Chapter VI

Empirical Analysis and Modification of Data Savings and Investment Pattern in Sri Lanka
CHAPTER-VI

EMPIRICAL ANALYSIS AND MODIFICATION OF DATA ON SAVINGS AND INVESTMENT IN SRI LANKA

6.1 Introduction

This chapter is an attempt to identify the factors affecting the growth of the Sri Lankan economy, investment pattern and savings behaviour, using the official data published by the Central Bank of Sri Lanka for the period 1961-2000. Further, reported estimates are modified by taking into account the civil war and the black economy in Sri Lanka for the period 1983-2000. Based on the findings, conclusions are arrived at in explaining the changing trends in investment, saving and rate of growth of the Sri Lankan economy.

6.2 Determinants of Rate of Growth

Sri Lanka's economic performance during the last four decades was not very impressive, though it was in a good position at the time of independence. For example, Sri Lanka's per capita income in US $ was 276% higher than that of Indonesia, 46% higher than of Thailand, about the same as of South Korea and about 50% lower than Malaysia's (Ahmed & Ranjan 1995). However, there has been a reversal in the situation. At present, Sri Lanka is far behind all these above mentioned countries in terms of per capita income. However, Sri Lanka achieved a respectable human development index for the country. The issue arises, what are
the factors that contributed to the poor performance of the Sri Lankan economy? Are they endogenous factors, such as, inadequate investment and low saving rates, or, are they exogenous factors, like, investment climate, civil war and the black economy?

The growth of a capitalist economy can be assumed to be a function of the rate of growth of private investment, capitalists’ consumption, primary deficit of the government and the export surplus of the country. This means that an increase in the above variables would increase the rate of growth of an economy. As discussed in Chapter 2, the net profit is the sum of private consumption, private investment, budget deficit and export surplus (Kalecki, 1971). Kalecki considered these variables as explanatory variables in determining the profit of a capitalist economy. Profit may be assumed to be proportionate to income of the country in the short run. Therefore, the above variables could be taken as the explanatory variables for the growth of a capitalist economy. Based on this argument, rate of change in private consumption, private investment, budget deficit and export surplus are considered as independent variables which determine rate of growth of the economy. In a form, Kaleckian income identity could be expressed as follows:

\[ NP = PC + PI + BD + ES \]

Where, NP stands for net profit, PC for private consumption, PI for private investment, BD for budget deficit, and ES for export surplus.
Kumar (1988) argued that the budget deficit in the Kaleckian model need to be interpreted broadly as fiscal deficit and in Kumar (1999) he introduced primary deficit (PD) when modifying the above income identity. Accordingly, primary deficit of the budget is considered as one of the explanatory variables instead of the budget deficit in our model for the rate of growth of the economy. The functional form for the rate of growth of an economy GR could be expressed as a function of growth rate of the above variables:

$$GR = f(GPC, GPI, GPD, GES)$$

In order to estimate the effect of the chosen macroeconomic factors on the growth of the economy, growth of the real variables at 1996 prices of each of the variables are considered. It is expected that, ceteris paribus, all of these variables considered in the functional form will have a positive impact on the growth of the economy.

Using multiple regression analysis the following result obtained is reported below:

$$GR = 3.46 + 0.42 GPC + 0.63 GPI + 0.11 GPD - 0.16 GES$$

$$\begin{align*}
(1.688)^* & \quad (1.986)^* & \quad (1.295) & \quad (-0.638)
\end{align*}$$

$$R^2 = 0.50, \text{ Adjusted } R^2 = 0.41$$

"t" values are given in parenthesis, F-value = 6.12
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The above result shows that all the major factors taken into consideration failed to explain fully the variation in the growth of the Sri Lankan economy. Though the chosen factors are the most relevant factors, they explained only 41% of the variation in the rate of growth of the Sri Lankan economy. This implies that we need to reconsider either the model or the data or both. Further, it was expected that all these variables would have a positive impact on the growth of the economy. However, the expected positive relationship was not obtained for export surplus. The export surplus is found to be a non-significant variable in the model.

Primary deficit is also found to be a non-significant variable in the model, though it has a positive impact on the rate of growth of the economy. Primary deficit is largely driven by policies of the government. We have seen in Chapter 3 that the gap between the government revenues and the government expenditures got wider showing continuous drop in the revenue and escalating government expenditure. We found that the main reason for this was a drop in tax revenue and, on the expenditure side, rise in defense expenditure and the interest payments rose. It is possible, as suggested earlier, that the official data is being affected by the black economy.

We have seen that defense expenditure remained very low before the civil war started, ranging from 0.5 to 0.9 of GDP. But it escalated during the civil war period and reached the level of 6% of GDP in 1995 which forcing the government
to reduce its capital expenditure as well as expenditure on social services. This changes the linkage between primary deficit and the rate of growth of the Sri Lankan economy. The increase in the primary deficit was mainly due to the increase in the defense expenditure but the increase in interest payments tended to reduce its magnitude.

Theoretically, export surplus should have a positive impact on rate of growth of the economy. But the result obtained above is in contradiction to the theory. We have argued in Chapter 5 that the National Account estimates are not reliable for a number of reasons, such as reliability of the data, effect of the civil war on the National Account estimates, the impact of the black economy, etc. Therefore, the official data do not reveal the actual estimate for the export surplus. For instance, because of the black economy, capital flight is taking place (Sarvananthan, 2002) and there is smuggling on a large scale. This is not reflected in the official statistics.

The above analysis clearly points out that chosen explanatory variables need to be corrected, to accommodate the effect of the civil war and the impact of the black economy.

6.3 Determinants of Investment

There are ample analytical and empirical studies on the determinants of investment in developed as well as developing countries. Before attempting to formulate a model for investment for our empirical analysis, a brief description of the theoretical background is presented below.
6.3.1 Model Specification for Investment

Here it is assumed that the determinants of investment are the factors that affect profit of the capitalists. Factors that affect the profits directly or indirectly are taken into consideration. Accordingly, the most relevant factors in the context of the Sri Lankan economy are taken to be government investment, defence expenditure, stock market index, and capacity utilization of the industrial sector.

There are arguments whether the government investment is complementary to private investment or whether it crowds out private investment. Kelagama (2005) argued that government investment is complementary in the case of Sri Lanka. Our descriptive analysis shows a mixed result. Theoretically, because it helps raise capacity utilization there will be a positive impact till full capacity is reached.

There are controversies on the impact of the defense expenditure on growth of the economy. Benoit (1973) argued that it has a positive impact on the growth of the economy whereas, among others, Lim (1983), Deger (1986), and Taylor (1984) showed that its impact was negative. A study by Kelagama (2001) found that the defence expenditure has a negative and insignificant effect on government in the long run in the case of Sri Lanka. He ran a regression equation for government capital formation with defence expenditure, and FDI, and dummies accounting for reform in 1977 and civil war in 1983 for the period 1960-
1996. His estimates show that 1% increase in defence expenditure (% of GDP) reduces the government capital formation by 2.14%, though his model could explain only 50% of the variation by the chosen independent variables. Grober and Gnananselvam (1993) argue that the spending on the defense reduced the investment and the non-military government expenditure, particularly the expenditure on economic activities. Their study indicates that 1% increase in defence expenditure leads to reduced government expenditure by 1.4%. The above studies show that the defence expenditure crowd-out government capital formation.

The stock market index and the capacity utilization are taken as explanatory variables since these two are the indicators for profits. Share prices in the stock market are mostly determined by the profit expectations of the particular firms they choose while capacity utilization determines the capitalists' profits. If more capacity is utilized, more profit is earned out of this. Therefore, it is expected that these two have a positive impact on private investment.

The basic model may expresses the rate of investment (PI) as a function of government investment (GI), defense expenditure (DE), stock market index (SMI), and capacity utilization (CU). Thus,

$$PI = f(GI, DE, SMI, CU)$$

Linearization will produce the following;

$$PI = a_0 + a_1 GI + a_2 DE + a_3 SMI + a_4 CU$$
The expected sign of the coefficients as discussed above are:

\[ a_1 > 0; a_2 < 0; a_3 > 0; a_4 > 0 \]

The estimation was carried out with its full specification with and without dummy variables for economic reform in 1977 and 1989 and the civil war in 1983. All the variables are expressed in real terms at 1996 prices. As reported below, the regression without dummy variables explained better than the model with dummy variables and it is taken for further analysis.

The statistical findings reported below show that the coefficients of the explanatory variables are significant except the coefficient for stock market indicator. Among them, the coefficients of the government investment and defense expenditure are the most significant variables at the 95% level of confidence while capacity utilization is significant at 90% level. The statistical significance of most of these variables support our choice of the independent variables. However, these could only explain 57% variation in the private investment.

\[
\begin{align*}
PI &= -4.63 + 0.399 GI + 0.36 SMI - 0.404 DE + 0.218 CU \\
&= (2.687)^* 

degree 
0.286 
\) 
(-2.755)^* 
(1.695)* 
\end{align*}
\]

\[ R^2 = 0.63 \quad \text{Adjusted } R^2 = 0.57 \]

"t" values are given in parenthesis. \( F = 10.70 \)
The main implications of this statistical investigation can be summarized as follows. The government investment, defense expenditure and capacity utilization are the major factors determining the private investment in Sri Lanka since they are significant in the model. The stock market is found to be insignificant though it has a positive impact of the investment. Further, it is found that the government investment expenditure is complementary to the private capital formation supporting crowding-in hypothesis. Consistent with other findings in Sri Lanka, defense expenditure has a negative impact on the private capital formation. According to our estimate, 1% increase in the defense expenditure reduces the private investment by 0.40%. This result is similar to that in two other studies regarding Sri Lanka (Kclagama, 2001; Grober & Gnanaselvam, 1996).

The positive relationship of stock market index suggests its significant role in the capital formation in Sri Lanka. It is already suggested in Chapter 4 that its contribution in mobilizing savings is minuscule. As discussed in Chapter 3, the stock market was vulnerable to exogenous factors such as business environment and country's insecurity due to civil war. Further, it was insignificant as a means of financing corporate investment before 1989 (Central Bank of Sri Lanka, 1992). During the nineties, it could not contribute much also for the same reasons.

We have seen in Chapter 5 that there are problem with the national account estimates. We argued that due to the civil war, the published data do not
reflect the data for the entire country specially the economic activities in North-East. The investment activities were severely affected due to the civil war during the last two decades. Therefore, the published data cannot provide good results. The results obtained above support our view that the variables would not explain the investment pattern unless the data are corrected for the war and the black economy.

6.4 Determinants of Savings

The formulation of the savings function is based on a Kaleckian model. Kalecki derived the savings equation from his generalized equation for the national income identity, which states that the profit net of taxes \((P - T)\) is the sum of capitalists’ consumption \((Cc)\), private investment \((PI)\), budget deficit \((BudGet)\), export surplus \((ES)\) minus workers’ savings \((Ws)\). In an equation form, it is expressed as follows;

\[
(P-T) = Cc + PI + BudDef + ES - Ws
\]

The equation for savings may be obtained by subtracting \(Cc\) and adding \(Ws\) in both sides of the above equation;

\[
Cs + Ws = PI + BudDef + ES
\]

The above equation states that the gross domestic savings, which is the sum of capitalists’ savings and workers savings, is equal to the sum of private investment, budget deficit and export surplus. One of the basic assumptions in the Kaleckian
model is that workers do not save. Therefore, capitalists' savings becomes equal to private investment, budget deficit and export surplus.

In Kaleckian model, rate of interest is not a factor which brings equality between savings and investment. As against the classical model. Kalecki (1971) says;

"...it will be independent of the level of the rate of interest which was customarily considered in economic theory to be the factor equilibrating the demand for and supply of new capital' pp.83

As discussed earlier, once the investment is carried out, this automatically provides the savings necessary to finance it. This is to say that if investment increases by a certain amount, savings out of profits are pro tanto higher.

The relationship between savings and government savings is the most controversial issue in macro economics (Mohanty, 1995). Keynesian framework postulates that fiscal deficit increases the total expenditure and increases the savings potential of the country. Though the neoclassical economists support this view, they argue that fiscal deficit increases the private consumption, not to the level as prescribed by the Keynesian school. In the meantime, some economists argue that fiscal deficit may have positive or negative impact on private savings. This effect is popularly known as “Crowing-out effect”. According to this, if the private expenditure, both consumption and investment, are complementary to the government total expenditure, the increase in the fiscal deficit will reduce the domestic savings by reducing the fund availability for investment activities by
private sector, which in turn increase the foreign savings. In this case, government expenditure crowds out the private investment, hence their savings. The opposite side is also true when the private expenditure substitutes the government expenditure. Some other economists argue if the government expenditure is spent on incentives for promoting savings in the country, the fiscal deficit will increase the savings propensity of the country.

Kalecki shows that budget deficit stimulate savings in the country. He explained this phenomenon in terms of profits. The generalized equation derived by Kalecki indicates that an increase in export surplus will increase profits of the capitalists that in turn would increase their investment capacity. Budget deficit also has a similar effect on profit. Kalecki considers the budget deficit as an artificial export surplus. In the case of export surplus, capitalists get more from export than imports from foreign countries whereas capitalists receive more from government expenditure than they pay in taxes in the case of budget deficit. In both cases, capitalists get benefits and thereby they increase the profits. Both create indebtedness. In the case of export surplus, it is from foreign countries towards the country considered, and in the other case it is from the government towards the private sector. Kalecki (1971) argues, based on the above argument, that it is the export surplus and budget deficit which enable the capitalists to make profits over and above their own purchase of goods and services.
Since the relationship between the gross savings and the government is already established, it is not attempted here to test it statistically.

6.4.1 Concluding Remarks

The regression results for the growth of the economy, investment and savings behaviour indicate that the factors considered in each of the models explained only part of the variation. It was 41% in the case of rate of growth of the economy, and 57% for investment and 56% for savings. As we have argued earlier that the national account data affected by the civil war in the country and non-inclusion of the black economy. Consequently, the use of the published data do not yielding good results is not surprising. Therefore, data have to be modified taking into account the civil war and the black economy in Sri Lanka for a meaningful analysis of the macroeconomic relationships considered in this study.

6.5 Rate of Growth, Investment and Savings: Effects of the Civil War in North-East

War in a country may result in increased economic activity related to the war effort. Government could increase its expenditure as a % of GDP and this could be financed through higher taxes. This through the balanced budget multiplier could result in a higher GDP. However, war could result in lower private investment due to uncertainty and reduce the level of GDP.

Further, during a war, while gross investment may rise, due to war related destruction, net investment may fall. Destruction due to war also results in lower
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level of net GDP. In the case of an economy like Sri Lanka where war related production is low since most of the equipment is imported, gross investment would also not rise much (imports would rise). Hence, net investment would fall and due to rise in imports, trade surplus would fall. Both these would tend to reduce the rate of growth of output of the economy. However, during the Nineties, the rate of growth remained high. How can this be understood?

It has been claimed that Sri Lanka has achieved a respectable rate of growth in spite of the civil war (O’Sullivan, 2001). This claim is purely based on the official estimates of the GDP for Sri Lanka and needs to be looked at closely since the official estimates have a problem.

As discussed in Chapter 5, though the North-East part of the country was covered in the estimates of GDP during 1983-2000 (Savundranayagam, 2005), it was based on the survey data collected before the civil war started. The Consumer Finance Survey done in 1982 was taken as a benchmark and extrapolated to get the estimates for 1983-2000. It is evident that the civil war beginning in 1983 damaged and or affected the Sri Lankan economy in numerous ways. It hindered the capital formation in the North-East region to a great extent and even in the other region as discussed in Chapter 1. Savings propensity was affected mainly due to the economic embargo in the North-East region. Because of these factors, the growth rate of the country was affected. The following table provides some estimates of the losses due to the civil war in Sri Lanka during the period 1984-1996.
The above table indicates the extent to which the civil war affected the Sri Lankan economy. As argued in Chapters 5 and 6, almost all aspects of the economy were affected. However, no adjustment for these factors has been made to the official estimates for the North-eastern part. The official data published by...
the Central Bank of Sri Lanka are used in our models in the previous sections. We have argued that until these data are modified, meaningful analysis cannot be undertaken. In the following section, an attempt is made to modify the estimates of the North-East region of the country.

The above table has two clear implications. First, the war damaged the economy severely and its effects on data have to be separately incorporated through special effort and secondly, the official machinery broke down and no data collection was possible from the North-eastern part. Hence the government resorted to projections based on what data it could collect from that part of the economy which was not directly affected by the war. This has two problems: a) Data from the rest of the economy (not directly experiencing the war) was not relevant to the North-eastern part and b) the surveys done before 1983, used as the basis for projections, were no more relevant to the post 1982 period when war was going on.

We will incorporate the effect of the war on the data of the north-eastern part in two stages. First assuming, that there was an unchanging effect of the war and secondly that the intensity of the war affected the variables directly each year. After all, there was a period of negotiations and ceasefire in between when there was no war then there were periods of intense conflict with heavy loss of life and destruction of assets. Hence we should not expect a uniform effect in all the years.
6.5.1 Modified Series for Growth Rate, Investment and Savings

It was argued elsewhere in the thesis that official data on the rate of growth, investment and savings are based on data collection from only a part of the country and it does not represent the whole economy. Therefore, the published data represent only that part of the economy unaffected by the war. Due to the destruction in the North-East region, there could hardly have been growth of the economy, or positive investment and savings during the civil war period 1983-2000. Though it is argued in this Chapter that the rate of changes in these variables would have been negative, as a simplifying assumption, it is taken to be zero for the North-east region during the war years. The following formula was applied to modify the official data of these variables of Sri Lankan economy as a weighted average of the two part of the country based on the share of the population of the N-E region and rest of the country. The assumption here is that the war had a uniform effect all through.

\[
\text{gr}_{\text{tot}} = \frac{(\text{gr}_{\text{ne}} \cdot P_1 + \text{gr}_{\text{roc}} \cdot P_2)}{(P_1 + P_2)}
\]

where; \( P_1 \) and \( P_2 \) represent the population in the N-E and the rest of the country respectively while \( \text{gr}_{\text{tot}}, \text{gr}_{\text{ne}} \) and \( \text{gr}_{\text{roc}} \) refer to the changes in each of the variables of the country, North-East region and the rest of the country respectively. The estimated rate of growth for the country is given in the Table-6.1.
### Table 6.1: Modified data for the country after correcting for N-E region, 1983-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Reported Rate of Growth</th>
<th>Estimated Rate of Growth</th>
<th>Reported Gross Capital Formation (% GDP)</th>
<th>Estimated Gross Capital Formation (% GDP)</th>
<th>Reported Gross Domestic Savings (% GDP)</th>
<th>Estimated Domestic Savings (% GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>5.0</td>
<td>4.3</td>
<td>28.9</td>
<td>24.9</td>
<td>13.8</td>
<td>11.9</td>
</tr>
<tr>
<td>1984</td>
<td>5.1</td>
<td>4.4</td>
<td>25.9</td>
<td>22.3</td>
<td>19.9</td>
<td>17.1</td>
</tr>
<tr>
<td>1985</td>
<td>5.0</td>
<td>4.3</td>
<td>23.8</td>
<td>20.5</td>
<td>11.9</td>
<td>10.2</td>
</tr>
<tr>
<td>1986</td>
<td>4.3</td>
<td>3.7</td>
<td>23.6</td>
<td>20.3</td>
<td>12.0</td>
<td>10.3</td>
</tr>
<tr>
<td>1987</td>
<td>1.5</td>
<td>1.3</td>
<td>23.4</td>
<td>20.2</td>
<td>12.8</td>
<td>11.0</td>
</tr>
<tr>
<td>1988</td>
<td>2.7</td>
<td>2.3</td>
<td>22.6</td>
<td>19.5</td>
<td>12.0</td>
<td>10.3</td>
</tr>
<tr>
<td>1989</td>
<td>2.3</td>
<td>2.0</td>
<td>21.7</td>
<td>18.7</td>
<td>12.2</td>
<td>10.5</td>
</tr>
<tr>
<td>1990</td>
<td>6.2</td>
<td>5.3</td>
<td>22.2</td>
<td>19.1</td>
<td>14.3</td>
<td>12.3</td>
</tr>
<tr>
<td>1991</td>
<td>4.6</td>
<td>4.0</td>
<td>22.9</td>
<td>19.8</td>
<td>12.8</td>
<td>11.0</td>
</tr>
<tr>
<td>1992</td>
<td>4.3</td>
<td>3.7</td>
<td>24.3</td>
<td>21.0</td>
<td>15.0</td>
<td>12.9</td>
</tr>
<tr>
<td>1993</td>
<td>6.9</td>
<td>6.0</td>
<td>25.6</td>
<td>22.1</td>
<td>16.0</td>
<td>13.8</td>
</tr>
<tr>
<td>1994</td>
<td>5.6</td>
<td>4.8</td>
<td>27.0</td>
<td>23.3</td>
<td>15.2</td>
<td>13.1</td>
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<tr>
<td>1995</td>
<td>5.5</td>
<td>4.8</td>
<td>25.7</td>
<td>22.2</td>
<td>15.3</td>
<td>13.2</td>
</tr>
<tr>
<td>1996</td>
<td>3.8</td>
<td>3.3</td>
<td>24.3</td>
<td>21.0</td>
<td>15.3</td>
<td>13.2</td>
</tr>
<tr>
<td>1997</td>
<td>6.3</td>
<td>5.4</td>
<td>24.4</td>
<td>21.1</td>
<td>17.3</td>
<td>15.0</td>
</tr>
<tr>
<td>1998</td>
<td>4.7</td>
<td>4.1</td>
<td>25.1</td>
<td>21.7</td>
<td>19.1</td>
<td>16.5</td>
</tr>
<tr>
<td>1999</td>
<td>4.3</td>
<td>3.7</td>
<td>27.3</td>
<td>23.6</td>
<td>19.5</td>
<td>16.9</td>
</tr>
<tr>
<td>2000</td>
<td>6.0</td>
<td>5.2</td>
<td>28.0</td>
<td>24.2</td>
<td>17.4</td>
<td>15.1</td>
</tr>
</tbody>
</table>

Sources: Central Bank of Sri Lanka, Annual report, 2002 & Author’s Calculation

It can be seen from the above table that the modified value for rate of growth, capital formation and savings are less than the official estimates. This is in accordance with our hypothesis. We have argued earlier that these macroeconomic indicators are over estimated and they have to be modified.

### 6.6 Rate of Growth, Investment and Savings: Effect of the Black Economy

As argued in Chapter 2, the black economy affects savings and investment of government as well as the private sector. Consumption, primary deficit, export surplus and output are also underestimated because of the black economy. We
argued that it is necessary to incorporate the black economy in the theoretical and empirical analysis so that the behavior of the total economy could be explained in a meaningful way. As discussed by Kumar (1999), one of the most important effects of the existence of the black economy is policy failure at both macro and micro levels. It prevents the economy from achieving its potential rate of growth of the economy. It affects the business environment of the country and the prospect for investment. The growth of business activities depends heavily on good social class and physical infrastructure. As Kumar (2005) argued the quality of infrastructure is compromised by the existence of the black economy.

It is argued elsewhere in the thesis that non-inclusion of the black part of the economy gives an incorrect impression of the economy. It is explained in Chapter 2 that the black economy results in the lowering of the investment rate and increases the saving rate. Further, it was argued that the rate of growth would be higher than the reported rate of growth when the black part of the economy is taken into account. As Kumar (1999) correctly claims, aspects of the black economy are like *digging holes and filling holes* resulting in activity without productivity resulting in less productive assets and lower productivity in the long run.

Based on the above considerations, further modification to rate of growth, investment and savings were carried out taking into account the black economy. Our modified figures, presented in the previous section, for rate of growth, gross
capital formation and gross domestic savings would represent only white part of the economy. In order to accommodate the black economy, the GDP at factor cost data based on 1996 prices for 1982 was taken as a base figure. The following method was used to estimate the value of the GDP for the white economy at 1996 prices.

\[ Y_{t+1} = Y_t (1+G_t) \]

Where; \( Y \) denotes the white GDP and \( G \) represent the modified white rate of growth of the economy.

The values of the re-estimated GDP for the white economy at 1996 prices are reported in Column four of the Table 6.3 given below. These GDP estimates are used to calculate the size of the black economy in Sri Lanka. The estimates of the black economy in Sri Lanka were 36 and 42 percentage of the white economy in 1988 and 1996 (Jayawardene, 1996). Data were extrapolated to get a series for the black economy from 1983 to 2000. In the absence of other studies and in the light of similar estimates for India taking these to be correct, it is assumed that rate of growth of the black economy is growing at a trend and based on this assumption, the black economy for the entire period was obtained. These rates were applied to the re-estimated white GDP in order to get the black components of the GDP at 1996 factor cost prices. The actual GDP for the country was obtained by adding the white and the black part of the GDP. The actual rates of growth for the country were obtained using these figures. The results are reported in the following table.
### Table 6.2: Estimation of Actual Growth Rates, 1983-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Reported Growth Rate</th>
<th>Modified Rate of Growth for White Economy at 1996 constant prices</th>
<th>Re-estimated GDP for White Economy at 1996 constant prices</th>
<th>Estimated GDP for Black Economy at 1996 constant prices</th>
<th>Actual rate of Growth Rate for the Country at 1996 constant prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>5.0</td>
<td>4.3</td>
<td>394,376</td>
<td>127,186</td>
<td>4.90</td>
</tr>
<tr>
<td>1984</td>
<td>5.1</td>
<td>4.4</td>
<td>411,685</td>
<td>135,856</td>
<td>4.98</td>
</tr>
<tr>
<td>1985</td>
<td>5.0</td>
<td>4.3</td>
<td>429,406</td>
<td>144,925</td>
<td>4.89</td>
</tr>
<tr>
<td>1986</td>
<td>4.3</td>
<td>3.7</td>
<td>445,308</td>
<td>153,631</td>
<td>4.28</td>
</tr>
<tr>
<td>1987</td>
<td>1.5</td>
<td>1.3</td>
<td>451,062</td>
<td>158,999</td>
<td>1.86</td>
</tr>
<tr>
<td>1988</td>
<td>2.7</td>
<td>2.3</td>
<td>461,559</td>
<td>166,161</td>
<td>2.89</td>
</tr>
<tr>
<td>1989</td>
<td>2.3</td>
<td>2.0</td>
<td>470,712</td>
<td>172,987</td>
<td>2.55</td>
</tr>
<tr>
<td>1990</td>
<td>6.2</td>
<td>5.3</td>
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<td>3.7</td>
<td>534,701</td>
<td>208,533</td>
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</tr>
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<td>1993</td>
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<td>6.0</td>
<td>566,559</td>
<td>225,207</td>
<td>6.53</td>
</tr>
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<td>240,556</td>
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</tr>
<tr>
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<td>3.7</td>
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<td>323,662</td>
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</tr>
<tr>
<td>2000</td>
<td>6.0</td>
<td>5.2</td>
<td>769,437</td>
<td>346,247</td>
<td>5.74</td>
</tr>
</tbody>
</table>

Sources: Central Bank of Sri Lanka, Annual Report, 2002 & Author’s calculation

It can be seen from the above Table that the actual rate of growth is lower than the reported rates in the official estimates. This is because of the effect of correction for the North-eastern part. For instance, the reported rate of growth was 5.5 and 6.0 in 1995 and 2000. When the correction was made for the North East region, it came down to 4.8 and 5.2 respectively. When modification was made to accommodate the black part of the economy, the actual rate of growth of the country increased to 5.3 and 5.7 in 1995 and 2000.

This clarifies why the expected result based on testing of the theoretical models could not be obtained in the earlier sections of this Chapter. However,
these corrections are still inadequate to generate series which can be used for
empirical testing of the models. The effect of the civil war has been to be uniform.
This only produces a parallel shift in the data series. A further correction is
required which is attempted in the Section 6.7.

6.8 Correction to Gross Capital Formation and Savings

As for the rate of growth, GDP of 1982 at market price was taken as base
year figure to modify the GCF and GDS data from 1983-2000. The GCF and the
saving propensity were assumed to be zero in the N-E during 1983-2000. This is
reasonable assumption given the disturbed conditions in this part of the country.
Actually both GCF and GDS for North-East part should be negative but the
assumption of their being zero will give a reasonable under-estimate to work with.
Further, as for the growth rate, the reported GCF and GDS were assumed to
represent only the part of the country, excluding N-E region. The population
factor, as in the case for calculating GDP growth rate for the country, was applied
to get re-estimated values for the GCF and GDS for the country. The estimated
figures are given below.

The actual savings rates are higher than the reported figures and the gross saving
for the country are lower than the estimated figures for the white economy. This is
true because it was expected that civil war would adversely affect the business
climate during that period. With regard to the domestic saving, it was expected
that rates of domestic savings for the country would be lower than the reported
domestic savings, and we have argued that savings propensity in the N-E was
severely affected by civil war due to the increased expenditure on consumer items due to the economic blockade in the region, unexpected expenses due to displacement, and other related income loss due to civil war.

We may argue that the civil war during 1983-2000 decreased the investment rate of the country and the saving propensity as well.

Table 6.3: Modified Data for Gross Capital Formation, Gross Domestic savings, 1983-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Capital Formation</th>
<th>Gross Domestic Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reported (% of GDP)</td>
<td>Re-estimated White (% of GDP)</td>
</tr>
<tr>
<td>1983</td>
<td>28.9</td>
<td>24.9</td>
</tr>
<tr>
<td>1984</td>
<td>25.9</td>
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<td>1985</td>
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<td>1988</td>
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<tr>
<td>1989</td>
<td>21.7</td>
<td>18.7</td>
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<tr>
<td>1990</td>
<td>22.2</td>
<td>19.1</td>
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<tr>
<td>1991</td>
<td>22.9</td>
<td>19.8</td>
</tr>
<tr>
<td>1992</td>
<td>24.3</td>
<td>21.0</td>
</tr>
<tr>
<td>1993</td>
<td>25.6</td>
<td>22.1</td>
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<tr>
<td>1994</td>
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<td>23.3</td>
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</tr>
<tr>
<td>1999</td>
<td>27.3</td>
<td>23.6</td>
</tr>
<tr>
<td>2000</td>
<td>28.0</td>
<td>24.2</td>
</tr>
</tbody>
</table>

Source: Central Bank of Sri Lanka, Various Annual Reports & Author's Calculation

Table 6.4 shows that the rates of investment are less than the reported figures. (We have already argued that due to the existence of the black economy, there is waste and inefficiency so that the investment rate falls. In the case of savings,
there is leakage so that it is higher). It is noticed that the savings rate become more than the official data when the black economy is taken into account. Sarvananthan (2000) argues that in spite of liberalization, contraband trade and illegal capital transfers have increased in the 80s and 90s.

6.8 Impact of the Intensity of the Civil war on Capital formation

Existing literature shows that the civil war affects capital formation negatively (Sarvananthan, 2002; Savundranayagam, 2005). Analysis in the previous sections takes this into account assuming a constant effect all through the period of the war from 1983 to 2000. Clearly, if war has an effect, then this should vary with the intensity of the war and not be a constant. The intensity of the civil war was different in each year during period because of several reasons such as, negotiations between the rebels and the government, unilateral declaration of cease fire, break-down of the negotiation, etc. Civil war in Sri Lanka had a “stop-and-go” pattern of fighting. Therefore, the effect of the civil war on the macro variables should also vary accordingly.

They did not show the estimate for each of the year during the civil war period. As usual, heavy fighting between the parties would result in heavy lost of physical assets as well as human lives.

The capital assets destroyed may differ annually, depending on a number of factors, like, the number of soldiers fighting, extent of aerial bombing, area of
agricultural land destroyed, number of factories destroyed, damage to houses and infrastructure. The destruction in the North-east due to the war may be taken to depend on the intensity of the war.

As argued in Section 6.4 even before the war started in 1983, the rates of investment in the North-east region were much lower than in the rest of the country. Further, it was argued that the official estimates for investment represent only the figures for the rest of the country. If the rate of investment in the North-East is $I_{ne}$ and the rate of investment in the rest of the economy given by the official estimate for the investment is $I_r$, then the gap between the two would depend on the intensity of the war. Both the rates of investment $I_{ne}$ and $I_r$ are adversely affected by the civil war, but $I_{ne}$ would be more affected than $I_r$.

There is no readymade index available to represent the intensity of the war. Further, data on destruction of the assets, etc., is not readily available to capture the intensity of the war. However, some data is available on casualties, the number of dead and wounded. Even this is not entirely reliable since both sides in a war exaggerate the casualties of the other side. However, if the data were to be available, the number of casualties could represent the intensity of war. Consequently, we could write

$$I_r - I_{ne} = g \text{ (Intensity of war)}$$

$$\text{Intensity of war} = h \text{ (casualties).}$$

If casualties can be represented by $C$, we could write

$$I_r - I_{ne} = f (C)$$
Further, as the intensity of the war increases, casualties would rise sharply. So let us assume it to be a function of $\sqrt{C}$.

Thus $I_r - I_{ne} = f(\sqrt{C})$

Assuming $f$ to be a linear function,

$$I_r - I_{ne} = \alpha + \beta \sqrt{C}, \quad \text{where, } \alpha \text{ and } \beta \text{ are positive constants.}$$

Since, $I_r$ is given, the official $I_r$, $I_{ne}$, can be determined from this equation. To determine $\alpha$ and $\beta$, we adopt the following assumptions. When the war is at the lowest ebb, say in year $T$, $C = C_{\text{min}}$ and $I_r = I_r^*$ and assume that $I_{ne} = 0$.

Therefore, $\beta = (I_r - \alpha) / \sqrt{C_{\text{min}}}$

Further, assume that in 1982, the year before the war started, $I_{ne} = \frac{1}{2} I_r = 14.5$ and by definition $C=0$.

Therefore, $\alpha = 14.5$

$$I_{ne} = (I_r - 14.5) - (I_r^* - \alpha) \cdot \sqrt{C} / \sqrt{C_{\text{min}}}$$

This tells us that $I_{ne}$ rises with $I_r$ but falls with the casualties, $C$. Finally, investment for the economy becomes,

$$I_t = \text{weighted average of } I_r \text{ and } I_{ne} \text{ in year } t.$$
of population in North-East and the rest of country. The rate of investment corrected for civil war is plotted in the following Chart along with the rate of investment in North-East part of the economy and the official rate of investment.

Chart 6.1: Trend in Investment corrected for the Intensity of civil war, 1983-2000

The above Chart indicates that the rate of investment in the North-East varies because of the variation in capital destruction in the North-East region, as captured by number of casualties. It also can be observed the rate of investment corrected for civil war for the country is affected by the civil war in the North-East. It is lower than the reported rate of investment for the country. In the meantime, it shows the effect of the civil war on the rate of investment of the country by showing a fluctuation in the rate of investment in response to the fluctuation in the rate of investment in the North-East region.
The result obtained through this model formulated by incorporating the intensity of the civil war explains better the behavior of investment. We may argue that the official rate of investment of the country did not reveal the true behaviour of the investment in Sri Lanka. It is shown that the civil war has an negative effect on the rate of investment and therefore, actual rate of actual rate of growth and savings would be lower than the official estimate.

In order to see whether the new estimate for the rate of investment for the country would better explain the rate of growth of the economy, it was employed in the equation for the growth model (Section 6.2) together with the other variables. Multiple regression estimation was carried down and the following result was obtained.

\[
\text{GRE} = 2.588 + 0.388 \text{GPC} + 3.15 \text{GPI}' + 3.38 \text{PD} + 3.06 \text{ES}
\]

\[3.403** 2.247** 1.849* 2.511**\]

\[R^2 = 0.832, \quad \text{Adjusted } R^2 = 0.698\]

"t" values are given in parenthesis, F – value = 9.12

This model, with the corrected rate of investment, explains far better than the previous model for the growth of the economy. Previous model explained only 41% of the variation in the growth of the economy whereas the new model for growth explains around 70% of the variation. Further, all the variables have positive relationship in accordance with the theory. In the previous model, rate of
Empirical Analysis...

investment was significant at 90% level of confidence whereas it is 95% in this model. The other important outcome is that the export surplus has become a significant variable in the model at 95% level of confidence and it has a positive effect on the growth of the economy.

The results support our argument that the civil war in Sri Lanka is one of the major constraints for the growth of the economy. Further, it supports the view that the rate of growth of the economy depicted by the reported data is not a correct picture of the economy.