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SOME MACROECONOMIC UNDERSTANDING OF THE SRI LANKAN ECONOMY

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1. INTRODUCTION

Sri Lanka has been described as a 'statistical out-liar' among developing countries for its outstanding social indicators of development. However, its economic growth record, since independence, has failed to match its outstanding performances in the field of social welfare despite the fact that the country had enough resource endowments for an early take off towards a high growth path at the time of independence in 1948. The failure to achieve a sustainable high growth rate may partly be attributable to the drawbacks in planning efforts of the post independence era. Sri Lanka, unlike many newly industrialised countries in Asia, has not exploited the benefits of using quantitative techniques for planning. It is observed in this study that no serious attempts have been made to use comprehensive quantitative tools in planning. A macroeconometric model provides a framework for evaluating the effectiveness of economic policies and therefore can help in policymaking and planning. In building a macroeconomic model for a developing country like Sri Lanka, it is necessary to adopt an approach which takes into account not only the demand side but also the supply-side constraints. There have been attempts to construct macroeconometric models for Sri Lanka incorporating both demand and supply variables. (See for example, Cooray 1998, Karunasena 1985 and Perera 1994) In this study we make further attempts to emphasise the supply-side constraints in modelling the Sri Lankan economy.

Sri Lanka has a huge potential to benefit from adopting some advanced planning techniques which will enable her to quantify the impact of different policies on the economy. Therefore the objectives of this paper are twofold. One is to construct an

econometric model for Sri Lanka using the new set of data made available recently by the Central Bank of Sri Lanka. The other is to assess the effectiveness of various economic policy measures adopted by the Government through a set of simulation experiments. It is hoped that the results of these experiments throw not only some light on the effectiveness of various macroeconomic policies, but also provide some guidelines for policymakers in policy formulation.

The paper is organised in six sections. The following section presents an overview of the economy which will help us in modelling. Section 3 discusses how the model is developed. Section 4 evaluates the model for its validity. Section 5 the assess the various policies through a set of simulation exercises using the model developed in the previous section. Conclusions are given in section 6.

2. OVERVIEW OF THE ECONOMY[1)]

Population and employment

Sri Lanka is densely populated country with a population of 18.5 million and a land area of 62,705 square kilometres (excluding inland waters). The population growth rate has varied between 1.1 and 2.8 per cent during the past five decades. (see Table 1) With the current growth rate about 1.1 per cent it would take another 50 years to double the size of the current population. Sri Lanka is most likely to face the ageing population problem, next to Japan and Singapore in Asian region.

Table 1: Population growth

	Total population (000's)	Annual average growth rate (%)	Crude birth rate (per '000)	Crude birth rate (per '000)
1946	6657	1.4	37.4	20.2
1953	8098	2.8	38.7	10.9
1963	10582	2.7	34.4	8.5
1971	12690	2.2	30.1	7.7
1981	14846	1.7	28.2	5.9
1991	17247	1.4	20.0	5.8
1996	18315	1.2	18.6	6.5
1997	18552	1.3	NA	NA

Source: Central Bank of Sri Lanka (1998)

Time series data on employment were not available before 1990. The 1946 Census of Population was the first to collect data on unemployed persons. Since then, various census reports of population have provided some data on employment. However they are not strictly comparable due to definitional and conceptual differences. During the 1950s the country has had no serious unemployment problem. However, the situation had changed later on and according to Consumer Finance Survey data, the country's overall unemployment rate was 16.6 per cent in 1953. The unemployment problem became acute in the early 1970s notwithstanding the many major efforts made by the successive governments to combat the problem. The highest unemployment rate was recorded at 24.0 per cent in 1973 and this rate declined sharply with the introduction of liberalisation policy in 1977. Due to picking up of economic growth in the 1990s unemployment rate showed a declining trend reaching down to 11.5 per cent in 1996/97.

Economic growth and structural change

During the last five decades the economy grew at an average annual rate of 4.2 per cent with commendable achievements in the social sector. This rate was higher than that of all South Asian neighbours with the exception of Pakistan. However, it was lower than that of many East Asian and Southeast Asian countries. In 1960, Sri Lanka's

Table 2: Selected macroeconomic indicators (annual average percentage change)

Item	1951–55	1956–60	1961–65	1966–70	1971–77	1978–88	1989–93	1994–97	1951–77	1978–97
GDP growth at 1982 factor cost	4.3	2.6	3.6	5.3	2.9	5.0	4.8	5.2	3.8	5.0
GDP (real) Per capita income	1.6	–0.2	1.2	2.9	1.3	3.3	3.6	3.9	1.4	3.5
Gross domestic investment ratio	11.2	14.0	15.3	16.9	15.7	26.1	20.7	25.7	14.7	25.3
Gross domestic savings ratio	13.5	11.6	14.1	13.3	13.1	13.3	13.4	15.8	13.1	13.8
Foreign savings ratio	–2.3	2.4	1.2	3.6	2.6	12.8	7.3	9.9	1.6	11.5
National savings ratio	11.0	9.7	13.1	12.3	12.2	15.5	14.2	19.7	11.7	16.5
Inflation										
Colombo consumer price	0.7	0.6	1.7	4.2	5.7	12.7	8.9	10.4	4.8	12.6
GDP Deflator	0.8	2.5	–0.2	3.9	11.6	11.6	11.9	9.7	4.2	11.3
Budget deficit as % GDP	2.1	–4.5	–6.0	–6.8	–8.2	–13.8	–9.9	–8.3	–5.7	–12.0
Current account balance of BOP, % of GDP	0.2	–2.3	–1.4	–3.9	–1.0	–7.5	–4.3	–4.9	–1.6	–6.3
Broad money, change in %	5.2	5.2	7.8	6.5	16.5	20.9	16.1	16.1	8.9	19.6
Interest rate										
Treasury bill (3 months) rate	1.1	1.6	2.8	3.7	5.6	12.3	9.2	16.9	8.2	14.5
Deposit rate, weighted average	1.7	2.0	2.3	3.3	5.2	10.6	7.9	12.2	3.0	11.6
Prime lending rate, (do)	5.8	6.2	7.1	7.8	10.0	18.8	13.9	16.6	7.6	18.6
Real Treasury bill rate	0.4	1.0	1.1	–0.5	–0.2	–0.4	0.3	6.5	0.3	1.8
Real deposit rate	1.0	1.4	0.6	–1.0	–0.6	–2.1	–1.0	1.8	0.2	–1.0

Source: Central Bank of Sri Lanka (1998)

human development index was only lower to that of Japan and Singapore. But now ranks at 90 among 174 countries even though it is included in the medium human development category. (UNDP 1998) The per capita income, in nominal terms, has increased from Rs. 397 (US$120) in 1948 to 48,020 (US$ 814) in 1997, recording an annual increase of 11 per cent per annum. (Table 2)

Average annual economic growth rate was about 3.8 per cent during the 1951-77 period. The highest average annual growth rate of gross domestic product (GDP) at 6.5 per cent recorded between 1978 and 1981. This is notably higher than that of for the 1978-96 period (4.9 per cent per annum). The lower growth rate (3.4 per cent) between 1986 and 1992 could be explained by the civil war. From the beginning of the 1990s, the economy has shown a gradual recovery with a 5.5 per cent annual average growth rate, reaching up to an annual rate of 6.4 per cent in 1997.

Even though domestic savings ratio did show an improvement over the period mainly due to the decline in consumption, lack of export earnings and other revenue prevented the government from generating the relatively higher savings and capital formation for growth-related activities. The slow or stagnating growth, coupled with the deterioration in the country's security situation after 1983, aggravated some problems and delayed the country's take-off.

The objectives of the planning after independence were to encourage import substitution and industrialisation, and to continue expanding domestic agriculture with the dual intention of reducing import dependency and achieving self-sufficiency in rice and other essential food items. The government expanded its welfare expenditure in order to improve social welfare by providing universal free education, food subsidies, and a nation-wide free health programme.

There have been structural changes in the Sri Lankan economy. The share of agricultural sector in GDP has declined from about 35.0 per cent in 1950 to 17.8 per cent in 1997, this is partly due to relatively poor performance of this sector. The share of

manufacturing sector in GDP has increased from 16.8 per cent to 21.5 per cent while the share of services sector has increased from 41.0 per cent to 51.4 per cent between 1950 and 1997. Most of these changes were taken place in the of economic liberalisation. The construction sector's share in GDP has remained unchanged over the last five decades while the share of mining and quarrying has improved from 0.4 per cent in 1950 to 2.5 per cent in 1997.

Table 3: Structural change in employment and production

	Agriculture		Mining & quarrying		Manufacturing		Construction		Services	
	E	O	E	O	E	O	E	O	E	O
1950*	53	35	–	0.4	9	16.8	1	6.8	37	41
1981	46	27.7	1	1.9	10	16.2	3	8.8	40	45.4
1996	38	18.4	2	2.5	14	21	6	6.9	40	51.2

Source: Central Bank of Sri Lanka (1998)
Notes: *Employment data is for 1946, E= employment and O= output

Many changes have also taken place in the structure of employment over the last five decades. The share of agricultural sector labour has declined from 53 per cent in 1946 to 38 per cent in 1996. The mining and quarrying sector accounted only for a very small proportion of the total employment throughout this period. The share of employment in the manufacturing sector increased by 2.6 per cent during the 1946-96 period and its contribution to total employment also increased to 14 per cent in 1996 from 9 per cent in 1946. The highest growth rate of 4.8 per cent was exhibited by the construction sector for the same period. It's share in total employment increased from 1 per cent in 1946 to 6 per cent in 1996. The service sector has been emerging as the leading sector in the recent past and accounted for well over 40 per cent of the total employment in 1996.

Price, money and wage

There are four indicators to measure the price behaviour of Sri Lanka, namely, Colombo Consumer Price Index (CCPI), Greater Colombo Consumer Price Index (GCPI), Wholesale Price Index (WPI) and the Implicit Gross Domestic Product Deflator

(GDPD). Data pertaining to these four indexes are given in Table 4, together with some other related data. Officially the CCPI is used as the indicator of inflation while GDPD, which is implicit in national accounts statistics and has the widest coverage, is also used as an alternative indicator. The WPI is used as a measure of price movements at the primary market. The estimation of GCPI started in 1989 by the Central Bank of Sri Lanka with the objective of having a comprehensive consumer price indicator.

Table 4: Annual changes in selected economic indicators

Index	1948-66	1967-76	1977-96	1952-96	1997
Consumer price	1.2	6.4	12.5	6.9	9.6
Implicit GDP	1.0	8.9	11.4	7.6	8.5
Wholesale price	–	–	11.9	–	6.9
Money supply	6.9	10.9	20.2	13.1	13.8
Export price	1.1	8.6	15.4	8.4	8.2
Import price	3.5	14.6	17.7	11.5	3.8
Exchange rate Rs./US$	2.0	11.3	7.2	6.0	6.3
Wages/Period	1952-66	1967-76	1977-96	1996	1997
Government employees	1.7	6.8	12.5		10.8
Non executives	1.4	5.7	11.9		11.3
Minor employees	1.9	7.5	13.0		10.0
School teachers	1.2	4.8	11.8		2.4
Wages Board Trades	1.2	8.3	14.0		5.9
Agriculture	1.1	8.3	14.9		7.0
Industry and commerce	2.0	8.2	11.9		4.1
Services	NA	NA	8.9*		0.0

Source: Central Bank of Sri Lanka (1998)
Note: (*) is for 1979-96

The rate of inflation in Sri Lanka was lower than that of many developing countries during the period from 1948 to 1966. However, the country experienced a moderately high inflation for the period from 1967 to 1976. With the introduction of open economic policies in 1977, this moderate trend was changed to 12.5 high rate of

inflation for the period from 1977 to 1996. The highest inflation rate recorded so far was 26.1 per cent in 1980. Several external factors and internal factors contributed to surging inflation. The magnitude of the influence of these factors varies among different administrations. The comparatively lower rate of inflation until 1977 was partly due to various food subsidy schemes and price controls implemented by the government of the day. Import price increases, coupled with the continuing depreciation of the Sri Lankan rupee was also a significant cause of inflation, particularly after 1977. (Lakshman and Nicholas 1991) Other major factors behind the higher rate of inflation were: (a) rapid increase in money supply due to heavy government reliance on the central bank for deficit financing; (b) huge government investment programmes which created demand pressures in the economy; and (c) migrant workers' remittances.

The country has two main employment sectors i.e. organised and unorganised sectors. Organised sector include employees working in the public and local government sectors, the semi-government sector, the co-operative sector and the organised private sector while unorganised sector includes employees working in enterprises which have not been registered and therefore are not benefiting from any organised labour market regulations.

As given in Table 4 there are eight wage indexes to measure the wage movements of which four indicators include workers in Wages Board Trades with four sub-categories i.e. workers in agriculture, industry and commerce, services and combination of the above three. Wage growth in all sectors in the 1952-66 period was higher than the inflation (0.8 per cent) indicating an upward trend in real wage. This upward trend continued for the proceeding 1967-76 period except in the salaries for government school teachers and government non-executives. After the introduction of open economic policies in 1977 growth rates of all wages were higher than before. However inflation too was higher for the same period than before, making real wages either to decline or to stagnate. The impositions of controls to trade union activities were partly responsible for unfavourable real wage situation after 1977 period. In 1997 the

government implemented B. C. Perera Salary Review Committee's proposal. This was the first comprehensive public sector emolument in more than 20 years. As a result salaries of all government employees except for that of teachers increased in real terms.

Government fiscal operations

As shown in the Table 5 government revenue exhibited no significant compositional changes since independence in 1948. The tax revenues as a percentage of GDP were 18.8 and 19.0 per cent in 1948 and 1996, respectively. However, the tax revenues from domestic goods and services have increased moderately from 2.1 per cent in 1948 to 8.5 per cent in 1996. This is quite clear in the post-1977 period. One of the most significant changes in the tax structure has been a structural shift towards domestic taxes from international trade-oriented taxes. The enhanced significance of this source of taxation is attributed to a reclassification of commodities for turnover tax and the impact of defence levy. Another significant change in the tax base is the declining trend in the taxes on external trade which reflects the impact of the elimination of export taxes and gradual reduction of import duties. Non tax revenue has also remained unchanged for the last 50-year period.

Table 5: Government revenue structure (as % of GDP)

Item	1948	1948–53	1970–75	1991–96	1996
Total revenue	16.4	16.2	17.3	17.6	16.9
Taxes on income	3.4	3.9	3.5	2.9	2.7
Taxes on external trade	11.0	10.5	8.0	7.1	5.8
Export taxes	4.8	4.9	2.1	0.1	–
Import duties	6.2	5.6	2.2	4.1	3.3
FEECs	–	–	3.7	–	–
Turnover tax on imports	–	–	–	2.9	2.5
Taxes on domestic goods and services	2.1	1.8	5.8	7.6	8.5
Excise tax	1.6	1.3	2.2	2.6	2.9
Turnover tax	–	–	2.7	3.1	2.5
Defence levy	–	–	–	1.4	2.1
Other taxes	0.5	0.5	0.9	0.5	1.0
Non-tax revenue	2.4	3.1	3.2	2.2	2.1
Total revenue	1.8.8	19.3	20.7	19.8	19.0
Share of tax revenue in total revenue (%)	87.8	83.9	84.4	88.9	89.0

Source: Central Bank of Sri Lanka (1998)

On the expenditure side, total expenditure as a proportion of GDP rose from an average of 23.4 per cent in the 1948-57 period to an average of 30.3 per cent in the 1988-96 period. (Table 6) In 1997 this proportion accounted for 23.8 per cent showing a decline in the last two years notwithstanding the heavy expenditure on defence (5.7 per cent in 1996). Nearly 6.4 per cent of current expenditure is allocated for personal emoluments and pension payments to government employees. Interest payments on government debt have also been a major reason for the high expenditure that accounted for 6 per cent in 1996. The share of interest payments to GDP was 0.6 per cent for the period 1948-53 and 6.0 per cent for the period 1991-96. By 1997, this figure had increased to 6.2 per cent of GDP. Transfer payments and subsidies, a subgroup of goods and services expenditures, decreased in line with the government adjustment policy stance of eliminating all subsidies. The Capital expenditure which was about 15.8 per cent of GDP for the period 1978-87 has declined to 8.4 per cent for the period 1988-96. It was only 3.1 per cent in 1997. This decline was entirely due to the massive reduction in capital expenditure on public enterprises. The capital expenditure incurred by public enterprises may decrease further because of ongoing privatisation and stabilisation programmes.

Table 6: Key components of current expenditure (as % of GDP)

Item	1948	1948–53	1970–75	1991–96	1996
Transfer to households	4.3	4.5	6.6	4.8	4.3
Of which: Food subsidy	2.7	2.8	4.3	1.0	0.1
Pension	0.8	0.8	1.4	2.0	2.0
Interest payments	0.6	0.6	2.6	6.0	6.0
Defence	0.2	0.5	1.5	4.7	5.7
Total recurrent expenditure	15.1	15.6	20.4	21.9	22.2

Source: Central Bank of Sri Lanka (1998)

The average annual budget deficit for the 1948-57 period (after grants) was 2.5 per cent of GDP. For the two periods 1978-87 and 1988-96, the deficit was 11.5 and 8.4 per cent, respectively. By 1985, the budget deficit had reached an unsustainable level, and the need for rapid economic reforms became evident. In 1988, the budget deficit

reached 15.7 per cent of GDP and by July 1989, the size of the deficit signalled the need for introducing a strong stabilisation programme. The resulting July stabilisation programme had, as its major objective, the reduction of the deficit. Consequently, the deficit fell to 8.4 per cent for the period 1988-96. Nearly 43 per cent of the budget deficit during the period 1978-87 was financed by foreign sources, which consisted mainly of foreign borrowing with the remainder in the form of grants. Deficit financing, however, has declined recently reaching down to 4.5 per cent of GDP in 1997. Domestic bank financing for the same period has accounted for about 23 per cent of the budget deficit. (Table 7)

Table 7: Budgetary out-tern 1948-1996 (as a % of GDP)

Item	1948–57	1958–67	1968–77	1978–87	1988–96	1997
Total revenue & grants	21.0	22.3	21.0	23.7	21.9	19.4
Total revenue	20.8	22.1	20.3	21.1	20.0	18.5
Tax	17.2	18.9	17.3	18.4	17.7	16.2
Grants	0.2	0.2	0.7	2.6	1.9	0.8
Total expenditure	23.4	28.0	27.1	35.2	30.3	23.8
Current	15.7	21.0	19.9	19.4	21.9	20.7
Capital	7.7	7.0	7.2	15.8	8.4	3.1
Current account (sur./dep.)	5.1	1.1	0.4	1.7	–1.9	–2.2
Overall deficit (after grants)	–2.4	–5.8	–6.1	–11.5	–8.4	–4.5
Financing	2.4	5.8	6.1	11.5	8.4	4.5
Foreign	0.2	0.8	1.5	5.0	2.8	1.1
Domestic	2.2	5.0	4.6	6.5	5.6	3.4
Bank	1.1	2.1	1.1	2.6	0.6	–0.2

Source: Central Bank of Sri Lanka (1998)

External trade and Balance of Payments

At the time of independence in 1948, the traditional subsistence economy of Sri Lanka had already been transformed into a classic example for an export economy by the emergence of the plantation agriculture. (Snodgrass: 1966, Corea: 1975) In 1950, the total trade as a percentage of GDP was about 70.6 per cent and the total trade as a percentage of the world trade was about 0.49 per cent. The open trade regime prevailed in the 1950s was partly responsible for the high ratio of total trade

to GDP which indicated a high degree of openness during that time. However, in response to the deterioration of terms of trade and unfavourable trend in imports, an economic policy regime which emphasised import substitution industrialisation was introduced in the late 1950s. As a consequence the period from 1960 to 1977, except the phase of partial liberalisation in the late 1960s, was characterised by an inward looking trade regime. This resulted in a declining trend in the share of trade which reached 37.7 per cent of GDP and 0.07 of world trade in 1977. The economic policy reforms introduced in 1977 marked the beginning of a new phase which emphasised the export promotion industrialisation strategy. As shown in the Table 8, the degree of openness declined during the import substitution period and recovered again in the post 1977 period of open trade policy regime.

Table 8: Trade dependency ratios

Items	1950	1956	1977	1996
Exports as a % of GDP	40.4	34.0	18.2	29.5
Imports as a % of GDP	30.2	32.0	16.5	38.9
Total trade as a % GDP	70.6	66.0	37.7	68.4
Exports as a % world exports	0.57	0.39	0.07	0.08
Imports as a % of world imports	0.41	0.34	0.06	0.10
Total trade as a % of world trade	0.49	0.36	0.07	0.09

Source: Central Bank of Sri Lanka (1998)

There was surplus in the current account (BOP account) at the time of independence. The trade balance was also favourable with a surplus of 3.2 per cent of GDP for the 1948-56 period and turned to a deficit of 2.4 per cent of GDP for the 1956-77 period. The positive balance in 1977 was a remarkable achievement, after a long period of deficits. In the face of open economic policies, the deficit widened continuously and reached an annual average of 13.3 per cent of GDP for 1977-85 period. The gap narrowed down to about 11 per cent of GDP for the 1985-96 period and 8.0 per cent of GDP in 1997.

Table 9: Composition of exports

Item	1950	1960	1970	1977	1996
Total exports (US $ million)	328.3	384.7	341.6	748.2	4103.5
Agricultural products	307.5	348.2	313.2	593.4	962.7
Tea rubber and coconut	307.5	348.2	302.4	555.6	830.7
Other agricultural products	NA	NA	10.8	37.8	132.0
Industrial products	NA	NA	7.0	106.1	3013.3
Textile and garments	NA	NA	1.0	16.0	1905.9
Petroleum products	NA	NA	3.0	67.3	103.9
Other industrial products	NA	NA	3.0	22.8	1003.5
Mineral products	NA	NA	3.0	35.7	95.7
Unclassified	20.8	36.5	18.4	13.0	31.8
Total exports (% share)					
Agricultural products	93.7	90.5	91.7	79.3	23.5
Tea rubber and coconut	93.7	90.5	88.5	74.3	20.2
Other agricultural products	NA	NA	3.2	5.1	3.2
Industrial products	NA	NA	2.0	14.2	73.4
Textile and garments	NA	NA	0.3	2.1	46.4
Petroleum products	NA	NA	0.9	9.0	2.5
Other industrial products	NA	NA	0.9	3.0	24.5
Mineral products	NA	NA	0.9	4.8	2.3
Unclassified	6.38	9.5	5.4	1.7	0.8

Source: Central Bank of Sri Lanka (1998)

As Table 9 reveals, there was a heavy concentration in the structure of exports as few primary commodities accounted for a very high proportion of exports earnings. As the structure of exports is more diversified now, the trade balance is less vulnerable to commodity price fluctuations. The composition of imports also changed drastically towards intermediate goods, which accounted for 54.9 per cent in 1996. The share of consumer goods decreased from 56.6 per cent in 1951 to 19.1 per cent in 1996. (see Table 10)

Table 10: Composition of imports

Item	1951	1960	1970	1977	1996
Total imports (US $ million)	327.2	411.5	388.6	677.0	5417.2
Consumer goods	185.1	250.9	215.4	285.6	1033.1
Food	146.0	157.9	177.6	245.8	599.0
Of which: rice	49.6	50.8	53.4	103.3	92.6
Other con. Goods	39.1	93.0	37.8	39.8	434.1
Intermediate goods	57.3	83.4	77.8	298.4	2974.1
Investment goods	84.2	74.5	91.7	84.1	1205.8
Unclassified	0.6	2.7	3.7	8.9	204.2
Total imports (% share)					
Consumer goods	56.6	61.0	55.4	42.2	19.1
Food	44.6	38.4	45.7	36.3	11.1
Of which: rice	15.2	12.3	13.7	15.3	1.7
Other con. Goods	11.9	22.6	9.7	5.9	8.0
Intermediate goods	17.5	20.3	20.0	44.1	54.9
Investment goods	25.7	18.1	23.6	12.4	22.3
Unclassified	0.2	0.7	1.0	1.3	3.8

Source: Central Bank of Sri Lanka (1998)

Sri Lanka held a strong balance of payments position in the immediate post-independence period and has undergone many changes since then. External assets in 1948-49 were enough to pay for almost one year of imports. Since the tea boom of 1954-55, these favourable trends have gradually been reversed. Gross official external assets in 1996 and 1997 were sufficient to finance only 4.3 and 4.2 months of imports, respectively. Because of a heavy investment programme that was financed mainly by foreign aid and commercial credit, Sri Lanka's foreign debt has increased rapidly since 1977, climbing to 74.5 per cent of GDP in 1994 from 3 per cent in 1948. Having explained basic features of the economy of Sri Lanka, in the next section, an attempt will be made to model the economy based on the information given in this section.

3. THE MODEL[2]

The present model is estimated for the period from 1970 to 1997 by using data made available recently by the Central Bank. (CBSL 1998)[3] The present model incorporates major structural features of the economy and consists of eight blocks, namely: (a) population, wage and employment; (b) production; (c) demand and expenditure; (d) external trade and balance of payments; (e) government fiscal operations; (f) monetary sector; (g) prices; and (h) macroeconomic aggregates. The complete model has 207 equations, of which 122 are behavioural equations, and 85 are identities (including definitions).

Respective demand equations for the various production sectors are included in the production block itself. In order to take into account the interactions leading to market clearing both the demand and supply sides have been incorporated in the model. Some export functions are linked to the production block directly by variables representing the availability of exports. These exports are also linked to the price block by the variables representing their price indices. The exports and imports provide a significant tax base for the government, making a useful link between the two blocks of production and government fiscal operations. In addition, all variables affect the government and financial block through the supply of foreign exchange that, in turn influences the money supply.

Population and employment block

Population is endogenized in a behavioural form using the population growth rate and a one-year time lag of population. The birth rates and death rates are regressed on per capita income. Both variables show negative signs as expected. An asymptotic level is placed in the birth and death rate equations. We have included both the demand for and supply of labour in the model. Labour supply is estimated by using labour force participation rate and working age (age 20-64). The labour force participation rate is calculated with unemployment rate data given in the Central Bank Annual Report 1998.

There are five main sectoral categories of labour demand (employment) in the model, i.e., (a) agricultural; (b) mining and quarrying; (c) manufacturing; (d) construction; and (e) services. The size of the estate (or the area cultivated) as well as its organisational nature will significantly influence employment in the plantation crops. Furthermore, the data on employment in the plantation sector shows that 97 per cent of the total number of employees belong to the labourer grades engaged in field and factory operations. Therefore, it is rational to assume that employment in the estate sector is influenced by the area under cultivation. The labour demand in the agricultural sector, the mining and quarrying, the manufacturing and the service sectors are taken as functions of value-added, real wages of that sector. The unemployment rate influences wage determination in the price and wage block. The block has 11 behavioural equation and 6 identities.

Production block

The productions block covers the country's main agricultural crops (tea, rubber, coconuts, minor export crops, and paddy), and the industrial and service sectors. Many stochastic equations of this block are interrelated with the price block through the respective price deflators. This sector is also linked with final demand and the international trade and finance block by way of providing the output and making available exports, respectively. The GDP provides the basis for government revenue, particularly direct tax, and thus has a linkage with the government and financial block. The population and employment block is mainly connected to the production block.

In modelling the agricultural crops, a generally accepted yield and area approach is used. (Adams and Behram 1976) Many model builders have used output determination by yield and area approach. According to this approach, the production of a crop is equal to the average yield multiplied by cultivated area. Crop bearing and cultivated areas are different because, for instance, in the case of tea, up to five years are needed to provide the first crop. Therefore, it is obvious that the bearing area is the production-determining factor rather than the cultivated land area. Rainfall and fertiliser applications are the main yield-determining factors.

Value-added by crops is estimated based on the production and respective producers' prices that are determined in the price block. The gross value-added of the industrial and service sectors are modelled in terms of labour, capital, and imported inputs. Since Sri Lanka does not have data for capital stocks for agricultural, mining and quarrying, manufacturing, construction, and services sectors they were estimated by taking private and government investment on each respective sectors. The investments are separated based weights calculated on the value addition of each sector to total GDP. This block has 40 behavioural equations and 30 identities.

Demand and expenditure block

The demand and expenditure block consists of 10 behavioural and 6 identities. Great attention is given to the determinants of consumption, investment and net-exports in modelling the final demand and aggregate expenditure. Both the consumption and investment are first divided into two components as private and government. The total consumption is explained by disposable income, rate of interest and the lag consumption which represents the habit persistence. A detailed disaggregation of private investment is done by dividing the total private investment into five components. Each of these components is explained by the rate of interest (R) and the domestic credit to private sector. (DCP) The government consumption and investment are linked to the government fiscal operations block. The exports and imports which account for net exports are found in the international trade and finance block.

Price and wage block

Price deflators for different sectors are estimated by the prices of imported goods, wages of own sector relative to other sectors of the economy and the main commodity prices. The price deflator for agricultural sector is the weighted average of prices of paddy, tea, rubber and coconuts. These prices are estimated by using wages, cost of production and international prices of respective item. Theoretically, the implicit GDP deflator (PGDP) must be equal to the sum of price deflators for value-added in the agricultural, industrial, and service sectors with relevant weights. The consumer price index (CPI) is classified into five main groups which take behavioural form

with the import price indexes and ratio of money supply to real GDP representing the quantity theory of money. The impact of the import price on the previously mentioned three price deflators takes effect through the CPI (note that the CPI has an import price deflator). There is also the wholesale price index (WPI) which is divided into two categories, wholesale price indexes for domestic goods price, exports and imports. These are explained by wages, general price and foreign prices. The price and wage block consists of 32 behavioural equation together with the identities.

Government fiscal operations block

Government revenue, expenditure, budget deficit, and the money supply are the main features of this block. The revenue side of the government is specified so as to capture the influence of exports, imports, and other activities of the production block. Any change in government tax and subsidy policy will influence consumption. Government expenditure, on the other hand, is categorised into two main groups, current and capital expenditure. The latter, a policy variable in the model is divided into four (capital expenditure on agriculture, manufacturing, construction and service sectors), and are attached to production by the respective capital stocks of production block. The budget deficit is linked to the money supply through deficit financing. The supply of money is connected to the price block via the consumer price index (CPI). Export price deflators have been carefully analysed taking the world market factors into consideration. Price deflators for the value-added sectors are modelled with mark-up prices and world market factors. The country's total debt outstanding, both domestic and foreign, and the interest rate determine government expenditure on interest payments. The government's total revenue registers income from both taxes and non-tax sources. The export tax has further disaggregation as taxes from tea, rubber, and coconut exports.

Having specified the government's total expenditure and revenue, it is now possible to define the government budget deficit as the difference between expenditure and revenue. The Sri Lankan Government finances its deficits through foreign grants, foreign loans, and non-market and market borrowing. For simplicity and due to the

lack of continuous time-series data, all the deficit-financing sources were divided into either domestic finance or foreign finance. In the model, domestic finance is assumed to be endogenously determined and influences the government's domestic debt outstanding while foreign finance is exogenous and affects the foreign debt outstanding.

Monetary sector block

This block has seven equations and two identities explaining the important components, both domestic and foreign, of Sri Lanka's broad money supply. The monetary base consists of two items: (a) domestic credit supply from the banking system; and (b) foreign assets. By endogenizing the component of the foreign assts, an attempt is made to take into account the role of the balance of payments as well as the role of foreign assets held by the banking sector in determining the monetary aggregates in the country. The role played by the domestic credit is also considered by endogenizing the domestic credit availability as a behavioural equation in the model. Domestic credit is determined by the amount of banking assets or deposits.

External trade and balance of payments block

The external trade and BOP block consisting of 9 behavioural equations and 11 identities explains trade, services, transfer payments and capital accounts of the balance of payments. The exports of goods are disaggregated into agricultural exports, industrial exports and other exports. The agricultural exports are in turn disaggregated into tea, rubber, coconut and other agricultural exports. The exports of tea, rubber, coconut and industrial goods are explained by the behavioural equations that incorporate both the supply side and demand side factors. Appropriately defined relative price variables and the world real income variable are introduced to all of these export equations as demand side variables. A measure of the availability of exports defined as the difference between the level of production and the level of consumption is introduced to the equations of tea, rubber and coconut exports as a supply side variable. However, due to the difficulties of estimating the domestic consumption level accurately in the case of industrial exports we used the real value of industrial output

itself as the supply side variable.

The imports of goods are disaggregated into four categories such as consumer goods, intermediate goods, investment goods and other imports. The imports of consumer goods, intermediate goods and investment goods are endogenized to the model by behavioural equations. Based on the assumption that Sri Lanka is a small country in international trade, the imports are explained by the demand side variables such as the relative prices and the real income of the country. In addition, the lag values of the dependent variable and the real income variable are also introduced to these equations in order to account for the lag adjustments and the 'habit persistence' in cases of these imports. Separate export and import functions are not specified for services exports and services imports in the present model. Instead, the net in service is explained by the size of trade (the sum of the goods exports and imports) and a measure of the size of tourist industry. (SETOHR)

The capital account of the balance of payments is disaggregated mainly into two components as direct foreign investment and the rest. (BOP1) The direct foreign investment is explained by the relative price level (the ratio of the world consumer price index to the domestic consumer price index), the degree of openness of the economy (measured as the ratio of the sum of exports and imports to the GDP), the level of domestic economic activity (measured in terms of real GDP) and the own lag. The estimated results show that the elasticities of direct foreign investment with respect to the relative price level, the degree of openness and the level of economic activity is greater than unity. All of the behavioural equations for exports, imports and the direct foreign investment are specified as log linear formulations.

4. MODEL TESTING

The ordinary least-squares (OLS) method is used for estimation of the model. Sri Lanka does not maintain a comprehensive quarterly database. Thus, the model uses annual data, dating from 1970 to 1997. However, very few equations in the model

have been estimated with a smaller sample period due either to keep the fitting ability or to lack of data.

The model has been evaluated by using standard statistical diagnostics. The coefficients of determination (R2) are adjusted for degrees of freedom. The standard errors of regression are given by SE while the Durbin-Watson statistic is shown as DW. Durbin h is reported with distributed lag models. When there is an indication of the existence of first order auto-correlation, the respective equation is re-estimated by using the Cochrane-Orcutt (orcutt) technique. The coefficients of auto-correlation (rho) are also reported for the equations that have been corrected for auto-correlation problems. All correspondent "t" statistics are in parentheses beneath each of the coefficients. Most coefficients are significant at the 5 per cent or 1 per cent level. The signs of the coefficients are correct as expected. However, a few explanatory variables are included in the model, even though they do not satisfy the necessary "t" test, with a view to observing the correctness of model specification and the dynamic stability of the model.

Having estimated equations in the previous section an attempt is made in this section to evaluate the validity of the model. The individual equations in the model may fit the historical data well but may not perform well in a dynamic simultaneous equation system. At the same time, the opposite may also happen. The individual estimations of the whole model may have insignificant statistics but the model as a whole may represent historical data very closely. The simulation process of a model can be used for different purposes, among others, checking the stability of a model, multiplier analysis (historical policy analysis), and forecasting. (Pindyck and Rubinfeld 1991) A historical simulation of the model was performed for the period 1980-94 to test its explanatory performance.

The Gauss-Siedel iteration technique was used in the simulation. There are many ways of representing these deviations of simulation values from observed values. Mean Average Percentage Error (MAPE) is used as an indicator of a systematic bias. MAPE is less than 10 per cent for most of the major endogenous variables. Evi-

dently, only a few variables have MAPE values higher than 10 per cent due to the volatile nature of the data. However, the tracking ability of the model is satisfactory and has good stability. It should be noted that though the error margins for some equations are high they seem acceptable, given the difficulty of modelling with the available data. The following table 11 shows MAPE values of some selected macro indicators of the economy.

Table 11: Mean Average Percentage Error (MAPE) for selected macroeconomic variables

variable	Partial test	Final test	variable	Partial test	Final test
LD	0.004	3.158	GBD	0.003	14.940
LS	0.000	3.261	RTB	6.520	6.520
LPR	1.563	2.440	RDP	3.334	4.321
GDPFP82	0.000	7.559	RLR	3.311	4.270
GDPMP82	0.000	6.830	PGDP	0.000	3.224
CP	1.500	4.441	WPI	0.016	5.842
CG	5.112	5.112	PX	7.024	6.652
I	0.000	17.445	WAG	4.880	7.339
X	2.107	18.144	WIN	4.243	11.846
M	0.930	13.978	WSE	3.409	8.498
TB	3.529	21.606	YD	0.000	8.659

See Appendix for the list of variables

5. APPLICATION OF THE MODEL FOR POLICY SIMULATIONS

The purpose of this simulation is that by evaluating multipliers associated with the model's exogenous variables, it is possible for policymakers to obtain an assessment of the dynamic response of the economy. Using the model described in the section three we performed three multiplier analyses for the period 1980-94. All shocks are assumed to be sustainable and the impacts of those shocks are given in terms of percentage deviation from the control solution. The simulation results are given in respective tables.

Exchange Rate Policy

Sri Lanka had a fixed exchange rate regime at the time of independence in 1948 and

that prevailed until 1966. The rate was pegged to the Sterling Pound under the Bretton Woods System. The rupee was devalued in order to ease the pressure on the balance of payments in 1967. A multiple exchange rate system was advocated since 1968 until 1977. With the introduction of open economic policies in 1977, the government implemented an exchange rate system, which was described as a managed floating exchange rate system. With this system all restrictions on current account of the balance of payments were removed by 1994 and the government accepted obligations under Article VIII of the Article of Agreement of the International Monetary Fund in March 1994.

There are some studies (Lakshman and Nicholas 1991) suggested on removal of exchange controls and the government gradually started liberalising capital account activities even though Sri Lanka does still have some control over them. Had the country removed all restrictions it would have been affected by the Asian financial turmoil. Maintenance of competitive exchange rate policy would be very important in a highly dependent country such as Sri Lanka. Market forces with some degree of intervention determine the exchange rate. This intervention by the Central Bank is necessary to avoid erratic fluctuation of the rupee against major international currencies and to ensure the stability of the market. Taking these into account, a simulation was performed to review the effectiveness of devaluing the rupee by 10 per cent against the US dollar.

Currency depreciation has an expansionary impact on the economy. All price deflators increased. Consumer prices must increase with an import price hike, but reduced money supply and increased GDP offset this impact and it even declined in the long run. Producers' tea prices, rubber, and coconuts are boosted due to the upward trend in export prices, leading to a rise in the production and value-added of the economy. Tea exports do not change correspondingly since agricultural exports are price inelastic. The greater increase of nominal imports than exports results in a further deterioration in the trade balance. Activities in the industrial and service sectors were constrained due to the decline in imported inputs. Domestic prices rose because de-

valuation pushed import prices up and even export prices increased since they included imported intermediate inputs.

Upward pressure on the price levels is controlled by the reduction of both money supply and credits to the government. The government's decreased reliance on credit could be attributed to its revenue increase from foreign trade-related taxes. The currency devaluation reduced the budget deficit. This again is associated with an increase in tax revenue. It is obvious that following devaluation, nominal values of exports and imports increase and tax revenue also tends to increase since tax rates are based on nominal values. The conclusion that can be derived from this is that currency devaluation, as expected, did not improve the external imbalances of the country. Perera (1994) draws a similar conclusion with respect to the country's currency devaluation. Our result is contradictory to Rankaduwa's (1995) finding. The per-capita income increased as a result of improvements in GDP and unchanged population growth. Misery index, a combination of inflation and unemployment increased due to higher impact of inflation than that of reduction in unemployment rate.

Table 12: Results for Exchange Rate Policy Exchange rate 10% increase (10% devaluation)

	MIS	P	UEMR	GBDGDP	GDPMPPOP	GDPGR	POPGR	TBGDP
1980	0.67	0.85	–0.18	0.36	0.74	0.26	0.00	–0.68
1981	1.34	0.60	–0.26	0.57	1.48	0.24	0.00	–1.30
1982	1.49	1.81	–0.32	0.66	2.24	0.35	0.00	–1.56
1983	1.21	1.60	–0.40	0.48	2.92	0.27	–0.01	–1.66
1984	0.66	1.09	–0.43	0.26	3.43	0.03	–0.01	–1.44
1985	1.23	0.70	–0.47	0.22	3.73	0.10	–0.01	–1.56
1986	–0.45	–0.03	–0.42	0.23	3.88	0.22	–0.02	–1.80
1987	–1.64	–1.19	–0.45	0.06	3.93	0.20	–0.02	–2.28
1988	–3.25	–2.77	–0.48	0.11	3.89	0.35	–0.02	–2.52
1989	–4.57	–4.00	–0.56	–0.04	3.74	0.26	–0.03	–2.74
1990	–6.12	–5.45	–0.66	0.04	3.52	0.28	–0.03	–2.89
1991	–8.39	–7.62	–0.77	0.16	3.45	0.52	–0.04	–3.30
1992	–12.73	–11.85	–0.88	0.17	3.16	0.83	–0.04	–3.74
1993	–20.22	–19.01	–1.21	0.20	2.69	1.40	–0.06	-4.19
1994	–17.49	–15.55	–0.94	0.02	3.33	1.74	–0.07	-4.74

Fiscal Policy

There have been deficits in government budgets of Sri Lanka since 1955 and the deficit has widened after 1977. Successive governments have taken steps to reduce the deficit, particularly the current government is making further progress towards firm fiscal consolidation. The deficit is expected to be reduced to 4 per cent of GDP by the year 2000 even though this is not a realistic target given high expenditure on defence.

Keeping these in mind we carried out fiscal policy simulation. Any efforts to reduce the budget deficits involve a restrictive fiscal policy. To evaluate the impact of government fiscal policies, we disturbed the model with a decreases in the government's expenditure on goods and services and transfer payments by 10 per cent. When government decreases its capital expenditure, the budget deficit decreases by1.15 per cent of GDP. The policy implication here is that when the government reduces its welfare and on going war undertakings, the budget deficit can be lowered. The government can then reduce its borrowing from the banking system, which in turn can increase its loans to the private sector. The result shows that the banking sector is able to extend its loans by about 3 per cent if the government reduces its investment expenditure by 10 per cent. The investment expands the country's future production capacity by increasing the capital stocks of the agriculture, manufacturing, and service sectors. Output increases in the long-run without invoking accompanying price increases even though GDP growth decreases in the short run. Exports grow at a higher rate than imports, resulting in a reduction of the trade deficit.

Table 13: Results for Fiscal Policy

Govt. exp. On goods and services and govt. exp. On transfer payments 10% decrease.

	MIS	P	UEMR	GBDGDP	GDPMPPOP	GDPGR	POPGR	TBGDP
1980	0.11	0.09	0.02	–1.15	–0.22	–0.18	0.00	0.11
1981	0.19	0.18	0.00	–0.87	–0.18	–0.03	0.00	0.07
1982	0.19	0.20	–0.01	–0.92	–0.09	0.06	0.00	0.05
1983	0.17	0.18	–0.01	–0.82	0.09	0.12	0.00	0.07
1984	0.13	0.15	–0.02	–0.07	0.30	0.18	0.00	0.09
1985	0.19	0.21	–0.02	–0.99	0.41	0.12	0.00	0.18
1986	0.27	0.31	–0.05	–0.88	0.66	0.17	–0.01	0.26
1987	0.42	0.47	–0.05	–0.90	0.86	0.10	–0.01	0.37
1988	0.58	0.65	–0.07	–1.03	1.13	0.13	–0.01	0.46
1989	0.62	0.69	–0.07	–1.21	1.35	0.11	–0.01	0.55
1990	0.79	0.88	–0.09	–1.23	1.62	0.13	–0.01	0.63
1991	1.14	1.23	–0.10	–1.37	1.94	0.16	–0.02	0.77
1992	1.58	1.68	–0.10	–1.24	2.32	0.15	–0.02	0.91
1993	2.04	2.13	–0.10	–1.27	2.70	0.10	–0.02	1.01
1994	1.81	1.86	–0.05	–1.40	3.00	0.08	–0.02	1.18

Monetary Policy

Central Bank of Sri Lanka is responsible for monetary policy issues dealing with supply of money, supply of credit and interest rate while the General Treasury and the Ministry of Finance is responsible for fiscal policy activities dealing with tax, and expenditure. The monetary policy has two objectives of achieving stability and development. The stability means safeguarding the real value of the Sri Lankan currency while development means achieving economic growth and the full use of resources. (Central Bank of Sri Lanka 1998)

In this direction we carried out simulation with changes in interest rate (reducing bank lending rate by one point). The Central Bank rate can influence the commercial banking sector's credit supply to private sector. When the banking sector increases its credit supply, the economy expands. Exports increase due to increasing industrial production. Imports grow at a lower rate than exports, resulting in a favourable external balance, improving the trade balance by 0.04 per cent. Since domestic credit is

one component of the monetary base, any changes to that will influence money supply. The impact of increased money supply is cancelled off by increased GDP and as a result price level went down. Imports increased due to the income effect brought about by GDP. The misery index shows a favourable situation because of decline trend in the consumer price. The budget deficit is reduced marginally by 0.08 per cent in the first year because of the government revenue effect.

Table 14: Results for Monetary Policy (Bank rate 1 point down)

	MIS	P	UEMR	GBDGDP	GDPMPPOP	GDPGR	POPGR	TBGDP
1980	–0.04	–0.04	0.00	–0.08	–0.04	0.06	0.00	–0.04
1981	–0.16	–0.16	0.00	–0.12	–0.10	0.10	0.00	–0.09
1982	–0.29	–0.29	0.00	–0.15	–0.14	0.11	0.00	–0.11
1983	–0.45	–0.44	–0.01	–0.14	–0.22	0.11	0.00	–0.16
1984	–0.62	–0.60	–0.02	–0.14	–0.29	0.13	0.00	–0.18
1985	–0.89	–0.87	–0.02	–0.13	–0.38	0.18	–0.01	–0.25
1986	–1.12	–1.09	–0.03	–0.14	–0.46	0.09	–0.01	–0.26
1987	–1.43	–1.39	–0.04	–0.15	–0.53	0.08	–0.01	–0.38
1988	–1.79	–1.73	–0.06	–0.14	–0.67	0.14	–0.01	–0.49
1989	–1.85	–0.75	–0.10	–0.16	–0.71	0.15	–0.01	–0.63
1990	–2.28	–2.14	–0.13	–0.12	–0.74	0.06	–0.02	–0.66
1991	–3.12	–2.98	–0.14	–0.10	–0.83	0.10	–0.02	–0.77
1992	–4.27	–4.10	–0.17	–0.11	–1.03	0.14	–0.02	–0.86
1993	–5.69	–5.40	–0.30	–0.11	–1.07	0.32	–0.02	–1.01
1994	–4.76	–4.31	–0.45	–0.11	–0.88	0.42	–0.03	–1.14

6. CONCLUSIONS

A macroeconometric model for Sri Lanka is constructed and tested. The model is large in size and up-to-date. Moreover, population has been endogenized with fair disaggregation of the employment sector. The population and employment blocks are a distinguishing feature of the model as no previous models on the Sri Lankan economy have attempted to endogenize population and employment. Specifications of the export sector are different from other models such as Karunasena's (1985) and Perera's (1994) since the residual determination of tea exports has been dropped

from this model.

Dynamic simulations of the model have shown good tracking ability with the observed data. Furthermore, it was applied to explore the multiplier effects of some of the macro-economic policy issues of current interest. The model paid explicit attention to the supply side of the economy, which is not common in many models of developing countries. The results are acceptable and comparable with those of other large models developed for Sri Lanka such as Cooray (1996 and1998), Karunasena (1985), Rankaduwa et al. (1995) and Perera (1994). Yet in some cases, the magnitudes of the structural and policy parameters are different depending on the model's limitations and the focus.

The results of simulation experiments performed using the model provide a number of interesting insights into modelling of Sri Lankan economy in particular with respect to modelling the supply side, taking capital stocks of various sectors into account, and endogenous treatment of population and employment. Despite the model's limitations, it provides some methodological and empirical contributions to the prevailing literature on modelling of the Sri Lankan economy and can still be used for a short- and medium-term policy analysis.

Analysis on exchange rate policy is interesting since it is a crucial component in the BOP literature. Exchange rate policy is weak in improving a trade balance, but it improves the budget deficit and value-added of the economy. Government investment expenditure policy has a large impact on the economy, particularly on growth. In controlling the budget deficit, expenditure on capital investment can play a very significant role. This also improves private sector access to loans from the banking sector, through which private investment can be reinforced. The model can be further applied to assess the impact of various agricultural pricing policies on the economy. In doing so, producer prices of the respective agricultural commodities have to be adjusted according to government incentives and tax policies. Furthermore, the present model can be modified easily to quantify the influences of real

exchange rate differences taking into account the opening up of the external trade and capital accounts of balance of payments in many countries.

The capital flow of the BOP has been partly endogenized in this model. To have a complete external sector in the model, it is obvious that the capital account should be endogenized. Modelling the capital flows of the country, however, requires a thorough knowledge of their determinants. Policymakers in developing countries have taken a progressive interest in the environmental impact of policies in the recent past. The impact can be quantified by restructuring the model, particularly the production block. It is also necessary to incorporate a "human face" into the modelling. This involves factors such as income distribution, unemployment, and other aspects of human development. Furthermore, energy and defence expenditure issues are vital for the country's growth momentum and should be taken into careful consideration in modelling.

Notes

1) This section is heavily drawn from the Central Bank of Sri Lanka (1998).
2) The estimated model is not included here due space limitation and interested reader may obtain the model on request from the author.
3) To the best of author's knowledge this is the first time that any government institution published consistent long time series data.

Appendix: The list of variables

CG= Govt. consumption at current prices
CP= Private consumption at current prices
GBD= Govt. budget deficits
GDPFP82= GDP at 1982 factor cost
GDPMP82= GDP at 1982 market prices
I= investment
LD= labour demand
LPR= Labour force participation rate
LS= Labour supply
M= Imports
PGDP= GDP deflator
PX= Price of exports

RDP= Deposit rate
RLR= Lending rate
RTB= Treasury bill rate
TB= Trade balance
WAG= Agricultural sector wage rate index
WIN= Industrial sector wage rate index
WPI= Wholesale price index
WSE= Service sector wage rate index
X= Exports
YD= Disposable income
GBDGDP= Government budget deficit as % of GDP
GDPGR= GDP growth rate
GDPMPPOP= Per-capita income
MIS= Misery index (combination of inflation and unemployment)
P= Inflation
POPGR= Population growth rate
TBGDP= Trade balance as a % of GDP
UEMR= Unemployment rate

REFERENCES

Adam, F. G. and J. R. Behram (1976) *Econometric Models of World Agricultural Commodity Markets, Cocoa, Coffee, Tea, Wool, Cotton, Sugar, Wheat, Rice*, Cambridge, MA: Ballinger.

Athukorala, Premachandra and Sisira Jayasuriya (1994) *Macro Economic Policies, Crisis and Growth in Sri Lanka, 1969-1990*, Washington, DC: World Bank.

Central Bank of Sri Lanka (1998) *Economic Progress of Independent Sri Lanka, Colombo, Sri Lanka.*

Central Bank of Sri Lanka, *Economic and Social Statistics of Sri Lanka, and Annual Reports*, various issues.

Cooray, N. S. (1998) "Macroeconomic Management in Developing Countries: An Econometric Modelling Approach to the Sri Lankan Case," *Regional Development Studies*, Vol. 4, pp. 37-64.

Cooray, N. S. (1999) "Econometrics Modelling for Policy Analysis and Planning: Evolution and Application," *Regional Development Studies*, Vol. 5. (Forthcoming)

Corea, Gamini (1975) *The Stability of an Export Economy*, Colombo, Sri Lanka: Marga Institute.

Fair, Ray C. (1994) *Testing Econometric Models*, Cambridge, MA: Harvard University Press.

Hall, Robert E. et al. (1995) *"Eviews User Guide", Quantitative Micro Software.*

Indraratna, A. D. V. de S.(ed.) (1998) *Fifty Years of Sri Lanka's Independence, A Socio Economic Review*, Colombo, Sri Lanka: Sri Lanka Institute of Social and Economic Studies,

SLISES.

International Monetary Fund (1997) *International Financial Statistics Year Book.*

Karunasena, A. G. (1985) *An Econometric Model of Sri Lanka, Colombo*: Central Bank of Sri Lanka.

Kinoshita, Soshichi (1982) "On Macro Econometric Model Building in ASEAN Countries: The Case of Thailand," *Economic Science*, Vol. 29, No. 3, pp. 1-22.

Labys, W. C. (1973) *Dynamic Commodity Models: Specification, Estimation and Simulation*, Lexington, MA:Lexington Books, D. C. Heath.

Lakshman, W. D. (1997) *Dilemmas of Development*, Colombo, Sri Lanka: Sri Lanka Association Economists.

Lakshman, W. D. and H. Nicholas (1991) *Economic Consequences of the Total Removal of Exchange Controls*, Consultancy Report prepared by ECONSULT for the Ceylon Chamber of Commerce, Colombo, Sri Lanka.

Lance, Taylor (1992) "*Socially Relevant Policy Modelling*," Cambridge, MA: MIT Press.

Nakagawa, K. et al. (1995) *Long-term Hydrometeorological Data in Sri Lanka*, Tsukuba, Japan: University of Tsukuba.

OECD (1998) *National Account* Vol. 1, Main Aggregates.

Perera, Nelson (1994) "An Econometric Model of Sri Lanka," in H. M. Scobie, ed., *Economic Progress and Growth*, London: Chapman and Hall for European Economics and Financial Centre.

Pindyck, Robert S. and Daniel L. Rubinfeld (1991) *Econometric Models and Econometric Forecasts*, 3rd edition, New Delhi: McGraw-Hill International Edition.

Rankaduwa, W., Rao, U. L. G and Ogwang, T (1995) "A Forecasting Model of the Sri Lankan Economy," *Economic Modelling*, Vol.12, No. 4, pp. 343 - 375.

Snodgrass, D. R. (1966) *Ceylon: An Export Economy in Transition*, Illinois: Richard D. Irwin, Inc. for Economic Growth Centres, Yale University.

United Nations Development Programme (UNDP) (1998) *Human Development Report*, New York: Oxford University Press.