7 | Median Monthly Household Per Capita Income | Rupees (Base Year 2012) | Department of Census and Statistics (Household Survey) | |
| 4.3.1.8 | Poverty Head Count | Percent | Department of Census and Statistics (Household Survey) | Reverse Indicator |
| 4.3.1.9 | Poor Households | Percent | Department of Census and Statistics (Household Survey) | Reverse Indicator |
| 4.3.1.10 | Population (aged 5 years and above) with No Schooling) | Percent | Department of Census and Statistics (Household Survey) | Reverse Indicator |
| 4.3.1.11 | Population (aged 5 years and above) Passed GCE O/L) | Percent | Department of Census and Statistics (Household Survey) | |
| **4.3.2** | **Healthcare** | | | |
| 4.3.2.1 | Distribution of Households by Availability of Sufficient Water for Drinking | Percent | Department of Census and Statistics (Household Survey) | |
| 4.3.2.2 | Distribution of Households by Availability of Toilet Facility | Percent | Department of Census and Statistics (Household Survey) | |
| 4.3.2.3 | Distribution of Health Personnel by Regional Director of Health Services Division (Specialists - Curative Care) | Number | Annual Health Report of Medical Statistics Unit | Specialist to total ratio is the Indicator |
| 4.3.2.4 | Distribution of Health Personnel by Regional Director of Health Services Division(Total Medical Officers) | Number | Annual Health Report of Medical Statistics Unit | |

| | | | | |
|---|---|---|---|---|
| 4.3.2.5 | Total Patients (Outpatient and Inpatients) | Number | Annual Health Report of Medical Statistics Unit | Not used directly |
| 4.3.2.6 | Total number of nurses by RDHS Division (including Ward Sister, Pupil Nurses, Matrons) | Number | Annual Health Report of Medical Statistics Unit | Nurses per patient is the Indicator |
| 4.3.2.7 | Total Hospital Beds | Number | Annual Health Report of Medical Statistics Unit | Beds per Patient is the Indicator |
| 4.3.2.8 | Infant Mortality Rate | Number of Persons | Annual Health Report of Medical Statistics Unit | Reverse Indicator |
| **4.3.3** | **Education** | | | |
| 4.3.3.1 | Literacy Rate | Percent | Department of Census and Statistics(Labor Force Survey) | |
| 4.3.3.2 | Number Sat for 5 or more subject for GCE (O/L) Examination | Number | Annual Report, Department of Examination | Ratio is the Indicator |
| 4.3.3.3 | Qualified for GCE (A/L) | Number | Annual Report, Department of Examination | |
| 4.3.3.4 | University Admission | Number | Economic and Social Statistics, Central Bank of Sri Lanka | Ratio is the Indicator |
| 4.3.3.5 | Eligible for University Entrance (Passed in 3 subjects) | Number | Annual Report, Department of Examination | |

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