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# **Impact of Services Sector Policy Reforms CGE Model Analysis based on Sri Lanka**

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## **Abstract**

This paper investigates the macroeconomic effects of services sector reform policies using two computable general equilibrium models of Sri Lankan economy. First model assumes perfect competitive market and second one assumes monopoly supplier economy. Both models have been calibrated using Sri Lanka's social accounting matrix currently available. Impacts of both services sector production tax reduction and import tariff increase have been simulated. Simulation results imply that reduction of services sector production tax is better than increase of import tariff in both perfect competition case and monopoly supplier case.

**Keywords:** Sri Lanka, Services sector, Production Tax, Import tariff, CGE model

# 1. Introduction

Transformation to service sector is one of the important aspects of economic policies not only in the developed countries but developing countries. In high- income countries, on average, services sector constitute nearly two thirds of total Gross Domestic Product (GDP). Among low and middle- income countries, they account for a smaller share of 54 percent but still the majority of output. In East Asia, the services sector on average is about the same size as the industrial sector, at 41 percent of GDP. In Sri Lanka 59.3 percent of total GDP is contributed by service sector (Source: National Accounts 2009).

Throughout its history, Sri Lanka has been a beneficiary of being an active partner in global trade. In addition to being located on a very convenient naval route, conducive policies adopted by successive rulers have been a booster to international trade, and through it, to wealth creation. The reliance on services, especially commercial services, for wealth creation is not a new policy paradigm for Sri Lanka. Sri Lanka which is devoid of a sufficient natural resource base would find it difficult to enhance growth through industry or agriculture alone. The country's available land is limited and its population density at over 290 persons per square kilometer is one of the highest in the world.

Another factor that has driven Sri Lanka to the services sector is the ever rising globalization of services. Moreover, after ending 30 year internal conflict between separatist Tamil tigers has created ideal atmosphere to improve services sector in Sri Lanka.

So in this paper, I apply CGE model approach to Sri Lankan economy and look for new production tax and import tariff policies to improve the services sector in Sri Lanka. I use two CGE models based on perfect competitive market economy and monopoly market

economy. Then compare the differences of services sector improvements based on policy simulations.

This paper is structured as follows. Section 2 discusses the history of services sector of Sri Lanka and related literature. Section 3 presents the model and its calibration procedure. Section 4 provides the simulation results based on policy experiments. Finally section 5 summarizes the results.

## **2. Services sector in Sri Lanka**

Sri Lanka is the first country in the South Asia which started open market economic policies. In 1977, newly elected united national party government introduced new open market oriented economic policies. Until 1977, Sri Lanka had been following mainly socialist economic policies based on Marxism. With the introduction of open market economy, Sri Lankan economy gradually transforms from agriculture based economy to more liberalized industry and service sector based economy. But economic growth has been hampered by internal conflict started early 80s. Despite a brutal civil war that began in 1983, economic growth has averaged around 4.5%. In 2001, however, GDP growth was negative 1.4%; the only contraction since independence. Growth recovered to 4.0% in 2002. Following the 2002 ceasefire and subsequent economic reforms, the economy grew more rapidly, recording growth rates of 6.0% in 2003 and 5.4% in 2004. The December 2004 Indian Ocean tsunami killed 32,000 people, displaced 443,000, and caused an estimated \$1 billion in damage. The tsunami's overall economic impact was less severe than originally feared, with the economy growing by 6% in 2005 and 7.7% in 2006 as the damage was offset by the reconstruction effort. Sri Lankan economy recorded

a positive growth rate of 3.5 percent for the year 2009. This economic performance has to be considered as a very satisfactory achievement considering the global economic recession. Table 1 shows the Sri Lanka's GDP by three main sectors.

Table1: Sri Lanka GDP by sectors (%)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
<b>Agriculture</b>	20.1	14.3	13.7	13	12.5	12.3	11.9	12.1	12
<b>Industry</b>	26.8	28	27.7	27.7	28.1	28.2	28.5	28.4	28.6
<b>Services</b>	53.1	57.7	58.6	59.3	59.4	59.5	59.6	59.5	59.3

Source: Central bank of Sri Lanka (2009)

As we can see from table 1, the services sector contributes the highest percentage of Sri Lankan gdp in the last decade. Agriculture sector contribution had been declining year by year. On the other hand Services and Industry sector contribution had been increased. Moreover, the major division of economic activities, namely, Agriculture, Industry and Services registered positive growth rates of 3.2 percent, 4.2 percent and 3.3 percent respectively (Source :Sri Lanka National Accounts, 2009). The percentage share of the three major sectors, the agriculture, industry and services to the total National Income more or less remained unchanged being 12.0 percent, 28.6 percent and 59.3 per cent.

The main components of Sri Lanka's services sector are tourism, banking, finance, shipping, aviation and retail trade. Being situated as a small island country in northern part of Indian Ocean, It has a very good position to develop services sectors. Sri Lankan government recently started constructing new international harbor and air port to boost the shipping and aviation services. Financial services are another valuable sector which has got attention by global firms. Sri Lanka's financial sector comes under the purview of the Central Bank of Sri Lanka. Liberal policies and a lucrative business environment have

made the island nation an attractive location for several global banking firms to set up operations, complementing a strong local network of investment and commercial banks. On the other hand, Sri Lanka's IT industry has made rapid progress in the past decade, becoming a vibrant sector in the country and the region. The significant inroads has prompted growth and development in IT-related services as well as IT education. The sector has become particularly popular among the country's younger generation who have given prominence to improving their skills and knowledge in IT-related products and services. India's recent success as a global IT giant also gives valuable chance to develop information and communication technology (ICT) services in Sri Lanka.

### **3. Model and Calibration**

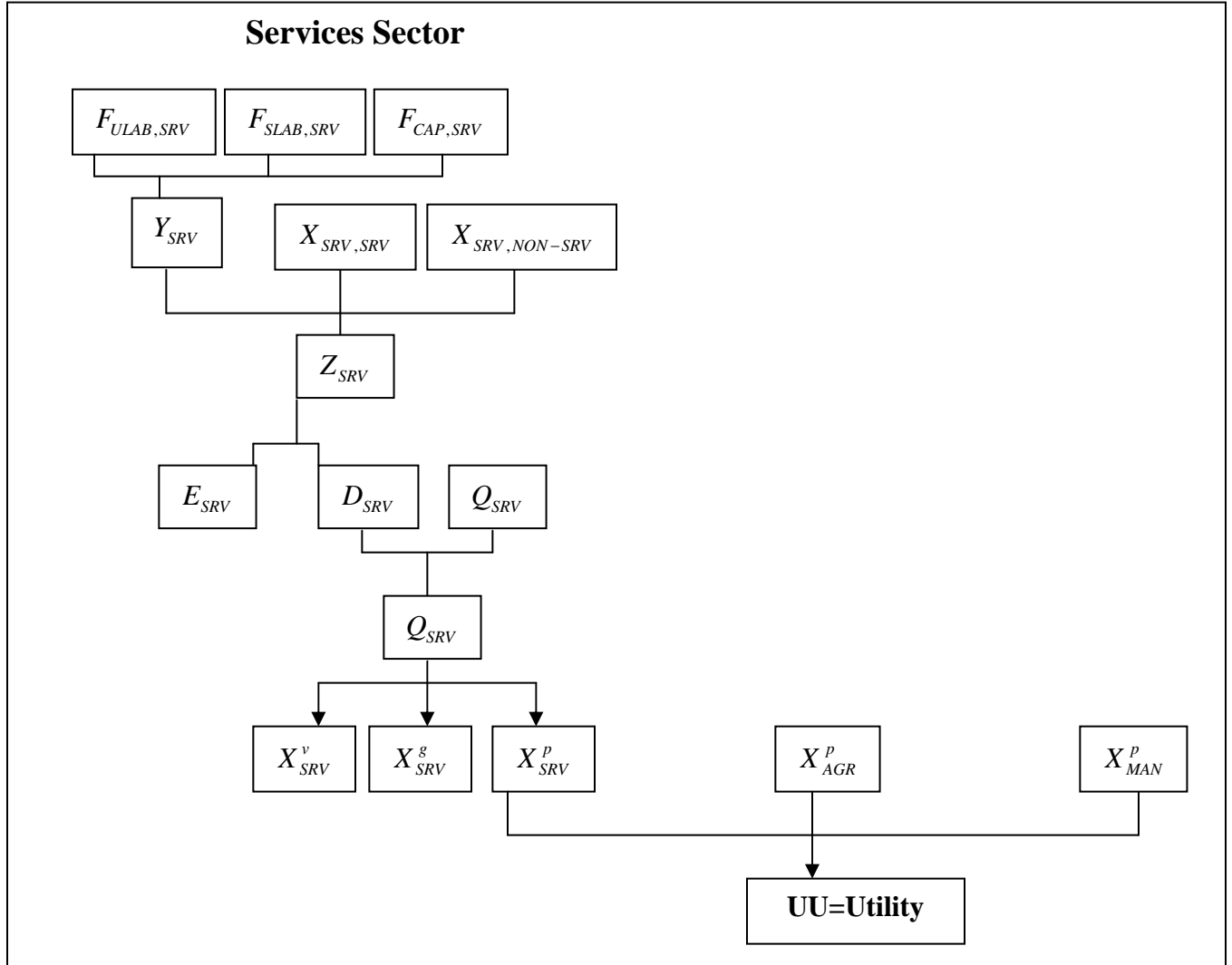
To quantify the possible impact of service sector tax policies in Sri Lanka, we employ a static computable general equilibrium model for Sri Lankan economy. Following Hosoe and others (2010), two computable general equilibrium (CGE) models have been applied to Sri Lankan economy. The first model is based on perfect competitive market economy and second one based on monopoly market where each sector only has one supplier. Basically these models provide an internally consistent economy-wide framework for policy analysis, in considering internal and/or external shocks to an economy on macro and micro economic variables.

#### **3.1 Model Structure**

The model includes four types of institutions: households, firms, the government and the rest of the world. Production sectors are categorized into Agriculture, Manufacturing and Services sectors. The government collects taxes (income taxes and tariffs), purchases

goods and services, and provides transfers to household groups or firms. The economy is also involved in transactions with the rest of the world: exporting or importing goods and services, receiving or sending transfers and grants. Household owns the capital and labor. Labor is divided in to 2 categories; skilled labor and unskilled labor.

All the agents of the model maximize their objectives. While Households maximize their utility, producers maximize their profit. Firms optimize labor according to wage, equalizing the value of the marginal product of labor with its wage rate. While basic structure for both perfectly competitive market economy model and monopoly market economy model are same, in the latter model  $i$ -th sector has only one monopoly supplier. The basic structure of both models is given in Figure 1 and Table 2.



**Figure 01:** Structure of CGE Model



Table 2: Description of Model

<b>Variable</b>	<b>Description</b>
$F_{CAP,SRV}$	Capital used in Services sector
$F_{SLAB,SRV}$	Skilled Labor used in Services sector
$F_{ULAB,SRV}$	Un-Skilled Labor used in Services sector
$Y_{SRV}$	Composite factor of Services sector
$Y_{Non-SRV}$	Composite factor of non-services sector
$X_{SRV,SRV}$	Intermediate Service sector products used in Services sector
$X_{Non-SRV,SRV}$	Intermediate non-service sector products used in services sector
$X_{SRV,Non-SRV}$	Intermediate services sector products used in non-services sector
$X_{Non-SRV,Non-SRV}$	Intermediate non-services products used in non-services sector
$Z_{SRV}$	GDP of services sector
$Z_{Non-SRV}$	GDP of non-services sector
$E_{SRV}$	Exports of Services sector products
$E_{Non-SRV}$	Exports of non-services sector products
$D_{SRV}$	Services sector products for domestic usage
$D_{Non-SRV}$	Non-services sector products for domestic usage
$Q_{SRV}$	Imports of services sector products
$M_{Non-SRV}$	Imports of non-services products
$Q_{SRV}$	Armington's composite Services sector goods
$Q_{Non-SRV}$	Armington's composite non-services sector goods
$X_{SRV}^v$	Investment of services sector goods
$X_{Non-SRV}^v$	Investment of non-services goods
$X_{SRV}^g$	Government consumption of services sector goods
$X_{Non-SRV}^g$	Government consumption of non-services goods
$X_{SRV}^p$	Household consumption of services goods
$X_{Non-SRV}^p$	Household consumption of non-services goods

### 3.2 Calibration

The model has been calibrated using Sri Lanka Social Accounting Matrix. The SAM has been obtained from GTAP database. The base year for this SAM is year 2000. All the parameters and initial values for the variables used in the model have been calibrated using this SAM. The detailed SAM is shown in Table 3. Gams computer code has been used for calibration and policy simulations.

Table 3: Sri Lankan Social Accounting Matrix (values are in millions of Rupees)

	AGR	MAN	SRV	CAP	SLAB	ULAB	IDT	TRF	HOH	GOV	INV	EXT
AGR	228.6	510.6	207.0	911.8	1406.9	1450.8	182.1	73.1				403.6
MAN	1606.9	5426.2	1929.4	3283.4	901.9		12.0	532.2				7911.8
SRV	76.7	2461.1	4017.7	4692.4	4818.5		1731.3					1145.1
CAP									8887.7			
SLAB									7127.2			
ULAB									1450.8			
IDT										1925.5		
TRF										605.2		
HOH	2549.4	5733.9	7186.6							1371.6	624.2	
GOV	35.3	255.7	1353.7								2257.6	
INV	87.1	1961.7	2872.0									
EXT	790.4	5254.6	1376.4								2039.0	

### 4. Simulations Results

Several policy experiments have been simulated using both perfectly competitive market model and monopoly market model. First we checked the macroeconomic impact of production tax rate reduction of services sector by simulating several scenarios. Next we checked the impact of import tariff rate increase in services sector.

#### 4.1 Macroeconomic Impacts of Production tax rate reduction of services sector

We have conducted several simulations of tax rate reduction scenarios in the services sector. Table 4 presents the macro economic indicator results of these scenarios.

Table 4: Macroeconomic impacts of production tax policies (% change to base case)

Macroeconomic Variable	Scenario (a)		Scenario (b)	
	Services Sector Production tax rate reduce by 50%		Services Sector Production tax rate reduce by 100%	
	Perfect	Monopoly	Perfect	Monopoly
	Competitive Model	Model	Competitive Model	Model
Service sector output	2.231	6.039	4.607	12.480
Service sector imports	-7.406	-16.781	-14.650	-32.004
Service sector exports	11.182	20.862	24.050	46.630
Social Welfare(EV)	658.893	616.672	1379.671	1274.997

Source: Model simulation results.

Simulation results indicate that reduction of services sector production tax rate by 50% will increase services sector output by 2.23% in under the perfectly competitive market of suppliers. But under the monopoly market model this will increase by 6.04%. So impact is larger under the production sector monopoly. These values will be approximately doubled when tax rate reduced by 100% to zero production tax rate. With the effect from this policy imports of service sector will be reduced in both models as expected. But again under the monopoly decrease will be higher than perfectly competitive market economy. Because reduction of production tax gives service sector producers an incentive to produce more products they can export more to rest of the world. We can see this from our simulation results. The larger the reduction of production tax rate on services the higher the services sector exports to rest of the world. Most importantly

reduction of production tax rate in services sector will give higher social welfare (Hicksian equivalent variation :EV).This increase will be higher under the perfect competitive model as expected as under the monopoly supplier model some of the monopoly rent will be taken by producers. Moreover, higher reduction of production tax rate in service sector will generate higher social welfare under both perfect competitive and monopoly models.

#### 4.2 Macroeconomic Impacts of import tariff rate increase of services sector

Next we conducted several simulation scenarios of increase of import tariff in the services sector. First scenario is increase of services sector import tariff by 5% .Second scenario is import tariff increase of 10%.Table 5 gives results for these two scenarios under the monopoly model and perfect competitive model separately.

Table 5: Macroeconomic impacts of import tariff policies (% change to base case)

Macroeconomic Variable	Scenario (a)		Scenario (b)	
	Services Sector import tax rate increase by 5%		Services Sector Import tax rate increase by 10%	
	Perfect	Monopoly	Perfect	Monopoly
	Competitive Model	Model	Competitive Model	Model
Service sector output	0.473	0.758	0.895	1.408
Service sector imports	-8.186	-11.894	-15.428	-22.052
Service sector exports	-0.167	0.083	-0.322	0.138
Social Welfare(EV)	-32.690	-16.496	-62.610	-31.369

Results imply that with the increase of import tariff in services sector by 5%, services sector gross output will be increased by 0.47% in the perfect competitive case and 0.76% in the monopoly case respectively. These values have approximately doubled when

import tariff rate doubled. So we can think that import tariff on services sector give an incentive to domestic services sector producers to produce more as price competition will be lower when tariff increase. We can see services sector imports will be reduced as expected in both perfect competitive and monopoly cases. Interestingly, services sector exports increased slightly only under monopoly model. Under the perfect competitive case increase of import tariff will reduce exports as well. The higher the import tariffs in service sector the lower the exports from service sector. In both scenarios social welfare will be decreased due to the import tariff increase. Moreover, Social welfare will be worsening under perfect competitive production model.

## **5. Conclusions**

This paper examined the impact of production tax policies and import tariff policies in the Sri Lankan services sector on a general equilibrium framework. Several policy experiments had been conducted for both perfect competitive production model and monopoly production model. We found that production tax reduction of services sector increases the output of the services sector in both perfect competitive and monopoly models. Social welfare also improved in both cases with reduction of services sector production tax rate. We also found that increase of import tariff in services sector increase the services sector output slightly. But in this case social welfare has been decreased considerably.

So according to these results, we can say that reduction of services sector production tax rate is more effective to improve the Sri Lankan services sector. Sri Lanka should give more tax reduction on services sector to get more benefits from service sector.

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