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Managing Regional Income Inequality in Sri Lanka: Lessons from Japanese Experience*

Hettige Don Karunaratne**

Abstract

There are three main objectives of this study. The first is to measure the regional (provincial level) income inequality in Sri Lanka in recent past with a decomposable inequality measure. The second is to quantify the determinants of recent trends in regional income inequality in Sri Lanka. Since Japan is said to be one of the most egalitarian societies in their development path, third objective is set to review pattern of regional income inequality in Japanese development path and draw some policy implications for Sri Lanka. As the method of analysis, Theil's entropy measure "T" was computed by using provincial level GDP and employment data, and decomposed into within-region inequality and between region inequality in Sri Lanka for 1997 and 2003. Contribution made by agriculture, manufacturing and services into total inequality and regional inequality is also estimated for the same years. Regional inequality in per capita GDP as measured by the Theil T index increased from 0.2077 to 0.2313 by 11 percent from 1997 to 2003. However, as expected in the early stage of development, contribution made by between-sector component to regional income inequality has increased from 30 percent in 1997 to 56 percent in 2003. This situation may have generated through high growth in "employment-lacked" western province-based serviced sector in Sri Lanka and slow growth in manufacturing and services sectors in other regions. Even though regional inequality level was relatively high in Japan soon after the World War II, it has reached to the lowest in late 1970s owing to implementation of land reform policies, substantial government subsidies on agricultural sector, high government intervention in regional infrastructure development and promotion of export oriented enterprises in various regions. Finally, this study stresses the importance of role of government in planning, implementing and monitoring in regional inequality in the development path of Sri Lanka. Inherent multi-ethnicity of the society and unusual service sector growth in the urban economy highlight importance of government role in managing regional inequality in Sri Lanka.

Keywords: Sri Lanka, Income Inequality, Regional Disparity, GDP by Province, Employment by Province

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1. Introduction

Regional income inequality has been increasing in Sri Lanka during the past few decades. The Western Province of Sri Lanka represented 5.7 percent of the total land area and 28 percent of the total population in 2005. According to national income statistics published by the Central Bank of Sri Lanka, the Western Province contribution to the Gross Domestic Product (GDP) increased from 43 percent in 1996 to almost 50 percent in 2005. Meanwhile, contribution made by three other provinces together, namely Sabaragamuwa, Central, and Uva to the total GDP decreased from 24 percent to 19 percent. The contribution made by war-affected provinces, namely Northern and Eastern provinces to the GDP has been remaining at stagnant level during the period under consideration. Even though national level GDP per capita income of Sri Lanka was US \$ 948 in 2003, the corresponding figure for the Western Province was US \$1471.

In addition, over 70 percent of the GDP growth rate (5.4 percent and 6.0 percent in 2004 and 2005, respectively) is claimed by the services sector and the Western Province alone contributed to 2/3 of the services sector in Sri Lanka. According to various sources, the Western Province of Sri Lanka represents lion's share not only in production but also in economic growth rate, aggregate consumption, investment, employment, industrial production, infrastructure availability, energy consumption, etc. Thus, it is important to explore underlying factors of widening regional inequality in Sri Lanka.

Apart from the above mentioned aggregate-level information, micro-level data available in *the Household Income and Expenditure Surveys* conducted by the Department of Census and Statistics of Sri Lanka (here after DCSL), and *the Consumer Finances and Socio-economic Surveys* conducted by the Central Bank of Sri Lanka (here after CBSL), have indicated the growing contribution of the Western Province to the total income, expenditure and living conditions inequality in recent past. Economic organization in terms of production, distribution and consumption in the Western Province has been closer to a well developed region while Northern, Eastern, Sabaragamuwa and Uva Provinces were far behind from the average level. Since income inequality directly matters for expenditure inequality and differences in social conditions, this paper attempts to explore quantifiable factors behind the regional income inequality in Sri Lanka.

Moreover, there are some other reasons to undertake this study. The first reason is, although many studies have identified rising regional income inequality in the early stage of economic development due to rapid industrialization in some regions, sizeable labour migration flows to urban areas, changes in income elasticity for various goods and services and relative prices of agricultural goods and manufacturing commodities in typical developing countries, the case of Sri Lanka has been different even after the introduction of trade liberalization policies in 1977. Income inequality has been increasing with rising share of the services sector in the national production and employment, stagnated manufacturing sector and neutral internal labour migration rate, high international migration and gradual removal of government subsidies (see Karunaratne 2000b, and 2002/2003 for more details). Drawing upon these phenomena, the present study intends to explore quantifiable factors behind the regional income inequality in Sri Lanka and then to compare the results with experience in typical developing countries and Japan.

The second reason is, even though Sri Lanka is a small island covering 65,615 square kilometers with 19.7 million population (in 2005), it has a pluralistic society in terms of eth-

nicity, language, religion, and culture. Different ethnic groups dominate in different regions. Sinhalese dominate in southern part of the island and Tamils dominate in Northern Province and Estate plantation sector (mainly located in central hill country), while Muslims and Tamils together dominate in Eastern Province and Colombo metropolitan area. In a pluralistic-society, it is essential to pay attention to regional equality to maintain sustainable peace. Regional inequality was one of the reasons behind the on going civil war in Northern and Eastern provinces in Sri Lanka. Today, lasting peace has become the most critical determinant of economic development of Sri Lanka. Thus, it is important to understand quantifiable factors behind the regional income inequality in Sri Lanka to design and implement sustainable development programs.

The third reason is Sri Lanka has been considered as a special developing country by many researchers due to its high social development level in comparison to level of per capita income. This situation was generated by the excessive government intervention in education, health, and nutrition rather than by market mechanism (see Sen,1981). Market mechanism became more important than the government intervention since introduction of trade liberalization policies in 1977. Rising income inequality is one of the accepted failures of the market mechanism. This paper is also ambitious to understand through which factors, market mechanism caused to generate rising regional income inequality in Sri Lanka

The fourth reason is many of the prevailing income inequality studies on Sri Lanka have been based on micro-level data obtained from *the Household Income and Expenditure Surveys* conducted by the DCSL and *The Consumer Finances and Socio-economic Surveys* conducted by the CBSL. Since, there are critical problems in those data sets (see Lakshman 1980 and 1997 for more details) this paper utilizes regional per capita GDP and employment data to estimate regional labour productivity and labour participation rate to explain regional income inequality in Sri Lanka.

2. Objectives and Plan of the Study

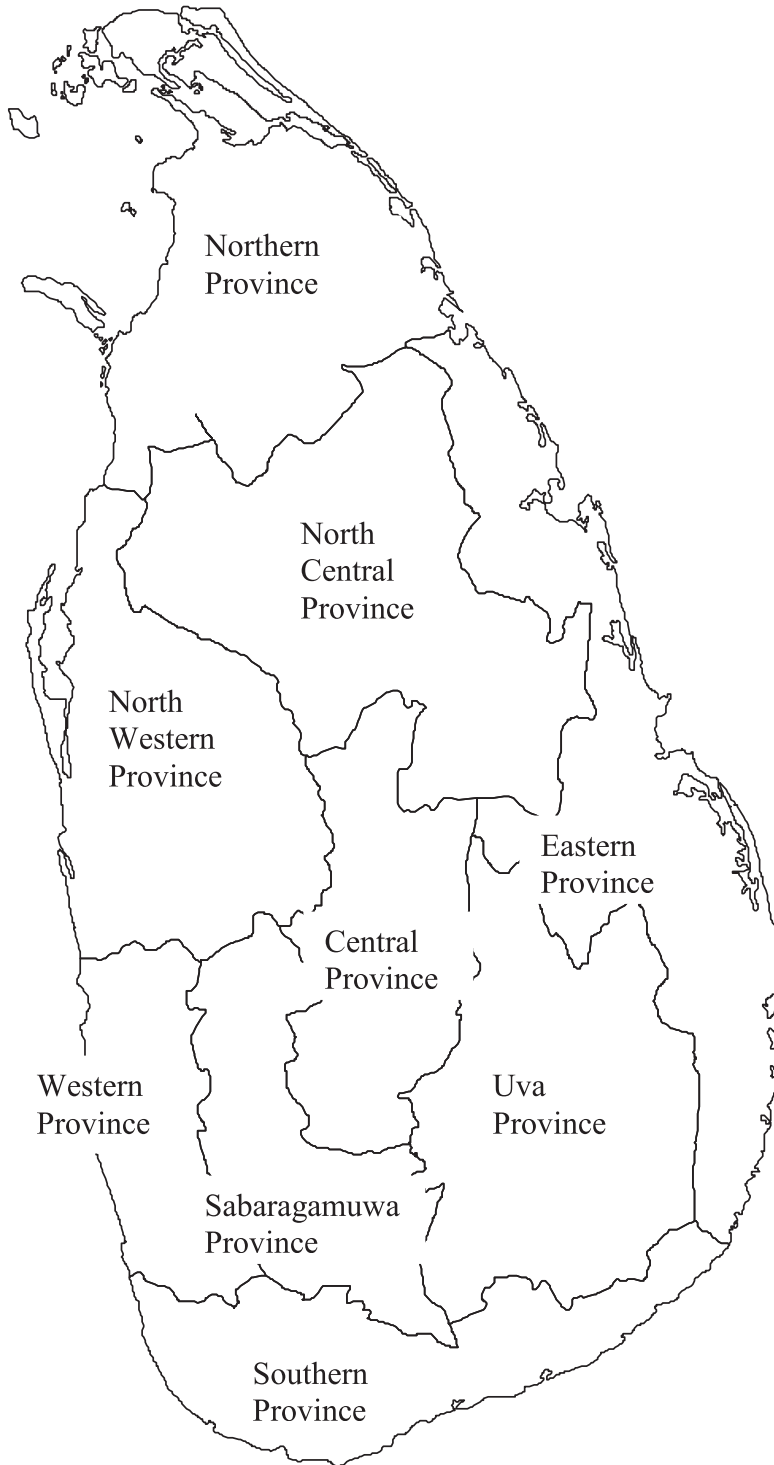
There are three main objectives of this study. The first is to measure the regional (provincial level) income inequality in Sri Lanka in recent past with a decomposable inequality measure. The second is to quantify the determinants of recent trends in regional income inequality in Sri Lanka. Since Japan is said to be one of the most egalitarian societies in their development path, third objective is set to review pattern of regional income inequality in Japanese development path and draw some policy implications for Sri Lanka.

This paper consists of seven sections including introduction, objectives and plan of the study. The section three illustrates trends in regional population inequality and regional income inequality with available macro level data in Sri Lanka. The section four presents literature survey on regional income inequality and the behavior of the Japanese regional income inequality path during the period of 1955-1985. Method of analysis is explained in section five. The section six is devoted to present empirical findings and discussion and section seven concludes the study.

3. Trends in Regional Inequality in Sri Lanka

As shown in Figure 1, for the administrative purposes Sri Lanka is presently divided into

Figure 1. Provincial Map of Sri Lanka

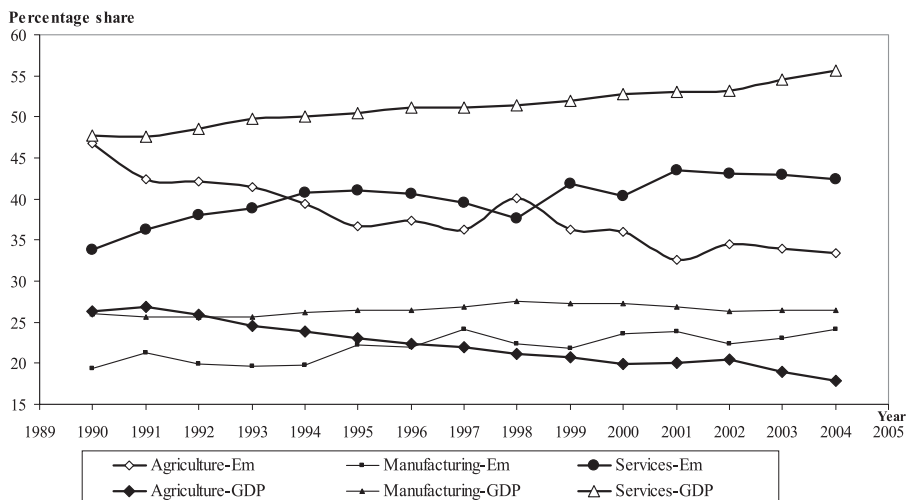


nine provinces (eight provincial councils) and twenty five districts. Northern and Eastern provinces have been subjected to political turmoil and civil war during the past three decades. These two provinces were merged for administrative purposes and establishing one provincial council to govern in mid 1980s. The Western Province holds the smallest land share and the largest population share while the North Western Province claims the opposite. The largest commercial city and former capital city (Colombo) as well as current capital city (Sri Jayewardenepura) of Sri Lanka are located in the Western Province.

Table 1 presents provincial level data on share of land area and share of population. In terms of land area, the Western Province shows the lowest contribution as 5.7 percent to the total land area in Sri Lanka. North Central Province is the largest province. In terms of land area, the size of the Western Province is 1/3 of the North Central Province. However the Western Province has nearly five times of population of the North Central province. Provinces such as Western, Southern, Sabaragamuwa, and Central have been recording larger population shares than their shares in GDP. These four provinces together represented 31 percent of land area and 63 percent of population in Sri Lanka in 2004. Population concentration into these four provinces has not been a phenomenon in recent past. Historical evidence shows that these four regions represented the largest population share even before the European colonial period (1505-1948) started. Since these provinces have been located in wet zone, and received significant amount of rain fall from the south-east monsoon wind, rice farming has been the main occupation of majority of the people in these areas even before the European colonial period started in Sri Lanka.

However, after regaining political independence in 1948, the early stage of public policies devoted to reduce population concentration in these provinces by introducing re-settlement schemes in North Western and North Central provinces. Consequently, population concentration into Western, Southern, Sabaragmuwa, and Central provinces decreased from 71 percent in 1946 to 63 percent in 2004. Northern Province population share has been declining due to political turmoil and civil war started in early 1980s. Initially, substantial number of population in Northern Province migrated to South India, North America, Western Europe, and Australia.

Figure 2 Behavior of Sectoral Shares in Gross Domestic Product and Total Employment in Sri Lanka, 1990-2004



Source: Data obtained from CBSL (2005) *Economic and Social statistics of Sri Lanka*.

However, a considerable amount of total population in Northern and Eastern provinces migrated to the Western Province, mainly to the city of Colombo by late 1990s. This has transformed Colombo City into a multi-ethnic city in recent past.

It is possible to explain recent trends in regional income inequality by comparing data given in Table 1 and 2. Table 2 presents provincial shares of GDP in Sri Lanka during 1996-2003. The Western province share in the GDP has increased from 43.7 percent to 49.7 percent while its population share was remaining constant during this period. This phenomenon is different from the historical experience of developed countries and the present situation in many typical developing countries. GDP share and population share increased together in some

Table 1 Provincial Land Share, and Population Share

Province	Land Share-%	Population Share-%							
		1946	1953	1963	1971	1981	1996	2001	2004
Western	5.7	28.2	27.3	26.8	26.8	26.4	25.7	28.6	28.4
Southern	8.6	14.4	14.1	13.5	13.1	12.7	13.0	12.2	12.1
Sabaragamuwa	7.8	11.2	11.0	10.6	10.3	10.0	9.7	9.6	9.5
Central	8.9	17.1	16.6	16.0	15.4	13.5	12.7	12.9	12.9
Uva	13.3	5.6	5.8	6.2	6.4	6.2	6.2	6.3	6.3
Eastern	14.9	4.2	4.5	5.2	5.7	6.6	7.2	7.6	7.9
North Western	12.0	10.0	10.8	10.9	11.1	11.5	11.8	11.5	11.4
North Central	15.5	2.1	3.0	3.7	4.4	5.7	6.1	5.9	5.9
Northern	13.2	7.2	7.0	7.0	6.9	7.5	7.6	5.6	5.8

Source: (i). DCSL, Various published documents
(ii). CBSL (2005) *Economic and Social Statistics of Sri Lanka*.

Table 2 Provincial shares of Gross Domestic Product in Sri Lanka, 1996-2003

Province	1996	1997	1998	1999	2000	2001	2002	2003
1. Western	43.7	44.3	45.3	48.7	49.6	48.3	48.1	49.7
2. Southern	9.0	8.8	9.3	9.6	9.4	9.7	9.5	9.3
3. Sabaragamuwa	9.0	7.6	6.7	6.4	6.7	6.4	6.8	6.1
4. Central	10.1	10.4	9.8	9.2	9.4	9.4	9.5	8.8
5. Uva	5.1	5.0	4.9	4.1	3.9	4.6	4.2	4.4
6. Eastern	4.8	5.0	5.5	5.0	4.5	5.0	4.9	5.5
7. North Western	11.3	12.1	12.0	10.4	10.4	10.7	10.3	9.5
8. North Central	4.6	4.0	3.6	4.1	3.9	3.7	4.0	3.9
9. Northern	2.4	2.8	2.9	2.5	2.2	2.4	2.7	2.7
10. Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's Computations based on Data available in CBSL (2005) *Economic and Social Statistics of Sri Lanka*.

regions while other regions indicating declining population shares in those countries. For example, in Japan, GDP share of the Tokyo metropolitan area increased from 25 percent in 1955 to 32.2 percent in 1990 while population share increased from 17 percent to 25.7 percent in the same period. The present situation in China, India and Indonesia is also showing the importance of cities as growth poles. Metropolitan cities in these countries have emerged through absorption of migrant workers from rural areas to urban sector manufacturing industries. However, in Sri Lanka, neither the city of Colombo nor the Western province acted as growth poles to attract migration flows from backward areas. Stagnated manufacturing sector with rapid expansion in capital intensive services in western province provide a strong reason for rising GDP per capita income Sri Lanka (see Karunaratne, 2002/2003 for more information).

As shown in Table 2, contribution made by the Uva province and the North Central province to national GDP declined from 5.1 percent to 4.4 percent and 11.3 percent to 9.5, respectively during the same period. Meanwhile, the population share of these two provinces had been stagnated at 12.2 percent. Poor performance in agricultural sector and heavy agricultural biasness in these two provinces caused the decline of contribution to GDP from these two provinces. Contribution to overall GDP by the Northern and Eastern provinces has been remaining in very low level and almost constant during the 1996-2004 period. On the other hand, population share of the Northern Province has been declining due to civil war. Many people migrated from Northern Province to India, Canada, Australia, Norway, and rest of the provinces in Sri Lanka since early 1980s. Destruction of infrastructure services and instability in agricultural activities due to political turmoil and civil war have been influenced to record lower GDP share in Northern and Eastern provinces in Sri Lanka.

By comparing data given in Table 1 and 2, it is possible to understand growing trend of the regional income inequality in Sri Lanka during the past few year. It is easy to verify this trend with the help of estimated per capita GDP figures given in Table 3. For example, the Western Province per capita GDP grew from \$1263 in 1998 to \$1471 in 2003. By contrast North Western province per capita GDP declined from \$733 to \$699 during the same period.

Table 3 Per Capita Gross Domestic Production by Province in US Dollars*

Province	1998	1999	2000	2001	2002	2003
1. Western	1263	1375	1485	1254	1304	1471
2. Southern	512	534	559	593	607	648
3. Sabaragamuwa	500	486	536	497	553	545
4. Central	555	519	556	540	569	577
5. Uva	569	470	474	546	523	594
6. Eastern	537	493	472	491	486	585
7. North Western	733	642	686	689	694	699
8. North Central	423	494	489	468	522	564
9. Northern	271	242	220	317	357	398
10. Sri Lanka	717	724	767	744	771	841
11. Sri Lanka**	879	863	899	841	870	948

*Author's Estimations Based on Production in Factor Prices and Mid-Year Dollar Exchange Rates

**Central Bank Estimations using Market prices and Variable Exchange Rates

Sources: (i). DCSL, Various published documents.

(ii). CBSL (1995) *Economic and Social Statistics in Sri Lanka*.

4. Review of Literature

Starting from Williamson (1965) many comprehensive studies have been undertaken both in theoretical and empirical point of view to study relationship between the level of regional income inequality and economic development in various developed and developing countries. There are number of time series studies as well as cross-sectional studies on relationship between the regional income inequality level and economic development stage. As a result, conclusions such as inverted-U hypothesis (Kuznets, 1955), N hypothesis and zero relationship have been identified in between these two variables. In addition, many studies have identified declining share of within-regional inequality and growing share of between-region inequality in the early stage of economic development in many developing countries. Needless to mention, these kinds of generalizations are not applicable to all the developing countries due to country-specific factors. Therefore, it is important to identify country-specific factors behind the regional inequality path in each stage of development.

There are several landmark papers on regional income inequalities in Japan due to its economic miracle made by shifting from developing state to developed state in shortest time period, while substantially reducing regional inequalities. Nishioka (1962), Tabuchi (1988), Mutlu (1991), Sala-i-Martin (1996), Fujita and Tabuchi (1997), Tanioka and Yamada (2000), Yamano and Ohkawara (2000), and Akita (2003) are some of landmark studies on this subject. According to many of these studies, even though regional inequality level was relatively high in Japan soon after the World War II, it has come down to lowest in late 1970s due to high government intervention in regional infrastructure development and promotion of export oriented enterprises in various regions. There are different conclusions on regional inequality trends in Japan after 1990s. Some studies have shown increasing regional inequalities while others predict constant or declining trends after 1990s. However, recent trend in regional income inequality in Japan is excluded from our discussion due to different stage of development in Sri Lanka. Being a developing country, Sri Lanka can learn more from Japanese experience during the 1955-1972 period. This period is considered as the rapid growth period in Japan. Some of the special characters of this period were achievement of unprecedented GDP growth rate, high employment creation, remarkable progress in export industries, and rapid rural-urban migration rate. Further, real wage had been increasing in many industries due to emerging shortage of labour force in latter years. However, role of researchers, policy makers, and regional business leaders had been very important to keep declining trend in regional income inequality until late 1970s. As Yamamoto (1987) mentioned “Williamson’s model fits better with Japan’s experience than the neo-classical model suggested by Borts and Stein. But capital and labour do not move among prefectures in the same manner as Williamson expected. What matters in Japan is the regional policies of the central and local governments, and selective decision-making by large enterprises.....” According to various studies on Japan, it is possible to conclude that regional inequality had been declining due to policy making and implementation rather than the free market mechanism.

5. Methodology and Data

Theil’s entropy measures (T and L) (Theil, 1967) are widely used to measure inequality in distribution of income, wealth, asset or expenditure due to their important characteristics such as mean independence, population-size independence, and the Pigou-Dalton principle of

transfers (Bourguignon, 1979). This study also utilizes Theil T inequality measure due to its additively decomposable character. An inequality index is said to be additively decomposable if total inequality can be written as the sum of within-group and between-group inequalities. Therefore, Theil-T index is widely used to measure regional inequalities (Williamson 1969, and Akita 2003).

After introduction of this method by Theil (1967), researchers such as Anand (1983), Mathur (1983), Akita and Lukman (1995), Akita (2003), Glewwe (1985 and 1986), (Karunaratne (1999, 2000a, 2001, 2002/2003), and many others have used this method to identify quantifiable factors behind the income inequality in Malaysia, Indonesia, Japan, Sri Lanka and many other countries. Among these studies some were based on national income and employment data and others were based on household survey data. However, for comparability, same as with Akita (2003) on Japan, this study utilizes regional (provincial) level GDP and employment data to decompose regional income inequality in Sri Lanka in 1997 and 2004.

Methodology adopted in this paper is rational and easy to understand by using the following steps. Consider GDP, Population and Employment in each region (province) of the country as Y_i , P_i , and E_i , respectively. The number of regions in the country is indicated by n . Then per capita GDP in region i is given as $y_i = \frac{Y_i}{P_i}$ and can be multiplicatively decomposed into two components as follows:

$$y_i = x_i e_i \quad (1)$$

where $x_i = \frac{Y_i}{E_i}$ is labour productivity in region i and

$$e_i = \frac{E_i}{P_i} \text{ is labour participation rate in region } i$$

Assuming that the economy is divided into the three sectors i.e. agriculture, manufacturing, and service, total GDP can be expressed as the sum of GDP from these three sectors, i.e.

$$Y_i = Y_{1i} + Y_{2i} + Y_{3i} \quad (2)$$

Where Y_{1i} , Y_{2i} , and Y_{3i} are GDP from agriculture, manufacturing, and service sectors in region i . respectively. Similarly total employment is the sum of employment in these three sectors, i.e.,

$$E_i = E_{1i} + E_{2i} + E_{3i} \quad (3)$$

Where E_{1i} , E_{2i} , and E_{3i} are region i 's employment in the agriculture, manufacturing and service sectors, respectively

Let $y_{ji} = \frac{Y_{ji}}{P_i}$ be per capita GDP from sector j in region i .

Then, we have $y_i = y_{1i} + y_{2i} + y_{3i}$

y_{ji} can be multiplicatively decomposed into three components as follows:

$$y_{ji} = q_{ji} e_i = x_{ji} s_{ji} e_i \text{ for } j=1, 2, 3 \quad (4)$$

where $q_{ji} = \frac{Y_{ji}}{E_i}$ is sector j 's GDP in region i per regional total employment,

$x_{ji} = \frac{Y_{ji}}{E_{ji}}$ is the labor productivity of sector j in region i , and

$s_{ji} = \frac{E_{ji}}{E_i}$ is the share of sector j in employment in region i .

Using equations (2) and (4), equation (1) is reduced to

$$y_i = \left(\frac{Y_{1i} + Y_{2i} + Y_{3i}}{E} \right) e_i = (q_{1i} + q_{2i} + q_{3i}) e_i = (X_{1i} S_{1i} + X_{2i} S_{2i} + X_{3i} S_{3i}) e_i \quad (5)$$

Therefore, as explained in Akita (2003), regional inequality in per capita GDP can be attributed to regional disparities in labour participation rate, sectoral labour productivities, and sectoral employment shares. Based on above explanations, the Theil T index as a inequality measure and its decomposition into Between-Sector and Within sector Components can be illustrated as follows.

Using GDP and population figures, the Theil T index can be written as follows.

$$T = \sum_{i=1}^n \left(\frac{Y_i}{Y} \right) \log \left(\frac{Y_i/Y}{P_i/P} \right)$$

let $\bar{y} = \frac{Y}{P}$ be national per capita GDP, where Y and P are respectively, total national GDP and population . Then this equation is written as

$$T = \sum_{i=1}^n (\log(y_i) - \log(\bar{y})) \frac{Y_i}{Y} \quad (6)$$

and thus the Theil T index measures regional inequality in per capita GDP. It uses GDP shares as weights, while another Theil index, the Theil L index, uses population shares as weight as follows

$$L = \sum_{i=1}^n \left(\frac{P_i}{P} \right) \log \left(\frac{P_i/P}{Y_i/Y} \right) = \sum_{i=1}^n (\log(\bar{y})) \frac{P_i}{P}$$

Using the Theil T index, we can measure regional inequality in labour productivity as follows.

$$T = \sum_{i=1}^n \left(\frac{Y_i}{Y} \right) \log \left(\frac{Y_i/Y}{E_i/E} \right) = \sum_{i=1}^n (\log(x_i) - \log(\bar{x})) \frac{Y_i}{Y} \quad (7)$$

In this equation, $\bar{x} = \frac{Y}{E}$ is national labour productivity, where E is national total employment. This equation compares sector j's labour productivity with the national labour productivity.

Next, in a three-sector economy, regional inequality in labour productivity for sector J can be measured by

$$T_j = \sum_{i=1}^n \left(\frac{Y_{ji}}{Y_{jt}} \right) \log \left(\frac{Y_{ji}/Y_{jt}}{E_{ji}/E_{jt}} \right) = \sum_{i=1}^n (\log(x_{ji}) - \log(\bar{x}_j)) \frac{Y_{ji}}{Y_{jt}} \text{ for } j=1, 2, \text{ and } 3. \quad (8)$$

In equation (8) $\bar{x}_j = \frac{Y_{jt}}{E_{jt}}$ is sector j's labour productivity in the nation and $x_{ji} = \frac{Y_{ji}}{E_{ji}}$ is defined in equation (4) above, where Y_{ji} and E_{ji} are sector j's GDP and employment in the nation, respectively. We can also measure regional inequality in labour productivity using sectoral GDP and employment figures as follows.

$$T = \sum_{j=1}^3 \sum_{i=1}^n \left(\frac{y_{ij}}{Y} \right) \log \left(\frac{y_{ij}/Y}{E_{ij}/E} \right) = \sum_{j=1}^3 \sum_{i=1}^n (\log(x_{ji}) - \log(\bar{x})) \frac{Y_{ji}}{Y} \quad (9)$$

As opposed to equation (7), this equation compares each sector's labour productivity in region i with the national labour productivity. The additively decomposability of Theil-T index allow us to write it as two components i.e. the within-sector inequality component (T_w) and the between-sector inequality component (T_b) as follows:

$$T = \sum_{j=1}^3 \left(\frac{Y_j}{Y} \right) T_j + \sum_{j=1}^3 \left(\frac{Y_j}{Y} \right) \log \left(\frac{Y_j/Y}{E_j/E} \right) = T_w + T_B \quad (10)$$

Where T_j is defined in equation (8) and T_B is written as

$$T_B = \sum_{j=1}^3 \left(\frac{Y_j}{Y} \right) \log \left(\frac{Y_j/Y}{E_j/E} \right) = \sum_{j=1}^3 \left(\log(\bar{x}_j) - \log(\bar{x}) \right) \frac{Y_j}{Y}$$

T_w is the weighted average of regional inequalities in labour productivity within each sector, while presents inequality in labour productivity between sectors.

Relationship between regional inequalities in per capita GDP land labour productivity by Theil-T index can be illustrated as follows;

If we take the log of both sides of equation (1), we get

$$\log(y_i) = \log(x_i) + \log(e_i) \quad (11)$$

and also we have

$$\log(\bar{y}) = \log(\bar{x}) + \log(\bar{e}) \quad (12)$$

Where $\bar{y} = \frac{Y}{P}$, $\bar{x} = \frac{Y}{E}$, and $\bar{e} = \frac{E}{P}$ using equations (11) and (12), it is possible to obtain

$$\sum_{j=1}^n \left(\log(y_j) - \log(\bar{y}) \right) \frac{Y_j}{Y} = \sum_{j=1}^n \left(\log(x_j) - \log(\bar{x}) \right) \frac{Y_j}{Y} + \sum_{j=1}^n \left(\log(e_j) - \log(\bar{e}) \right) \frac{Y_j}{Y}$$

It is possible to rewrite this equation as follows.

$$\sum_{i=1}^n \left(\frac{Y_i}{Y} \right) \log \left(\frac{Y_i/Y}{P_i/P} \right) = \sum_{i=1}^n \left(\frac{Y_i}{Y} \right) \log \left(\frac{Y_i/Y}{E_i/E} \right) + \sum_{i=1}^n \left(\frac{Y_i}{Y} \right) \log \left(\frac{E_i/E}{P_i/P} \right) \quad (13)$$

The left hand side of equation (13) presents regional inequality in per capita GDP as measured by the Theil T index (equation 6), while the first term of the right hand side presents regional inequality in labor productivity as measured by the Theil T index (equation (7)). It should be noted that the second term of the right hand side is not the Theil T index for the labor participation rate, since it uses GDP shares as weights, rather than employment shares.

There are nine (09) provinces in Sri Lanka, but provincial level production and employment data are available only after 1996. Data were obtained from the publications of Department of Census and Statistics of Sri Lanka and Central Bank of Sri Lanka. Exact publications are given in the reference list. Since there has being a long-term political turmoil (mainly in two provinces) in Sri Lanka, the author is expecting to get sever critique on data used in this paper. However, our findings of this paper are tally with the micro-level consumer finance and socio economic survey based findings and general trend of economic development of any society. So it is desirable to use findings of this paper for policy formation and implementation in Sri Lanka.

6. Results and Discussion

The first objective of this paper was to measure the regional income inequality in Sri Lanka in recent past with a decomposable inequality measure. GDP and employment-based estimated results of provincial Theil-T index is given in Table 4. As reflected in measures given in Table 4, regional income inequality measured by the Theil-T index in Sri Lanka increased by 11 percent from 0.2077 in 1997 to 0.2313 in 2004. Growing regional income dis-

parities during this period can be explained even with the micro level data in surveys conducted by the Central Bank of Sri Lanka. As recorded in annual report of CBSL “The Western Province reflected higher living standards than other provinces commensurate with better education, employment and income-earning opportunities that related to overall economic activity and development in the country..... Historical and continuing disparities the three sectors urban, rural, estates, were reflected in these regional disparities..... The CFS 2003/04 findings re-emphasize what policy makers in successive governments have been highlighting in recent years, namely, the need to address these regional disparities and create income generating opportunities that would provide economic options for citizens everywhere.” (P 52 of the CBSL 2005).”

As discussed in the previous section, regional income inequality can be decomposed into two components as within-region inequality and between-region inequality. As highlighted in review of literature in section four, contribution made by between-region component to total regional inequality usually increase in any society in the early stage of economic development. According estimations given in Table 4, between-region contribution to total regional inequality in Sri Lanka has increased from 30 percent in 1997 to 55 percent in 2004. This means Sri Lanka is still in the early stage of economic development. As shown in sectoral decomposition findings presented in Table 5, this situation has generated through high growth in employment-lack Western Province-based services sector, while slow growth in manufacturing and services sectors in other regions in Sri Lanka.

Table 4 GDP and Employment-based on Provincial Theil T Index in 1997 and 2004

	Region	1997	2004
1	Western Province	0.2110	0.2778
2	Southern Province	0.0244	0.0243
3	Sabaragamuwa Province	0.0234	0.0267
4	Central Province	0.0263	0.0332
5	Uva Province	0.0117	0.0154
6	Eastern Province	0.0198	0.0199
7	North Western Province	0.0061	0.0176
8	North Central Province	0.0177	0.0158
9	Northern Province	0.0199	0.0203
10	Witin-Region Inequality	0.1454	0.1047
	As % of total inequality	70	45
11	Between Region Inequality	0.0623	0.1266
	As % of total inequality	30	55
12	Sri Lanka	0.2077	0.2313

Source: Author’s computation based on Data obtained from CBSL (2005) and DCS (1998, 2005)

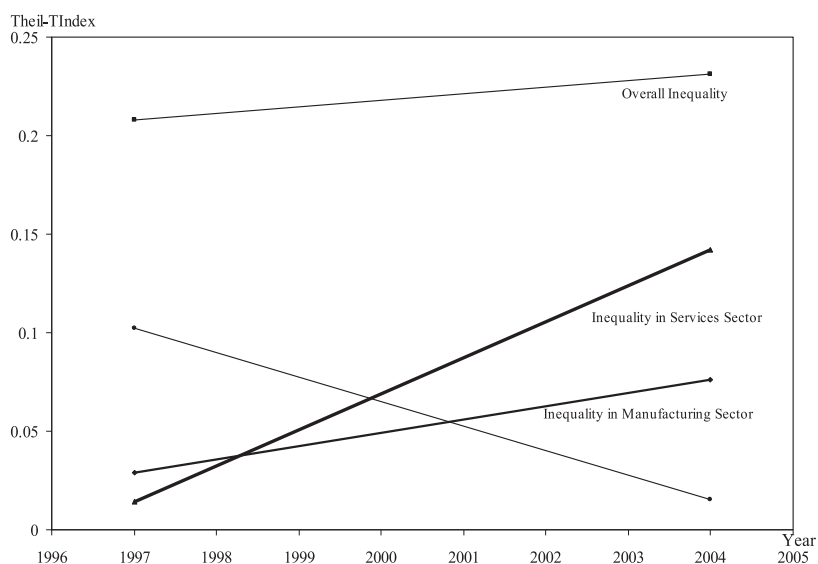
The highest income inequality growth was recorded in the Western province, where its value of the Theil-T index increased by 32 percent from 0.2110 in 1997 to 0.2778 in 2004. The main reason behind this unequal growth has been growing service sector output share and lack of employment creation in the Western Province. The highest contribution to services sector is recorded in the Western Province. Moreover, service sector contribution to GDP in the Western Province increased from 62 percent in 1996 to 64 percent in 2004. Estimated regional inequality indices by sector are plotted in Figure 3. As depicted in the figure 3,

Table 5 Decomposition of Theil-T Index for Labour Productivity

Sector		1997	2004
Agriculture	Inequality	0.1024	0.0152
	GDP share %	21.1	19.0
Industry	Inequality	0.029	0.0764
	GDP share %	27.5	26.4
Services	Inequality	0.0144	0.1422
	GDP share %	51.4	54.6
Within-Sector Inequality		0.1457	0.1047
Between-Sector Inequality		0.0619	0.1266
Overall Inequality		0.2077	0.2313
Contribution of each Component to Overall Inequality (in %)			
Agriculture		2.2	0.3
Industry		0.8	2.0
Services		0.7	7.8
Within-Sector Inequality		70.2	45.3
Between Sector Inequality		29.8	54.7
Total		100	100.0

Source: Author's Computations based on:

- (i). CBSL (2005) *Economic and Social Statistics of Sri Lanka*
- (ii). CBSL, *The Consumer Finances and Socio-economic Survey Report 1996/97 and 2003/04*
- (iii). DCSL (1997/8) *Provincial Profile of Labour Force, Sri Lanka-1996*
- (iv). DCSL (2005) *Annual Report on Labour Force Survey*

Figure 3 Estimated Regional Inequality by Sector and Sri Lanka, 1997-2004

Source: Author's Computations based on CBSL (2005) and DCS (1998)

income inequality in the services sector grew faster than the other two sectors during the concerning period. The Western Province services sector's contribution to the total GDP increased from 53 percent in 1996 to 59 percent in 2004. In addition, income inequality associated with manufacturing sector has also been increasing during the concerning period. By contrast, inequality associated with agricultural sector has been declining in Sri Lanka during the peri-

od of 1997-2004. Therefore, provinces associated with larger services and manufacturing sectors indicated growing regional income inequality trends. Especially, the Western Province and the Central Province recorded highest income inequality growth during this period. North Central Province recorded inequality declining trend due to its substantially large share of agricultural sector in total production. Income inequality has not been significantly changed in Sabaragamuwa Province, Eastern Province and Southern Province due to marginal expansion in services sector during the concerning period.

The second objective of this paper was to quantify the determinants of recent trends in regional income inequality in Sri Lanka. As discussed in the methodology section, regional inequality in per capita GDP can be explained by regional disparities in labour productivity and labour participation rate. Labour productivity rates were decomposed by sectors to understand factors behind the regional inequality and results are summarized in Table 5. Inequality in the labour productivity increased from 1997 to 2004. The major reason for this trend was increase in inequality in the between sector component during this period. Contribution of the within-sector labour productivity to the inequality in labour productivity declined from 70 percent to 45 percent from 1997 to 2004. Labour productivity in service sector is growing faster while labour productivity in agricultural sector has been declining during this period. As a result, agricultural sector is contribution to total inequality has declined from 2.2 percent in 1997 to 0.3 percent in 2004. Meanwhile, service sector contribution to total inequality increased from 0.7 percent in 1997 to 7.8 percent in 2004.

Table 6 Change in Regional Distribution in Japan : Population and Real GDP

Region	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	AGR
	Regional Share of Total Population (%)										(%)
Hokkaido-Tohoku	15.7	15.8	14.4	13.6	13.0	12.9	12.7	12.4	12.4	12.2	0.2
Kanto	26.2	28.8	29.6	31.2	32.2	32.6	33.1	33.9	34.2	34.5	1.4
Chubu	15.0	15.5	15.0	15.1	15.1	15.1	15.0	15.1	15.2	15.2	0.8
Kinki	15.1	16.2	16.7	17.3	17.5	17.4	17.3	17.2	17.1	17.1	1.0
Chugoku	7.8	7.6	6.9	6.7	6.6	6.5	6.4	6.3	6.2	6.1	0.2
Shikoku	4.7	4.5	4.0	3.7	3.6	3.5	3.4	3.3	3.3	3.3	0.0
Kyushu-Okinawa	15.3	15.2	13.4	12.4	12.0	12.0	11.9	11.7	11.7	11.6	0.2
Total	100	100	100	100	100	100	100	100	100	100	0.8
3 Major M.A	34.3	38.4	40.7	43.5	44.9	45.1	45.4	46.1	46.3	46.7	1.5
Tokyo	17.1	19.6	21.2	23.0	24.2	24.5	25.0	25.7	25.9	26.3	1.7
Nagoya	5.8	6.3	6.4	6.6	6.7	6.8	6.8	6.9	6.9	7.0	1.2
Osaka	11.3	12.5	13.2	13.9	14.0	13.8	13.7	13.5	13.4	13.4	1.1
	Regional Share of Real GDP (%)										
Hokkaido-Tohoku	14.0	13.3	12.1	10.6	11.3	11.2	10.8	10.0	10.6	10.7	4.7
Kanto	32.5	32.9	34.6	36.0	35.9	36.3	38.2	40.0	38.5	37.8	5.7
Chubu	14.7	15.6	14.7	15.6	15.3	15.4	15.8	15.8	15.9	16.6	5.6
Kinki	16.2	16.7	18.6	19.1	17.9	17.8	17.2	17.1	17.4	17.1	5.5
Chugoku	7.0	6.8	6.5	6.5	6.5	6.3	6.0	5.7	5.8	5.7	4.8
Shikoku	3.8	3.6	3.3	3.1	3.1	3.0	2.8	2.6	2.8	2.8	4.5
Kyushu-Okinawa	11.9	11.0	10.2	9.2	9.9	10.1	9.4	8.8	9.1	9.3	4.8
Total	100	100	100	100	100	100	100	100	100	100	5
3 Major M.A	43.6	45.8	49.6	52.8	51.1	51.0	52.2	54.3	52.7	51.7	5.7
Tokyo	25.1	25.8	27.6	29.1	28.8	28.6	30.3	32.2	30.4	29.7	5.7
Nagoya	6.2	6.8	6.7	7.7	7.5	7.6	7.8	8.1	8.0	8.2	6.0
Osaka	12.3	13.2	15.3	16.0	14.9	14.8	14.1	14.0	14.2	13.8	5.6

Source: Akita (2003) page 6

The third objective of this paper is set to review pattern of regional income inequality in Japanese development path and draw some policy implications for Sri Lanka. As highlighted in the review of literature, regional inequality in Japan drastically declined from 1955 to mid 1970s due to various reasons. In order to explain relationship between regional production and employment shares in Japan, data are presented in Table 6. Real GDP share of the Kanto area increased from 32.5 percent in 1955 to 40 percent in 1990. Tokyo prefecture (*TOKYO TO*: Tokyo Metropolitan area) is located within the Kanto area. The contribution made by Tokyo city to the total GDP increased from 25 percent to 32 percent during this period. On the other hand, population share of the Kanto area and Tokyo area has also increased from 26.6 percent to 40 percent and from 17 percent to 26 percent, respectively. As a result living standards of people in Kanto area increased rapidly. By using export earnings, heavy taxes on rich people and land, loans obtained from international financial institutions such as the World Bank and IMF, massive infrastructure development projects had been implemented in Japan during this period. Meanwhile, public investment projects were undertaken to develop rural infrastructures. Many government institutions in Japan, namely Ministry of Finance, Ministry of International Trade and Industry (MITI), Economic Planning Agency and Ministry of Labour have been committed to planning, implementing and monitoring programs addressing regional inequality in Japan. Finally, this study emphasizes the importance the of role of government in planning, implementing and monitoring programs designed to reduce regional inequality in the development path of Sri Lanka. Inherent multi-ethnicity of the society and unusual service sector growth in the urban economy aggravate importance of role of government in managing regional inequality in Sri Lanka.

7. Concluding Remarks

In order to achieve, three main objectives, this study utilized provincial GDP and employment statistics and inequality decomposition technique. The first objective was to measure regional (provincial level) income inequality in Sri Lanka in recent past with a decomposable inequality measure. The second objective was to quantify determinants of recent trends in regional income inequality in Sri Lanka. Since Japan is said to be the most egalitarian society in their development path, third objective was set to review studies on pattern of regional income inequality in Japanese development path and draw some policy implications to Sri Lanka.

As the method of analysis, Theil's entropy measure T was computed by using provincial level GDP and employment data, and decomposed into within-region inequality and between region inequality in Sri Lanka for 1997 and 2004. Contribution made by agriculture, manufacturing and services into total inequality and regional inequality was also estimated for the same years. Regional inequality in per capita GDP as measured by the Theil T index increased from 0.2077 to 0.2313 by 11 percent from 1997 to 2003. However, as expected in the early stage of development, contribution made by between-sector component to regional inequality has increased from 30 percent to 56 percent. This situation has generated by three factors. The first was high GDP growth in the Western Province, while having very slow GDP growth in other provinces. The second was high growth in employment-lack services sector in Sri Lanka, while slow growth in manufacturing and agricultural sectors. The third was unequal growth in service sector across the provinces. GDP growth in the Western Province dominated by the services sector while other provinces services sector grew at very slow speed.

Even though regional inequality level was relatively high in Japan soon after the World War II, it has come down to lowest in late 1970s due to high government intervention in regional infrastructure development and promotion of export oriented enterprises in various regions. Finally, this study addresses the importance of the role of government in planning, implementing and monitoring programs leading to reducing in regional inequality in the development path of Sri Lanka. Inherent multi-ethnicity of the society and unusual service sector growth in the urban economy aggravate importance of role of government in managing regional inequality in Sri Lanka.

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