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Abstract

The Influence of government expenditure on economy is highly important and relationship between these had attracted research interests as early as 1830s. Particularly because, government expenditure has significant impact on economic growth of the country. Hence, this study focuses on influence of the government expenditure on Sri Lankan economy using input-output method. Government expenditure data from 2006 to 2015, input output table 2006 and 2010 were used for the study.

According to the findings, induced impact of government consumption expenditure in period of 2009-2006 was higher than the induced impact of government consumption expenditure in period 2015-2010. Further, Land transport service, Electrical energy and non-petroleum gases, Postal, telecommunication, information services, water had higher induced impact on government consumption expenditure. However, induced impact of government investment expenditure during 2015-2010 was higher than that was during 2009-2006 period. Particularly, induced ratio of government investment expenditure was 2.11 higher and demonstrated increasing trend during 2015-2010 period.

In addition to that, conforming to decomposition analysis technological changes were higher than the demand changes between two periods. Particularly, crude petroleum and other minerals showed excessive technological change between two periods. Moreover, knitted or crocheted fabrics, land transport services also have high demand change in two periods.

Further, according to the structural changes in the economy between two period, the relative important of apparel products has changed in 2010. Knitted products more expanded in 2010 as a value-added product of apparels sector rather than general textile products. Hence, Yarn and thread; woven and tufted textile fabrics has high demand as intermediate input of knitted products.

Key words: Government expenditure, Input output method, Sri Lankan economy

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1.0 Introduction

The influence of government expenditures on the economy is a very debatable subject for analysis. The major concern is whether government expenditures influence the long-run, steady-state growth of the economy.

There are several reasons that every government must make economic expenditures. The private sector fails to make certain expenditures, for instance, expenditures on public goods, defence, infrastructural facilities, hospitals, schools, and welfare. Furthermore, these expenses improve the quality of life and economic prosperity. In particular, educational spending may help improve labour productivity and decrease unemployment. Thus, if such expenses are appropriately targeted, they may enhance the efficiency and effectiveness of the economy. Welfare expenditures such as unemployment benefits, child allowances, and income-creation allowances may help diminish relative poverty and income inequality. In addition, expenditures related to environmental protection and pollution controls are very important, and the private sector does not intervene because such non-profit projects generate expenses.

In Sri Lanka, total government expenditures in 1950 were 786 million rupees or 20.3% of GDP. However, spending has increased rapidly to 2,333,883 million rupees or 19.6% of GDP in 2016. This spending primarily consists of capital expenditures and current expenditures. Current expenditures are mainly spending on goods and services (wages, salaries, interest payments, raw materials, etc.). Therefore, it is short-term and must be renewed annually. Capital expenditures are spending on physical assets that create future benefits, such as infrastructure facilities (roads, bridges, buildings, and airports), hospitals, and schools. Capital expenditures do not have to be renewed each year, as they represent long-term spending. This study focuses on identifying the influence of government expenditures on the economy at both the aggregate level and the disaggregate level in Sri Lanka.

2.0 Economic growth of Sri Lanka

The average annual growth rate of the Sri Lankan economy was 5% from 1965-1969 and slowed to 2.8% during the first half of the 1970s. The economy shrank by 0.8% in 1971, primarily due to the agitation following a youth uprising in the southern part of Sri Lanka. After that, the economy sustained a slower growth rate than in the preceding decade, mainly because of deficiencies in imported inputs (Athukorala and Jayasuriya 1994, Chapter 4).

In 1977, economic liberalization reforms were initiated in the Sri Lankan economy. After that, satisfactorily high but unstable economic growth appeared. Growth has been shadowed by conflict over the last 3 decades, with only 1 year of negative growth in 2001.

The economy was devastated by a sequence of detrimental external shocks in 2001. A protracted drought decreased domestic agricultural output and impeded the generation of hydroelectricity in 2000 and 2001. A terrorist attack on Katunayake International Airport in July 2001 significantly decreased tourist arrivals, diminished business confidence, and shrank external trade because of the need for ships and airlines to obtain high war-risk insurance policies following the attack. Escalation of the country's ethnic conflict further depressed investor confidence (CBSL 2002).

The Sri Lankan economy was badly affected by the surge in world oil and food prices in 2007-2008 and the global financial crisis that followed. The economy increased by an annual average rate of 6% during the second half of that decade despite these external shocks, and the increased intensity of the civil war in its final stage. After the civil conflict, the economy set a growth record of 8.7% in 2010-2012. The key drivers of growth were non-tradable sectors (construction, transport, trade and other services), indicating the contribution of a major public-sector infrastructure development project. Over the next 2 years, the average growth rate decreased to 4%, confirming the unsustainability of debt-driven growth (Prema-chandra athukorala, edimon ginting, hal hill, and utsav Kumar, 2017)

2.1 Structural change in Sri Lankan Economy

Table 2.1- Sectoral composition of gross domestic product

	1960- 1969	1970- 1979	1980- 1989	1990- 1999	2000- 2004	2005- 2009	2010- 2014	2015
Agriculture	36.2	29	27.1	23.7	17.2	12.2	8.1	8.2
Industry	17.2	26.1	27	26.4	27.5	30	28.4	27.3
Services	46.6	45	45.8	50	50	57.8	55.7	57.3

Source: Central Bank of Sri Lanka

The type of structural change associated with Sri Lanka's economic development has been mainly traditional. Agriculture's share of the economy has contracted rapidly, from 30% of GDP in 1960 to 8% in 2015. Industry's share has increased from approximately 20% of GDP in 1960 to 30% by 2015. The key factor in the growth of industry has been the 1977

liberalization reform. Simultaneously, the share of services has experienced a sustained expansion. Until 2005, the prime contributor to the expansion of industry's share was manufacturing; later, the prime contributors were utilities and construction. The share of services in the economy expanded from 47% in 1969 to 57% in 2015.

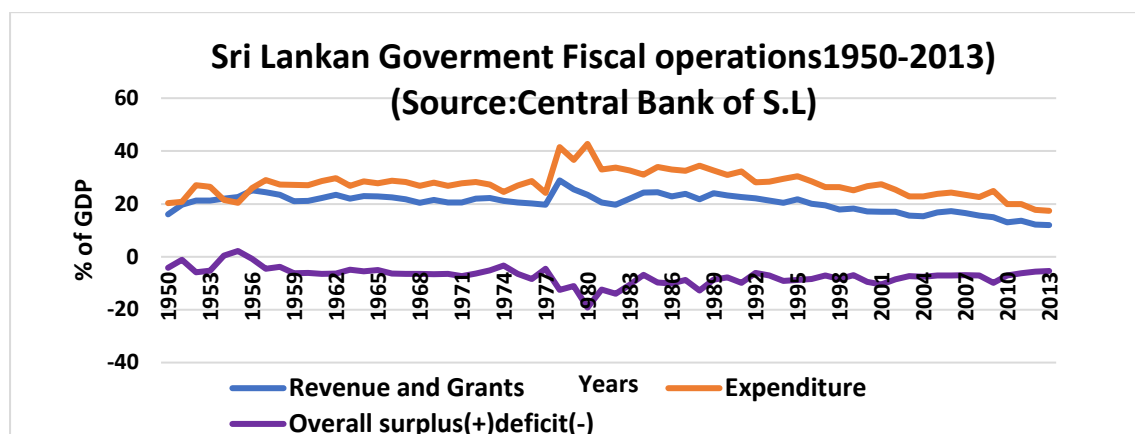
2.2 Government expenditures in Sri Lanka

Total government expenditures as a percentage of GDP were 28% on average from 1959-2015. The highest expenditure was 38% in 1980, and the lowest expenditure was 17% in 2013.

Government expenditures in Sri Lanka can be classified into two main parts: current expenditures and capital expenditures. The economic classification of recurrent expenditures consists of spending on salaries and wages, interest payments, goods and services, and transfers to public institutions, corporations and households. Along with the functional classification of expenditures, spending on civil administration, defence, education, health, community services, agriculture and irrigation, transport and communication, and the energy and water supply can be seen in both recurrent and capital expenditures.

Recurrent expenditures are assigned approximately 75 percent and capital expenditures are assigned approximately 25 percent of the total budget. Recurrent expenditures have increased more rapidly than capital expenditures in Sri Lanka. In 1985, recurrent expenditures accounted for 60% of total expenditures. However, in 2015, recurrent expenditures increased to 74% of total expenditures.

Figure 2.1



Source: Central Bank of Sri Lanka

High government expenditures were implemented after 1977 period when Sri Lanka introduced an open economic policy. Both expanded oils import whose costs increased in 1978 and the 1972 drought in Sri Lanka increased government expenditures.

3.0 Review of Empirical studies

There is some empirical literature relating to effect of government expenditures on the economy. Empirical studies fall into two main groups, namely, the aggregated and disaggregated levels, each of which are discussed below.

In 1983, Landau examined the relationship between government expenditures and economic growth at the disaggregated level using panel data on 27 less-developed countries and the ordinary least squares (OLS) methodology. The variable of government expenditures is categorized into productive expenditures and consumption expenditures. According to Landau's model, the proportion of government expenditures to GDP is considered the size of the government. The outcome of the research was that productive expenditures had a positive relationship to economic growth, and consumption expenditures had a negative relationship to economic growth. Further public investment in transport and communication was positively related to economic growth.

In 1986, Ram examined government size and economic growth utilizing cross-section and time series data. That study found that a large government is harmful to economic growth because government functions and processes are performed inefficiently. Furthermore, a large government is an unnecessary weight that imposes unnecessary costs on the economy. In addition, this investigation emphasized that large government has a strong influence on economic development because the government coordinates disputes between private and social interests, prevents foreigners from manipulating the country by foreigners and protects the growth of productive investment in a favourable direction for growth and development.

In 1990, Barro examined the relationship between government expenditures and economic growth using an endogenous model. According to that study's findings, real per capita GDP is positively associated with human capital. However, there was a negative relationship between the consumption-to-real GDP ratio and both growth and investment because public consumption not only decreases savings and economic growth but also distorts taxation and higher government expenditures.

In 1993, Devarajan examined the impact of government expenditures on economic growth using cross-sectional data on 14 OECD countries (1980-1990). He used functional types of government expenditures variables such as health, education, transport, defence, and so on. According to his findings, all the fertile expenditures such as transport, communication, health, and education had a negative or insignificant relationship with economic growth. Recurrent expenditures have a higher impact on economic growth.

In 1997, Kocherlakota and Yi examined how public capital and taxes affected economic growth in the United States and the United Kingdom. According to their findings, public capital enhanced economic growth and taxes obstructed economic growth. This research ignored the importance of human capital, and it used the ordinary least squares method to conduct its analysis.

In 1997, Singh and Weber investigated the composition of government expenditures and economic growth using Swiss time-series data. Justice, infrastructure, defence, education and agriculture were used as variables. These authors used a polynomial distributed lag model for their investigation. According to the results, transport, infrastructure, justice and defence spending worked to increase growth. A complicated relationship was found between education expenditures and economic growth.

Tanninen (1999) used panel data in 52 countries for the period 1970-92. The method of estimation employed by that study was generalized method of moments (GMM). The variables used were investment, categories of government expenditures and income inequality. The study found that government expenditures and consumption had a negative impact on economic growth, public spending on public goods was growth-retarding for large government expenditures but not for small ones, and social security spending was positively related to economic growth.

4.0 Methodology

Input-output analysis is a useful analytical technique for explaining and predicting the behaviour of an economic system. In 1936, Leontief first developed an input-output table, mainly specifying data on the perceived flow of goods and services between all the individual sectors of a geographic region over a given period. The basic information used in input-output analysis is treated as an interindustry transactions table. The rows of the table define the supply of a producer's output throughout the economy. The columns explain the compounded inputs

required by a specific industry to maintain its output. The column tagged Final Demand shows each sector's sales of its production to its final markets.

An input-output model usually includes three basic tables: the transaction table, the technical coefficients table and the interdependence coefficients table. The primary goal of the transaction table is to show the associations among the main sectors of the economy. The transaction table can be separated into two parts: the purchasing sectors section and the final demand section, which shows sales to end consumers.

The technical coefficient table exhibits the proportion of inputs needed to construct one unit of output. It is calculated by dividing individual column values by the total sum of the column in the transaction table.

The interdependence coefficient table displays the relations of individual sectors to all other sectors. The interdependence coefficient table is generally known as the Leontief inverse matrix. It discloses how the level of output in any sector depends upon the level of output in other sectors, the input needs of each sector and the level of its final demand.

The interdependence coefficients matrix (Leontief inverse matrix) can be written as follows:

$$X=(I-A)^{-1} Y$$

$(I-A)^{-1}$ is called the Leontief inverse matrix. Y is the final demand matrix, and X is the output matrix. The component of the Leontief inverse matrix estimates the direct and indirect output levels from each sector of the economy due to changes in final demand.

Sri Lanka also has a competitive I-O table. The effect of imports should be eliminated in this table. Accordingly, the Leontief inverse matrix $(I-A)^{-1}$ should be adjusted to $(I-(I-M^{\wedge}) A)^{-1}$. This new Leontief inverse matrix $(I-(I-M^{\wedge}) A)^{-1}$ is known as the self-sufficient Leontief inverse matrix. The equation of the input-output analysis is as follows:

$$X=(I-(I-M^{\wedge}) A)^{-1} Y$$

X = Induced output

$(I-(I-M^{\wedge}) A)^{-1}$ = Self-sufficient rate Leontief inverse matrix

Y = Government expenditures

4.1 Multisector multiplier, Backward linkage and Forward linkage

The multisector multiplier (MM) is developed to measure the total impact on the economy of all the product of the input-output table. It delivers a quantitative measure of the association among industries.

MM =

$$\frac{1}{n} \sum_{i=1}^n \sum_{j=1}^n b_{ij}$$

b_{ij} = inverse matrix elements $\{I-(I-M^A) A\}^{-1}$

n = no. of sectors

Sectors with a higher backward and forward linkage have a strong effect on the entire economy. Thus, it is important to identify backward linkage and forward linkage in the economy. Backward linkage means that the production activities of relevant sectors may influence the greater use of other sectors as inputs for their production (demand to other sectors). Higher backward linkage sector growth is more favourable to the economy in terms of increasing other industries' production. Forward linkage means that the relevant sector may be used as an input to other sectors for their production (demanded by other sectors). Higher forward linkage sector production is more responsive to changes in other industries' output. In this thesis, both backward and forward linkages from the Leontief inverse matrix are derived.

The Leontief inverse matrix is expressed as $B = (b_{ij}) = \{I-(I-M^A) A\}^{-1}$. The sum of rows for column j from the inverse matrix is defined as

$$b_{.j} = \sum_{i=1}^n b_{ij}$$

$b_{.j}$ estimates the total output from all sectors created from one-unit final demand of product j; it is the backward linkage of sector j. The sum of the columns for row i of the Leontief matrix is used to calculate the forward linkage effect.

$$b_{i.} = \sum_{j=1}^n b_{ij}$$

Multisector multiplier, backward linkage and forward linkage disclose an industry's structural relationships and shows both the economic structure for each period and how this structure changes over time.

5.0 Empirical Results and Discussion

5.1 Structural change

The 2010 transaction table for the Sri Lankan economy has been subdivided into 127 sectors. However, the 2006 Sri Lankan I-O table was prepared based on 64 sectors. Accordingly, the 127 sectors in the 2010 I-O table have been converted to 64 sectors using central product classification version 1.1 (published by the United Nations Statistical Commission) by this author. Next, the 2010 I-O table (64 sector) is transformed to employ the basic price format from 2006 using 6 sectoral price indexes (Table 5.1.2).³ The 2006 and 2010 I-O tables can be easily compared and can help identify structural change in the economy since inflation ceased to have an impact, as seen in the 2010 I-O table. Table 5.1.1 shows a 2010 I-O table (on a real value basis) for the Sri Lankan economy prepared for 64 sectors. Table 5.1.3 shows a 2006 I-O table for the Sri Lankan economy prepared for 64 sectors.

Table 5.1 1 - Transaction Sri Lankan input-output table 2010 (real value basis): 64 sectors

Products by Products	1	2	.....	63	64
1 Rice (not husked)	3,242.96	0.85	.....	0.00	80.26
2 Maize (corn)	17.62	2.55	.....	0.11	0.05
3 Other cereals	158.58	22.93	1.02	0.41
4 Potatoes	10.75	0.01	91.81	16.80
5 Vegetables and roots	32.50	3.26	164.48	19.59
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60 Real estate services	0.00	0.00	82.65	51,090.07
61 Public administration	0.00	0.00	790.03	280.06
62 Education services	0.00	0.00	.....	8.92	178.13
63 Health and social services	0.00	0.00	.....	261.65	1,565.16
64 Other services n.e.c.	6,066.64	18.68	.....	64.29	151,636.61

Source: Author's calculations based on data from the Sri Lanka Department of Census and Statistics

Table 5.1 2 - Price indexes used for the real value calculation

NO.	Products	Price Index
1	Rice (not husked)	Food and non-alcoholic beverages
2	Maize (corn)	Food and non-alcoholic beverages
3	Other cereals	Food and non-alcoholic beverages
4	Potatoes	Food and non-alcoholic beverages
5	Vegetables and roots	Food and non-alcoholic beverages
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58	Financial intermediation services	Miscellaneous goods and services
59	Insurance and pensions	Miscellaneous goods and services
60	Real estate services	Miscellaneous goods and services
61	Public administration	Miscellaneous goods and services
62	Education services	Education
63	Health and social services	Health
64	Other services n.e.c.	Miscellaneous goods and services

Source: Central Bank of Sri Lanka, 2010

The transaction tables exhibit the connections of good and service among industries. The worth of the inputs acquired by the industry is shown in the columns in this transaction table. Additional rows in the table demonstrate the supply of products to different industries and final demand categories.

Table 5.1 3 - Transaction Sri Lankan input-output table 2006: 64 sectors

No.	Product by Product	1	2	.....	63	64
1	Rice (not husked)	1,848.23	0.00	.....	0.00	0.23
2	Maize (corn)	4.10	9.85	.....	0.00	0.00
3	Other cereals	1.02	0.00	0.00	0.00
4	Potatoes	0.00	0.00	0.00	0.00
5	Vegetables and roots	236.79	0.80	0.00	0.00
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60	Real estate services	7.77	0.20	62.89	397.14
61	Public administration	0.00	0.00	0.00	0.00
62	Education services	0.00	0.00	0.00	0.00
63	Health and social services	0.00	0.00	1,174.60	0.00
64	Other services n.e.c.	18.97	0.50	2,764.91	41,012.50

Source: Sri Lanka Department of Census and Statistics

The structural change in the Sri Lankan economy can be identified between 2006 and 2010 using total output (Table 5.1.4), final demand, intermediate input, total compensation, backward linkage and forward linkage.

Table 5.1 4 - Total output comparison between 2006 and 2010

Total output- 2006			Total output-2010		
		4,777,657.72			7,307,564.74
				Ratio	1.53
No	Products	Total output 2006 (R.M)	No	Products	Total output 2010 real (R.M)
1	Wholesale and retail trade services	558,416.01	1	Other services n.e.c	1,051,234.59
2	Land transport services	538,323.61	2	Wholesale and retail trade services	730,951.70
3	Construction services	480,624.00	3	Land transport services	693,239.22
4	Public administration	337,357.83	4	Construction services	626,616.69
5	Financial intermediation services	289,384.74	5	Knitted or crocheted fabrics	394,476.37
6	Refined petroleum	227,403.30	6	Public administration	322,824.23
7	Meat and prepared fish, fruit, vegetables and fats	173,444.14	7	Real estate services	304,545.76
8	Other services n.e.c	169,887.00	8	Food products nec	290,280.99
9	Wearing apparel	148,628.09	9	Financial intermediation services	278,109.89
10	Food products nec	142,988.10	10	Glass and non-metallic products	157,931.69
11	vegetables and roots	136,522.00	11	Grain mill products (rice, wheat and other)	157,418.11
12	Electrical energy and non-petroleum gases	121,118.96	12	Postal, telecommunication, information services	143,040.98

13	Real estate services	120,846.36	13	Lodging; food and beverage serving services	134,564.86
14	Glass and non-metallic products	86,682.20	14	Air transport services	125,678.12
15	Education services	68,423.72	15	Crude petroleum and other minerals	121,297.37

Source: Author's calculations based on data from the Sri Lanka Department of Census and Statistics.

2010 Output is increased 1.53 times over 2006. Some industries have increased, some have decreased, and others are stable in 2010 compared to 2006.

Refined petroleum products drastically decreased in 2010 based on a total output and final demand (Table 5.1.5) comparison between the two time periods. Final demand for refined petroleum decreased by 99% in 2010 because the refinery of Ceylon Petroleum Corporation (CPC) broke down several times in 2010. CPC's crude oil refinery was built in 1969 and had a capacity of 38,000 barrels per day. Capacity later increased to 50,000 barrels per day. By 2010, the refinery was very old and contributed only 40-45% of the total petroleum products needed each year. Ceylon Petroleum Corporation (CPC) provides more than 95% of its petroleum output to the public sector. Therefore, the public sector industrial output also decreased because of CPC's low production level (Central bank, 2010) (Ministry of petroleum industries, 2013).

Both apparel and textile articles other than apparel also decreased in 2010. In terms of total output, textile articles declined 97%, and wearing apparel declined 73% in 2010 compared to 2006. The production of textiles and apparel is mainly based on the European and US export markets. Therefore, withdrawal of the GSP+ concession by the European Union in 2010 negatively affected the textile and apparel category in Sri Lanka (Central bank, 2010).

The intermediate consumption, final demand and total output of coconut drastically declined (more than 90%) in 2010 due to low rainfall in vital growing areas, especially the Coconut Triangle (Puttalam, Gampaha and Kurunegala). An excessive decline in coconut production was reported in Puttalam District, which had the least rainfall. In addition, reduced productivity was caused by decreased less fertilizer usage in the smallholder sector, the degradation of topsoil in many estates, diseases and the division of coconut lands for various alternative uses.

Table 5.1 5 - Total demand comparison between 2006 and 2010

	Total final demand- 2006	2,778,435.53		Total final demand - 2010	4,596,352.48
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				Ratio	1.65
No	Products	Final demand 2006 (R.M)	No.	Products	Final demand 2010 real (R.M)
1	Construction services	419,600.34	1	Other services n.e.c	750,417.35
2	Wholesale and retail trade services	396,050.42	2	Construction services	607,508.12
3	Land transport services	368,499.69	3	Land transport services	494,347.75
4	Public administration	337,357.83	4	Wholesale and retail trade services	456,613.17
5	Meat and prepared fish, fruit, vegetables and fats	145,834.79	5	Knitted or crocheted fabrics	358,540.39
6	Wearing apparel	133,328.18	6	Public administration	315,580.75
7	vegetables and roots	109,994.97	7	Real estate services	240,067.57
8	Food products nec	108,003.78	8	Food products nec	236,284.37
9	Financial intermediation services	107,911.03	9	Air transport services	121,811.58
10	Real estate services	107,031.06	10	Lodging; food and beverage serving services	121,021.22

Source: Author's calculations based on data from the Sri Lanka Department of Census and Statistics.

The production of knitted and crocheted fabrics drastically increased in 2010 as a total output (11.05 ratio increase) and final demand (6.45 ratio increase) compared to total output and final demand in 2006. Despite various threats to this industry such as the 2010 withdrawal of the GSP+ concession by the European Union, regional competition among manufacturers, the high cost of labour and imported raw materials, Sri Lanka prevailed in competitive export markets by manufacturing high-quality, state-of-the-art products for major Western clothing brands. Key players in the apparel industry survived competition in the export markets in 2010, retaining their status as providers of the best-quality knitted and crocheted fabrics. The apparel industry in particular focused on new innovations and incorporated the launching of re-engineered design (RED) products by using waste fabric of local apparel industries, up-cycling and converting them into a fashionable clothing line catering to Western clothing brands. (Central bank, 2010) These textile manufacturing factories employ 'Ethically Manufactured Garments', 'Garments without Guilt Certification' and 'Sustainable Environmentally Friendly Manufacturing' strategies to supply high-quality products to international markets. In addition, in 2010, yarn, thread and woven and tufted textile fabrics increased to a ratio of 2.5 with the

increase in knitted or crocheted fabrics (Table 5.1.6). With respect to the total production of yarn and thread, woven and tufted textile fabrics (67%) have been used in the production of knitted or crocheted fabrics (input-output table 2010). This is a 65.7% increase over 2006.

The total output of and final demand for real estate increased in Sri Lanka by 2.5 and 2.4, respectively, in 2010 compared to 2006 because various infrastructure projects, especially mega projects such as port development, highway construction and north-east post-war reconstruction activity have been implemented. Furthermore, private developers have been motivated by the country's peaceful environment and have invested more in commercial, residential, hospitality and office space.

Table 5.1 6 - Total intermediate comparison 2006 and 2010

	Total intermediate consumption -2006	1,999,222.18		Total intermediate consumption - 2010	2,711,212.26
				Ratio	1.36
No.	Products	TIC-2006 (R.M)	No.	Products	TIC, 2010 real (R.M)
1	Financial intermediation services	181,473.71	1	Other services n.e.c	300,817.25
2	Refined petroleum	180,852.10	2	Wholesale and retail trade services	274,338.53
3	Land transport services	169,823.92	3	Land transport services	198,891.47
4	Wholesale and retail trade services	162,365.59	4	Financial intermediation services	182,417.51
5	Other services n.e.c	162,170.17	5	Crude petroleum and other minerals	176,310.59
6	Crude petroleum and other minerals	142,804.18	6	Glass and non-metallic products	122,332.26
7	Glass and non-metallic products	77,445.86	7	chemical products (fertilizer, detergents etc)	121,749.59
8	Electrical energy and non-petroleum gases	66,015.45	8	Yarn and thread; woven and tufted textile fabrics	90,243.44
9	Construction services	61,023.66	9	Electrical energy and non-petroleum gases	85,798.56
10	Basic metals	58,121.99	10	Paper printed matter and related articles	77,951.28

Source: Author's calculations based on data from the Sri Lanka Department of Census and Statistics.

The total output of grain mill products (rice, wheat and other) has expanded by a ratio of 3.3 in 2010, and final demand for this product increased by a ratio of 2.8 ratio that same year. More specifically, the increase in paddy production is attributed to the increase in Grain mill products. The government's fertilizer support and paddy-taking schemes, along with adequate rainfall, the timely release of water for cultivation, and the increased growing area in the northern and eastern provinces due to their newly peaceful environment were some of reasons for the increase in paddy production.

Final demand and total output of lodging and food and beverage service (hotels and restaurants) drastically increased (7.9 ratio, 4.4 ratio) in 2010 compared to 2006 because tourist arrivals increased by 46.1% in 2010 compared to 2006 because of Sri Lanka's newly peaceful environment.

The Sri Lankan shipping and boat building industry has shown high growth in 2010. That industry has received a large number of international orders, particularly from Europe, Mauritius, the Solomon Islands, Singapore and the Middle East during that year, especially for medium-scale vessels. Further, their local orders have also increased for commercial and leisure boats and small- and medium-scale luxury yachts due to the opening of the northern and eastern sea fronts. Fabricated metal products are mostly used for the shipping industry. Therefore, the total output of fabricated metal products sharply increased (to a 16.8 ratio) in 2010.

The intermediate consumption of chemical products (fertilizer, detergents) has increased to a 2.3 ratio in 2010 compared to 2006 because in 2010, chemical products were mostly used for paddy production. According to the input-output table, this result represents a growth rate of 27%.

5.2 Multi-sector multiplier, Backward linkage effects and forward linkage effect

The term multi-sector multiplier means the total impact on the economy from all the products on the input output table in 2006 and 2010.

According to my calculation, the multi-sector multiplier can be stated as follows:

- 2006 = 1.37
- 2010 = 1.32

Thus, the economy has an impact of 1.37 for industries interrelated to each other in 2006. The economy has an impact of 1.32 in 2010. Therefore, the economic impact of interrelated industries is little decrease in 2010 compared to 2006 period.

Some industries create demand in other industries. That means when one relevant industry increases production, demand for the input of that production also increases. The relevant industry then creates demand in other industries. This is called the backward linkage effect. Sectors that have a backward linkage effect of more than 1 have a strong effect on the entire economy by supporting and motivating production in other sectors. In the Sri Lankan economy, there were 28 sectors that have more than 1 backward linkage in 2006 (Table 5.2.1) and, 34 sectors had more than 1 backward linkage in 2010.

Table 5.2. 1 - Backward linkage effect in 2006 and 2010 in the Sri Lankan economy

Backward linkage effect - 2006			Backward linkage effect - 2010		
No	Products	BLE - 2006	No	Products	BLE - 2010
1	Other services n.e.c	1.50	1	Grain mill products (rice, wheat and other)	1.23
2	Food products nec	1.42	2	Meat and prepared fish, fruit, vegetables and fats	1.21
3	Rubber products (tyres and tubes etc)	1.32	3	Postal, telecommunication, information services	1.21
4	Tobacco products	1.28	4	Leather and leather products; footwear	1.19
5	Meat and prepared fish, fruit, vegetables and fats	1.26	5	Refined petroleum	1.18
6	Dairy products	1.25	6	Food products nec	1.18
7	Grain mill products (rice, wheat and other)	1.23	7	Dairy products	1.18
8	Air transport services	1.22	8	Rubber products (tyres and tubes etc)	1.17
9	chemical products (fertilizer, detergents etc)	1.18	9	Air transport services	1.17
10	Lodging; food and beverage serving services	1.16	10	Rice not husked	1.16

Source: Author's calculations based on data from the Sri Lanka Department of Census and Statistics

Some industries' output is demanded by other industries. Therefore, increased production in other industries leads to growth in relevant industries as supply inputs to meet the expanded demand. This is called the forward linkage effect. The existence of some industries that have a

stronger forward linkage effect than other industries (more than one) means that these industries are comparatively more responsive to changes in other industries' output. The Sri Lankan economy has 14 sectors with more than 1 forward linkage in 2006 (Table 5.2.2) and, 16 sectors have more than 1 forward linkage in 2010.

Table 5.2. 2 - Forward linkage effect in 2006 and 2010 in the Sri Lankan economy

Forward linkage effect – 2006			Forward linkage effect - 2010		
No	Products	FLE - 2006	No.	Products	FLE - 2010
1	Wholesale and retail trade services	2.87	1	Wholesale and retail trade services	3.05
2	Financial intermediation services	2.83	2	Other services n.e.c	2.48
3	Land transport services	2.79	3	Land transport services	2.11
4	Other services n.e.c	2.25	4	chemical products (fertilizer, detergents etc)	1.74
5	Refined petroleum	2.20	5	Electrical energy and non-petroleum gases	1.70
6	Electrical energy and non-petroleum gases	1.67	6	Financial intermediation services	1.49
7	Construction services	1.45	7	Fabricated metal products nec	1.41
8	Natural rubber	1.32	8	Crude petroleum and other minerals	1.27
9	Rice not husked	1.22	9	Postal, telecommunication, information services	1.24
10	Wearing apparel	1.07	10	Glass and non-metallic products	1.17

Source: Author's calculations based on data from the Sri Lanka Department of Census and Statistics

Other services (beauty and physical well-being services; washing, cleaning and dyeing services; cremation and undertaking services; and security services), food products (tea and coffee products, soups, broths, and products using vinegar sauces), rubber products (tyres and tubes, etc.), meat and prepared fish, fruit, vegetables and fats, dairy products, and grain mill products (rice, wheat and other) are particularly likely to have high backward linkages in 2006 year. Grain mill products (rice, wheat and other), Postal, telecommunication, information services, Leather and leather products; footwear have high backward linkages in 2010. That means that these sectors have a strong influence on the economy.

Wholesale and retail trade services, financial intermediation services, land transport services, sectors have the highest forward linkages in 2006 year as well as 2010.

In 2006, the backward linkage effect of leather and leather products; footwear was 0.97. However, it increased to 1.19 in 2010. The forward linkage of Postal, telecommunication, information services was 0.92 in 2006 and increased to 1.24 in 2010.

In 2006, the forward linkage of fabricated metal products n.e.c. was 0.74, increasing to 1.41 in 2010 because it is used for the ship and boat-building sector, which drastically increased in 2010. In particular, there were many international orders for medium-scale vessels in 2010. Demand for locally manufactured commercial and leisure boats and small- and medium-scale luxury yachts increased in 2010 due to the growth of tourism industry and the peaceful situation of the seafronts in the northern and eastern provinces (Central Bank, 2010).

According to decomposition analysis total output between 2010 and 2006 equal to the summation of technological change, final demand change, and effect of both changes.⁴ So, technological change is higher in Sri Lankan economy than the demand change. Particularly, Crude petroleum and other minerals had higher technological change between these periods. However, demand change is higher in knitted or crocheted fabrics, other services n.e.c, land transport services sectors than the other sectors. (Table 5.2.3)

$$\Delta X = \Delta BF + B\Delta F + \Delta B\Delta F$$

X = Total output

B = Leontief inverse ($\{I - (I-M)A\}^{-1}$) Technological change

F = Final Demand

Δ = Difference between period 2010 and 2006

Table 5.2. 3 - Technology change and demand change between 2010-2006 period.

Technological change, Demand change between two period (unit Million Rupees)				
No.	Products	Technological change (inputs change)	Products	Demand change

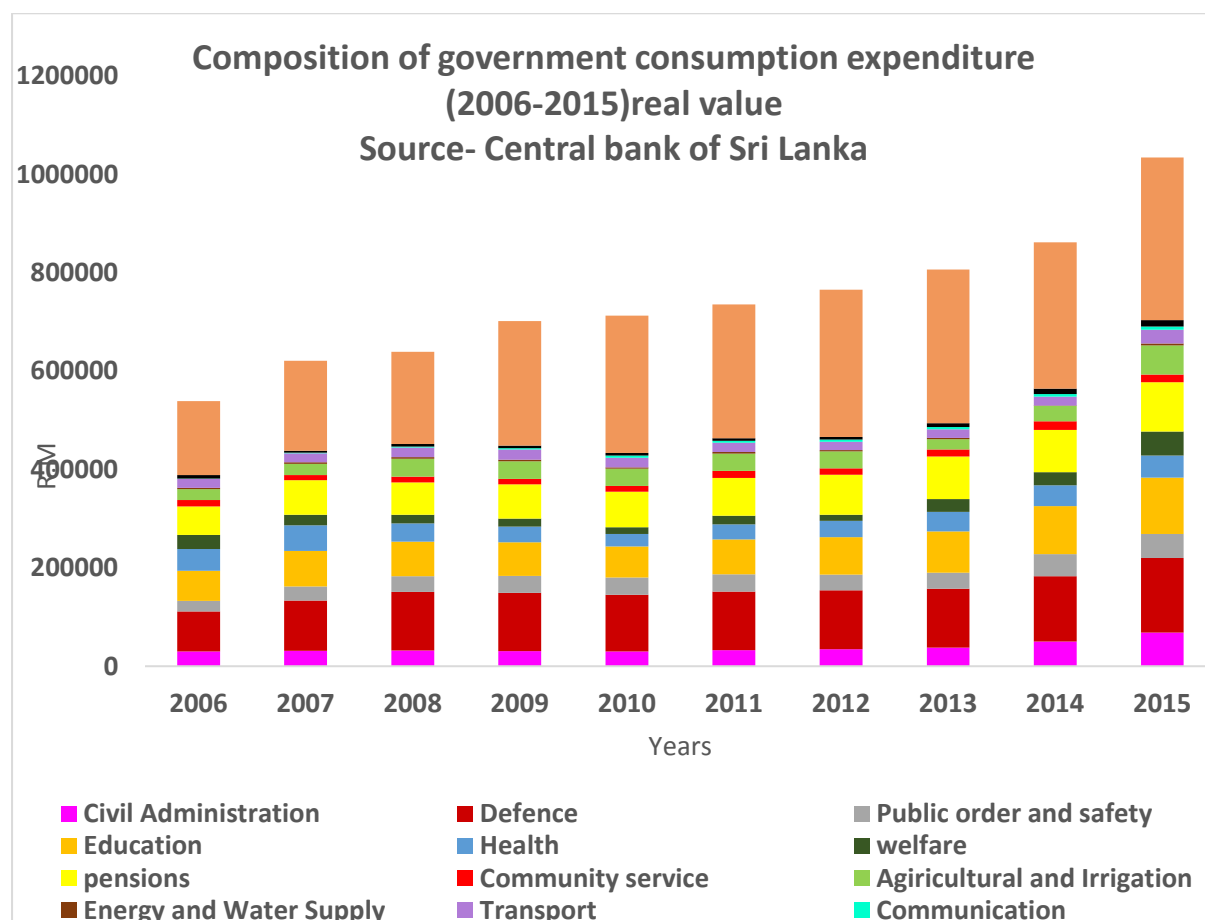
⁴ Appendix 2 shows the total output changes technological changes and demand changes between two period.

1	Crude petroleum and other minerals	3,089,667.80	Other services n.e.c	940,934.45
2	Wholesale and retail trade services	310,408.32	Knitted or crocheted fabrics	352,385.35
3	chemical products (fertilizer, detergents etc)	301,018.84	Land transport services	251,201.43
4	Other services n.e.c	298,391.33	Financial intermediation services	245,502.60
5	Electrical energy and non-petroleum gases	182,261.44	Construction services	243,526.07
	Total	4,862,791.53	Total	3,005,005.64
			Ratio	1.62

Source: Author's calculation based on input output table data

5.3 The influence of the government budget on the economy in Sri Lanka

Figure 5.3. 1- Composition of government consumption expenditures (2006-2015) (real value R.M)

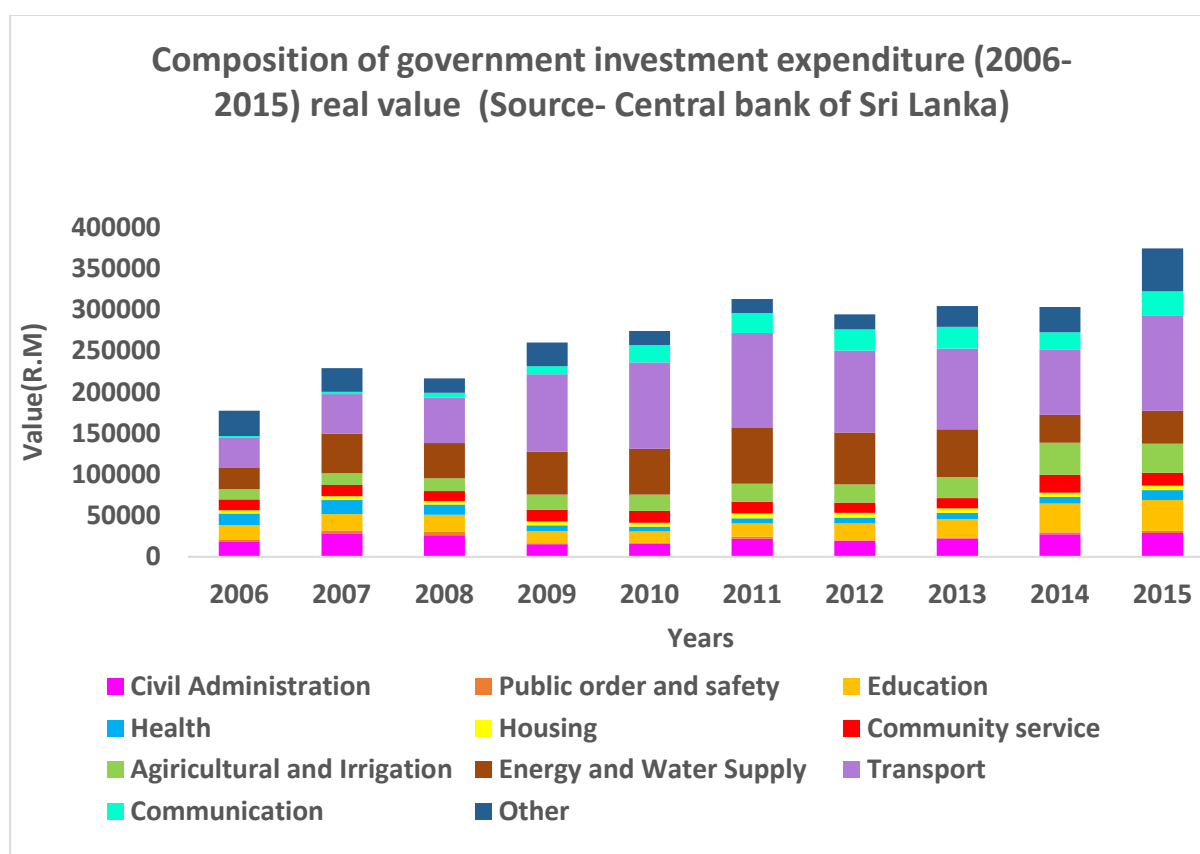


Source: Central Bank of Sri Lanka

There are two types of government expenditures in Sri Lanka: consumption expenditures and investment expenditures. Figure 5.3.1 shows consumption expenditures from 2006 to 2015(real value) in Sri Lanka. Figure 5.3.2. shows investment expenditures from 2006 to 2015(real value) in Sri Lanka.

Consumption expenditures for 2007 are allocated to the input-output table. This allocation is based on total output of 2006 input output table. Accordingly, other years consumption expenditure also allocated to input- output table, same as 2007.

Figure 5.3. 2 - Composition of government investment expenditures (2006-2015)



Source: Central Bank of Sri Lanka

Table 5.3 1- Average consumption budget (2009-2006) and average budget impact

No	Products	2009-2006 average budget	Average impact	Induced ratio
1	Financial intermediation services	193,498.39	218,637.78	1.13
2	Public administration	165,485.09	165,485.09	1.00

3	Health and social services	73,609.46	80,543.94	1.09
4	Insurance and pensions	65,982.58	69,615.10	1.06
5	Education services	67,988.37	67,998.74	1.00
6	Other services n.e.c.	8,855.83	48,924.59	5.52
7	Land transport services	16,605.01	47,906.84	2.89
8	Wholesale and retail trade services	0.00	21,235.68	0.00
9	Refined petroleum	0.00	19,136.82	0.00
10	Electrical energy and non-petroleum gases	2,914.39	16,290.69	5.59
	Total	491,673.61	855,406.87	1.74

Source: Author's calculation based on central bank data for Sri Lanka 2009-2006

When comparing the 2015-2010 period, the 2009-2006 period has a high total induced ratio (Table 5.3.2). That means that the impact of one unit of consumption budget is higher in the 2009-2006 period than the 2015-2010 period. Further consumption expenditures on Electrical energy and non-petroleum gases has a greater impact on the economy during the 2015-2010 period. That sector became one of the highest-impact sectors in 2015-2010 period. In addition, postal telecommunication information services, other services n.e.c sectors also had a high impact during the 2010-2015 period.

Table 5.3 2 - Average consumption budget (2015-2010) and average budget impact

No.	Products	2015-2010 average budget	average impact	induced ratio
1	Financial intermediation services	298,426.45	315,194.08	1.06
2	Public administration	206,791.86	212,060.71	1.03
3	Insurance and pension	83,851.71	90,330.90	1.08
4	Education services	84,198.97	84,222.60	1.00
5	Health and social services	74,699.00	75,606.42	1.01
	Total	832,627.77	990,453.57	1.19

Source: Author's calculation based on central bank data for Sri Lanka, 2010-2015

Table 5.3 3 - Difference in average consumption budget (2015-2010) -(2009-2006) and difference in average induced impact and induced ratio of consumption budget

No.	Products	Difference of average budget	Difference of average impact	Ratio
1	Financial intermediation services	104,928.06	96,556.30	0.92
2	Public administration	41,306.77	46,575.62	1.13

3	Insurance and pension	17,869.13	20,715.80	1.16
4	Postal, telecommunication, information services	4,060.17	9,209.99	2.27
5	Water	92.43	1,287.93	13.93
6	Electrical energy and non-petroleum gases	-620.88	-5,798.05	9.34
7	Land transport services	-859.90	-19,679.36	22.89
	Total	203,963.90	135,046.70	0.66

Source: Author's calculation based on central bank data for Sri Lanka, 2006-2015

The above table shows the difference in the average consumption budget, meaning that the 2010-2015 average consumption budget minus the 2006-2009 average consumption budget information for 64 sectors is included. According to this information, financial intermediation services, public administration, insurance and pensions, education services, other services n.e.c. (beauty and physical well-being services; washing, cleaning and dyeing services; cremation and undertaking services; and security services), postal, telecommunication, and information services average budget expenditures increased in the 2010-2015 period; the average induced impact also increased in this period.

Furthermore, the average budget for electrical energy and non-petroleum gases, land transport services decreased in 2010-2015 period compared to the 2006-2009. However, the average budget for health and social services increased in the 2010-2015 period, and the induced impact of health and social services and decreased in the 2010-2015 period. That means that these sectors' interrelations with other sectors decreased in the 2010-2015 period.

In addition to that, land transport services, electrical energy non-petroleum gases, Postal, telecommunication, information services, and water had higher induced ratio. That's means impact of one unit of budget is higher in those sectors than the other sectors. However, health and social service had negative induced ratio. That's means impact of one unit of budget had negative impact of the economy.

Investment expenditures for 2007 are allocated to the input-output table. This allocation is based on total output of 2006 input output table. Accordingly, other years investment expenditure also allocated to input- output table, same as 2007.

Table 5.3 4 - Difference in average investment budget (2010-2015) -(2006-2009) and difference in average induced impact of investment budget and induced ratio.

No.	Products	average budget difference	average impact difference	ratio
1	Construction services	89,924.66	86,963.58	0.97
2	Glass and non-metallic products	0.00	31,149.32	
3	Crude petroleum and other minerals	0.00	21,970.18	
4	Wholesale and retail trade services	0.00	18,492.90	
5	Land transport services	0.00	6,764.11	
	Total	89,924.66	189,453.41	2.11

Source: Author's calculation based on central bank data for Sri Lanka, 2006-2015

According to the above calculation, the induced ratio of average investment budget is increased to a 2.11 ratio in the 2010-2015 period. That means that the average budget of investment expenditures and the induced impact of investment expenditures increased in the 2010-2015 period.

During the 2010-2015 period, the average induced impact of the investment budget increased in the glass and non-metallic products, crude petroleum and other minerals, wholesale and retail trade services, and land transport services sectors. As a result of increasing construction services, government infrastructure projects, rehabilitation and reconstruction projects in the northern and eastern provinces, glass and non-metallic mineral products also increased. In particular, the cement, tile and roofing subcategories increased after 2009 with the end of the war in the northern and eastern province.

The induced impact of land transport investment expenditures increased in the 2010-2015 period. During this time period, several infrastructural construction activities relating to transport, especially the Southern Highway project, the Colombo Katunayake expressway project, and several other road-development projects have been initiated.

6.0 Conclusion

According to total output comparison, final demand and intermediate input comparisons can identify a structural change in 2010 compared to 2006. Refined petroleum products, textile articles other than apparel, apparel products, and coconut drastically decreased in 2010. However, knitted or crocheted fabrics, yarn and thread, woven and tufted textile fabrics, real estate services, lodging, food and beverage services, and fabricated metal products increased in 2010 compared to 2006.

The public consumption budget for financial intermediation services, public administration, insurance and pensions, education services, other services n.e.c., postal services, telecommunication services, and information services had a mostly positive effect on the induced output of the economy. The public consumption budget for postal telecommunication and information service, electrical energy and non-petroleum gases, and land transport services had a high induced ratio of the economy.

According to the induced ratio, the 2006-2009 consumption budget has a stronger induced impact than the 2010-2015 consumption budget.

Furthermore, construction services, Glass and non-metallic products, Crude petroleum and other minerals, Wholesale and retail trade services, Land transport services had higher induced impact of investment expenditure. The induced output of investment expenditure for the 2010-2015 period has a higher impact than for the 2006-2009 period. In particular, the induced ratio increased to 2.11 in 2010-2015 compared to 2006-2009.

6.1 Policy Implication

Fiscal authority should more focus on government consumption expenditure on particular sectors such as land transport services, electrical energy, non-petroleum gases, and postal telecommunication and information service sectors according to the results of the study. Because, these sectors produce more induced output to the economy. In those sectors, induced ratios are high in comparison with other sectors of the economy corresponding to consumption expenditure.

In addition to that, government investment expenditure on Construction services, Glass and non-metallic products, Crude petroleum and other minerals, Wholesale and retail trade services and Land transport services are more important as these generates higher induced output on investment expenditure.

Further, it is vital to identify structural changes of the economy because such changes influence of prioritization of sectors in the economy over a period. Hence, increase of relative importance of Knitted or crocheted fabrics, Real estate services, lodging; food and beverage serving services were significant in 2010 in comparison with 2006. Moreover, decreasing relative important of some sectors like refined petroleum products, Textile articles other than apparel, coconut sectors in 2010 was indispensable. Identification of priority sectors and analysing factors related to increasing and decreasing of these sectors in the Sri Lankan economy certainly important for planned, strategic disperse of government expenditure among sectors. Policy makers and implementers should consider these findings prior to expenditure allocation to ensure effective allocation of expenditure.

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