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RESEARCH ARTICLES

PERSPECTIVES

BOOK REVIEW

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The International Journal of the Sri Lanka Forum of University Economists

Aims and Scope

Sri Lanka is currently facing many transitions: economic, epidemiological, demographic, technological and social. The world economy too is evolving, with technological progress, economic crises and social upheavals demanding more and alternative economic analyses. Both these factors make it imperative for economists in Sri Lanka and overseas, among the academic community as well as practitioners, to focus on economic research and its dissemination. The journal of the Sri Lanka Forum of University Economists seeks to fulfill this mandate.

The Sri Lanka Journal of Economic Research (SLJER) creates a space where research, particularly *policy related* research, can be disseminated and so contributes to the economic thinking in the country in this period. The critical evaluation of policy is essential if optimal use is to be made of the demographic window of opportunity. Equity and social welfare, the cornerstone of economic thinking in the country, and the challenges posed to such fundamentals by economic liberalization, globalization and technological progress make it vital to dwell on ideas and ideals, as well as to collate systematic evidence to support rational policy making. The aim of this journal then is to support such processes through dissemination and discussion.

The SLJER is a refereed tri-lingual journal. The journal will primarily provide an opportunity for authors presenting papers at the annual sessions of the Sri Lanka Forum of University Economists to disseminate their contributions. Apart from the research articles the journal carries a special section titled 'Perspectives' which articulates alternative thinking and approaches to Economics. Book reviews are included as well.

All articles in this journal are subject to a rigorous blind peer-review process initially, and are then reviewed by the editorial committee prior to final acceptance for publication.

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PANEL OF REVIEWERS

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RESEARCH ARTICLES

THE BUDGET DEFICIT AND FINANCIAL CROWDING OUT: EVIDENCE FROM SRI LANKA

Sri Lanka Journal of Economic Research
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A A S Priyadarshanee
O G Dayaratna-Banda

Abstract

Fiscal policy is an important factor that influences the effectiveness of private investment. An expansionary fiscal policy might lead to growth in total income of a country, while such may also raise interest rates and thereby reduce private investment. The present study examined whether there is such a financial crowding out with reference to Sri Lanka, amidst a dearth of studies examining the impact of the budget deficit on private investment. Time series data from 1960 to 2007 were used for empirical tests based on Neoclassical Flexible Accelerator and Mundell-Fleming models. The bounds testing co-integration procedure was adopted to test the long-run relationships and dynamic interactions among variables. The results show that there is a long run co-integration relationship between real interest rate and budget deficit, money supply, exchange rate, and the expected inflation. The study found evidence for the absence of a financial crowding out effect as a result of fiscal expansions in Sri Lanka, where private investment appears to have increased as a result of fiscal expansions. The Central Bank of Sri Lanka appears to have mitigated any crowding out effect of fiscal expansions by an accommodative monetary policy which has been financed through capital inflows, foreign aid, foreign debt, and worker remittances.

Key Words: *Budget Deficit, Private Investment, Interest Rate, Financial Crowding-out, ARDL*

JEL Codes :*C01, C82, E62, E43, E52*

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INTRODUCTION

The relationship between budget deficits, interest rates, and private investment has long been discussed in literature on macroeconomics. Government activity related to fiscal policy seemingly affects economic outcomes. Expansionary fiscal policy, by positively affecting private investment (crowding-in), may lead to growth in total income of a country, while it may also raise interest rates, thereby reducing private investment (crowding-out). The net effect is determined by these two opposing tendencies. Since effects of fiscal policy on other macroeconomic variables tend to depend on monetary policy, balance of payments and exchange rates, whether fiscal policy would result in 'crowding-out' or 'crowding-in' effects cannot be determined, a priori, without empirically testing possible relationships with respect to a particular economy.

There are different theoretical positions taken by different schools of thought on the effects of fiscal policy. While the neoclassical school asserts crowding out effects, the Keynesian school emphasises crowding in effects, arguing that an increase in Government spending stimulates domestic economic activity. According to the Ricardian Equivalence Theorem, increases in budget deficit financed through Government borrowing will be matched with a future increase in taxes, leaving interest rates and private investment unchanged (Bahmani-Oskooee, 1999). It is therefore important to investigate empirically as to how the budget deficit in Sri Lanka impacted private investment through its effects on interest rates during the post-colonial period.

Sri Lanka endured persistent budget deficits for several decades. As the largest expenditure unit and employer, the scope and participation of Government has expanded since the 1950s. By 1955, the export boom collapsed, while economic conditions showed a consistent downward trend. In the 1960s, the Sri Lankan Government resorted to socialist inclined economic policies with heavy interventions into the economy, curtailing private economic activity. In 1970, the new Government adopted an inward-looking policy of import substitution and established Government enterprises, nationalized private enterprises and expanded welfare programs, which seriously reduced private economic activity to negligible levels. After 1977, the Government adopted open economic policies as its development strategy, though Government expenditure continued to remain at high levels. Sri Lanka, therefore, has witnessed the implementation of a series of contrasting development strategies since independence.

In spite of the different policy thrusts adopted, Sri Lanka experienced high budget deficits since 1960. According to Central Bank of Sri Lanka, the overall budget deficit as a percentage of GDP was 5.8 in 1958-67, 6.1 in 1968-77, 11.5 in 1978-87 and 8.4 in 1988-96 (CBSL 1998). It was 8.1 in 2006 (CBSL 2007).

Examining the macroeconomic implications therefore is of great significance to the policy making process in Sri Lanka, particularly because of the dearth of studies directly focusing on the impact of budget deficit on private investment. In this respect, the present study attempted to empirically investigate whether there has effectively been a financial crowding out in Sri Lanka.

REVIEW OF LITERATURE

In macroeconomic theory, there exist two variants of crowding out in an economy–real and financial. The real (direct) crowding out occurs when an increase in public investment displaces private capital formation broadly on a one-to-one basis, irrespective of the mode of financing fiscal deficit (Blinder and Solow 1973).

On the other hand, the financial crowding-out is the phenomenon of partial loss of private capital formation, due to the increase in interest rates emanating from the pre-emption of real and financial resources by the Government through bond-financing of fiscal deficit (Buiter 1990).

According to Barro (1974), budget deficits are irrelevant for financial decisions. An increase in budget deficit is expected to be accompanied by an increase in taxes in the future, if not today. Therefore, individuals considering their future income do not change their consumption and/or savings, leaving interest rates and private investment also unchanged, which translates into no crowding-out or crowding-in effect of fiscal spending (Barro 1978 and 1989, Darrat and Suliman 1991, Ghatak and Ghatak 1996).

The Keynesian school, on the other hand, assumes that there is unemployment in the economy and that the interest rate sensitivity of investment is low. In that case, expansionary fiscal policy will lead to little or no increase in the interest rate. This also assumes that Government spending tends to increase private investment because of the positive effect of Government spending on the expectations of investors. Therefore, there is a crowding-in rather than a crowding-out effect of public spending (Aschauer 1989, Baldacci, Hillman and Kojo 2004).

The Neoclassical Loanable Funds Theory explains that the balancing of savings and investment will be resolved by the interest rate mechanism (Grieve 2004). In case of an increase in Government spending, interest rates have to increase to bring the capital market into equilibrium, dampening private investment (Beck 1993, Heijdra and Ligthard 1997, Voss 2002, Amirkhakhali 2003, Ganelli 2003). Chakraborty (2006) pointed out that sale of bonds by the Government to finance budget deficits, regardless of its use of proceeds, raises supply of bonds and thereby lowers bond price. This results in increasing interest rates and reducing private investment (crowding-out).

Empirical findings on the effects of budget deficit on interest rate and private investment are ambiguous. Evans (1995) and Kormendi (1983) found that there is a relationship between budget deficit and interest rate. Alani (2006) found empirical support for the absence of a crowding-out effect arising as a result of financing budget deficit. Esiner (1989) concluded that budget deficit affects capital inflows, and not capital outflows. Cebula (1978), Cebula and Scott (1991), Cebula and Belton (1992), Cebula, Hung and Manage (1996) identified a positive relationship between budget deficit and interest rate with reference to USA and Canada. Investment appears to be affected by the net change in the debt, and hence crowding out effects (Ostroky 1979), while increase in the debt financed proportion of Government deficit appears to crowd out private investment (Feldstein 1986).

In an empirical study covering 10 Asian countries, Gupta (1992) has found that the Ricardian Equivalence Theorem is rejected vis-a-vis Sri Lanka, India, Indonesia and Philippines. He identified evidence of crowding out in all Asian countries excluding India. Chowdhary (2004) tested possible effects of fiscal actions enumerated earlier on five least developed countries (LDCs) in South Asia. In the case of Sri Lanka, the price effect seems negative but statistically insignificant and therefore does not indicate any perceptible influence on the interest rate.

However, none of these studies appears to have had their focus on empirically testing the financial crowding out hypothesis.

THEORETICAL FRAMEWORK

The Neoclassical Flexible Accelerator Model appears to provide a basis for analysing financial crowding out effects in advanced countries. The neoclassical theory does not adequately recognise Government investment as its philosophy encompasses assumptions which are not amenable to developing countries. However, Governments in developing countries appear to be carrying out significant functions pertaining to investment in their economies. Therefore, this study developed a theoretical model to establish a relationship between budget deficits and interest rates following the Mundell-Fleming Model, and also a model to establish a relationship between interest rate and private investment using the variant of the Neoclassical Flexible Accelerator Model adopted by Chakraborty (2006).

Firstly, with regard to the link between interest rate and private investment, Gross investment in private sector can be expressed as its net investment plus the depreciation of previous capital stock, as depicted in the equation (1).

$$I_{pvt} = \Delta KP_t + \delta KP_{t-1} \quad (1)$$

where, I_{pvt} = Gross Private Investment

$\Delta KP_t = N_{pvt}$ = Net Private Investment

δ = Depreciation Ratio

The Net Private Investment, on the other hand, can be expressed as a combination of the desired capital stock and the brought-forward capital stock (equation 2).

$$N_{pvt} = \Delta KP_t = \beta\left(KP_t^* - KP_{t-1}\right) \quad (2)$$

where, KP_t^* = desired stock of capital in private sector

KP_{t-1} = actual stock of private investment in previous year

β = coefficient of adjustment, $0 \le \beta \le 1$

Substituting equation (2) into (1);

$$I_{pvt} = \beta\left(KP_t^* - KP_{t-1}\right) + \delta KP_{t-1} \quad (3)$$

$$I_{pvt} = \beta KP_t - \beta KP_{t-1} + \delta KP_{t-1} \quad (4)$$

By rewriting equation (4) using Standard Lag Operator (L),

$$I_{pvt} = \left[1 - (1-\delta)L\right]KP_t \quad (5)$$

where $LKP_t = KP_{t-1}$

Partial adjustments function for gross investment is,

$$\Delta I_{pvt(t)} = \beta\left(I^*_{pvt(t)} - I_{pvt(t-1)}\right) \quad (6)$$

where $I^*_{pvt(t)}$ = desired level of private investment

Private investment in the steady state should be,

$$KP^*_{t-1} = KP_{t-1}$$

$$I^*_{pvt} = \left[1 - (1-\delta)L\right]KP_t^* \quad (7)$$

Combining equation (6) and (7), and solving for I_{pvt};

$$\Delta I_{pvt(t)} = \beta\left[1 - (1-\delta)L\right]KP_t^* - \beta I_{pvt(t-1)} \quad (8)$$

$$I_{pvt(t)} - I_{pvt(t-1)} = \beta\left[1 - (1-\delta)L\right]KP_t^* - \beta I_{pvt(t-1)} \quad (9)$$

$$I_{pvt(t)} = \beta[1-(1-\delta)L]KP_t^* + I_{pvt(t-1)} - \beta I_{pvt(t-1)} \quad (10)$$

$$I_{pvt(t)} = \beta[1-(1-\delta)L]KP_t^* + (1-\beta)I_{pvt(t-1)} \quad (11)$$

According to accelerator models, desired stock of capital can be assumed to be proportional to the output expectations in the economy.

$$KP_t^* = \alpha Y_t^* \quad (12)$$

where, Y^*_t = expected output in the economy

Substituting equation (12) into (10);

$$I_{pvt(t)} = \beta[1-(1-\delta)L]\alpha Y_t^* + (1-\beta)I_{pvt(t-1)} \quad (13)$$

$$I_{pvt(t)} = \beta\alpha[1-(1-\delta)L]Y_t^* + (1-\beta)I_{pvt(t-1)} \quad (14)$$

where (β) is the response of private investment to the gap between desired and actual level of investment. This response is determined by the economic factors that influence private investor's ability to reach the desired level of investment.

We assume that level of private investment depend on private consumption (C_{pvt}), real interest rate (i_r), and Government investment (I_{pub}).

$$\beta = \int \{C_{pvt}, i_r, I_{pub}\} \quad (15)$$

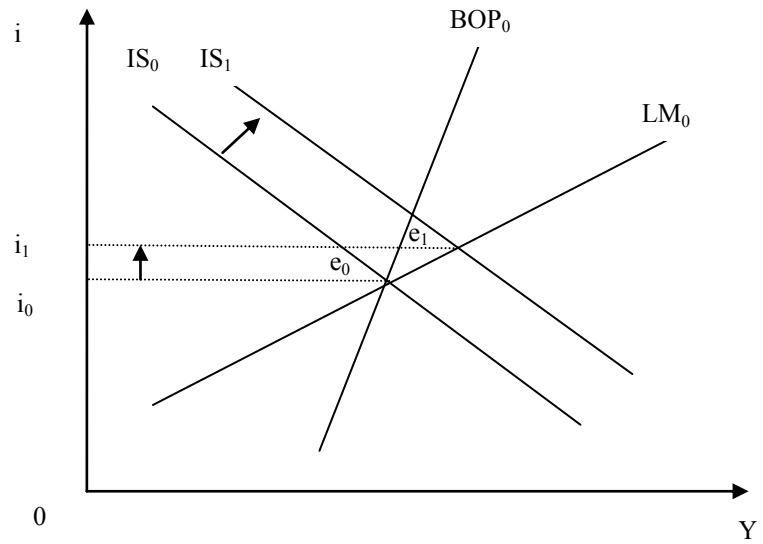
Secondly, though the study conducted by Chakraborty (2006) was able to show that private investment is sensitive to interest rate, it has been unable to build a relationship between interest rate and budget deficit.

To fill this gap, the present study modified the Mundell-Fleming Model to establish a relationship between budget deficit and interest rate. So this study used the IS-LM-BP model, developed by Robert Mundell based on J. Marcus Fleming in the 1960s including capital mobility and differentiated goods, equilibrium of goods and money market, also concerns the differences like fixed and flexible exchange rates, large and small countries and the effect of fiscal and monetary policies on these macro variables in an open economy. According to them, capital mobility is faster than international trade and it depends on interest rate. Long run capital inflow depends on marginal productivity of capital. Foreign Direct Investment (FDI) depends on capital gains, and not on interest rate. However Mundell-Fleming model discusses the short term capital mobility, that is "hot money".

According to Figure 1, increase in Government expenditure leads to shifting IS curve to the right (to the new position identified as IS_1) and then, interest rate increases to i_2. As

interest rate increases, the crowding-out effect begins to affect private investment. Higher the investment cost, lesser would be the tendency of private investors to invest. This implies a relationship between budget deficit and interest rate. This study therefore hypothesises that investment would decrease when budget deficit increases.

Figure 1: Fiscal and Monetary Policies in Sri Lanka



Source: Mundell (1963)

In the Mundell-Fleming model, interest rate is mainly influenced by fiscal policy, monetary policy and external factors. Thus, this study models real interest rate as a function of budget deficit (BD), money supply (MS), exchange rate (ER) and expected inflation (π^e).

$$RI = f(BD, MS, ER, \pi^e) \qquad (16)$$

Therefore the empirical equation for financial crowding-out would be as follows:

$$RI_t = C_0 + \delta_1 RI_{t-i} + \delta_2 BD_t + \delta_3 \pi_t^e + \delta_4 MS_{2t} + \delta_5 ER_t + \varepsilon_t \qquad (17)$$

where, RI_t = Real Interest Rate

BD_t = Budget Deficit Growth Rate

π_t^e = Expected Inflation Rate

ER_t= Exchange Rate

MS_{2t} = Money Supply Growth Rate

Estimation Methods

In order to test the stationarity of data, Augmented Dicky-Fuller (ADF) and Phillips-Perron tests were used in the presence of structural breaks. The liberalisation of the Sri Lankan economy in 1977 had a significant impact on the mean of most of the country's macroeconomic variables, because of the structural breaks that would have been caused by the economic policy shift from a controlled economy to a market-oriented economy. The Chow test was adopted to ascertain the significance of the break in the trends. The optimal lag length was selected using Schwartz-Bayesian Criteria (SBC) and Akaike Information Criteria (AIC). The study used a relatively longer lag length in the beginning, and then pared down the model through the usual AIC and SBC tests.

To empirically analyse the long-run relationships and dynamic interactions among the variables of interest, a model was estimated by using the bounds testing co-integration procedure [or autoregressive distributed lag (ARDL)] developed by Pesaran *et al* (2001). Unlike other techniques such as the Johansen approach, the ARDL approach to co-integration does not require the pre-testing of the variables included in the model for unit root (Pesaran *et al.*, 2001). It is applicable irrespective of whether the regressors in the model are purely I(0), purely I(1) or mutually co-integrated. However, as remarked by Ouattara (2004), if the order of integration of any of the variables is greater than one [for example, an I(2) variable], then the critical bounds provided by Pesaran et al. (2001) are not be valid. They are computed on the basis that the variables are I(0) or I(1). It is necessary to test for unit root to ensure that all the variables satisfy the underlying assumptions of the ARDL methodology before proceeding to the estimation stage.

The long run relationship as General Vector Autoregressive (VAR) model of order *p* is given below,

$$Z_t = C_0 + \beta t + \sum_{i=1}^{\rho} \phi_i Z_{t-i} + \varepsilon_t \qquad \text{t=1, 2,3,...j} \tag{18}$$

where $C_0 = \mathrm{K} + 1$ Vector of intercepts (drift)

$\beta = \mathrm{K} + 1$ Vector of trend coefficients

Vector Error Correction Model (VECM) below was derived using the above equation:

$$\Delta Z_t = C_0 + \beta t + \Pi Z_{t-1} + \sum_{i=1}^{\mathrm{P}} \Gamma_i \Delta Z_{t-j} + \varepsilon_t \qquad \text{t=1, 2,3,...j} \tag{19}$$

where the $(\mathrm{K} \times 1) \times (\mathrm{K} \times 1)$ matrixes $\Pi = l_{\mathrm{K}+1}$ and $\Gamma = -\sum_{j=i+1}^{p} \Psi_j$ represent the long run multipliers and short run dynamic coefficients of VECM. Z is the vector of variables Y_t and X_t respectively. Y_t is dependent variable and X_t is vector of I(0) and I(1) regressors.

Thus, the Conditional Vector Error Correction Model would be as follows:

$$\Delta y_t = C_{y0} + \beta t + \delta_{yy} y_{t-1} + \delta_{xx} X_{t-1} + \sum_{i=1}^{P-1} \lambda_i \Delta y_{t-i} + \sum_{i=1}^{P-1} \phi_i \Delta X_{t-i} + \varepsilon_{yt} \quad (20)$$

The first step in the ARDL bounds testing approach is to estimate equation (20) by Ordinary Least Squares (OLS) in order to test for the existence of a long-run relationship among the variables. Two asymptotic critical value bounds provide a test for co-integration when the independent variables are I(d) (where d is either 0 or 1): a lower value assuming the regressors are I(0) and an upper value assuming purely I(1) regressors. If the F-statistic is above the upper critical value, the null hypothesis of no long-run relationship can be rejected, irrespective of the orders of integration in the time series. Conversely, if the test statistic falls below the lower critical value, the null hypothesis cannot be rejected. If the statistic falls between the lower and upper critical values, the result would be inconclusive.

$$\Delta RI_t = C_0 + \delta_1 RI_{t-1} + \delta_2 BD_{t-1} + \delta_3 \pi^e_{t-1} + \delta_4 MS_{2t-1} + \delta_5 ER_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta RI_{t-i}$$
$$+ \sum_{j=1}^{q} \varpi_j \Delta BD_{t-j} + \sum_{l=1}^{q} \eta_l \Delta \pi^e_{t-l} + \sum_{m-1}^{q} \varphi_m \Delta MS_{2t-m} + \sum_{n-1}^{q} \gamma_n \Delta ER_{t-n} + \varepsilon_t \quad (21)$$

Once the co-integration is established, the ARDL long-run model for dependent variable can be estimated as:

$$RI_t = C_0 + \sum_{i=1}^{p} \delta_1 RI_{t-i} + \sum_{i=1}^{q} \delta_2 BD_{t-i} + \sum_{i=1}^{q} \delta_3 \pi^e_{t-i} + \sum_{i=1}^{q} \delta_4 MS_{2t-i} + \sum_{i=1}^{q} \delta_5 ER_{t-i} + \varepsilon_t \quad (22)$$

The error correction model associated with the long-run for estimate the short-run dynamic parameters could then be obtained as follows:

$$\Delta RI_t = C_0 + \sum_{i=1}^{p} \alpha_i \Delta RI_{t-i} + \sum_{j=1}^{q} \varpi_j \Delta BD_{t-j} + \sum_{l=1}^{q} \eta_l \Delta \pi^e_{t-l} + \sum_{m-1}^{q} \varphi_m \Delta MS_{2t-m} + \sum_{n-1}^{q} \gamma_n \Delta ER_{t-n} + \vartheta ecm_{t-1} + \varepsilon_t \quad (23)$$

The equation (22) will be the basic focus of our estimations to test the financial crowding out effects of fiscal expansion in Sri Lanka.

Description of Variables and Data

Interest rates on commercial bank loans were used for the purposes of this study. Average interest rate of loans and overdrafts (stock in trade, immovable property and other) was taken as nominal interest rate. Fisher hypothesis was used to convert nominal interest rate into real interest rate.

Ex-ante and ex-post equations are as follows:

$$\gamma^n = \gamma^r + \pi^e$$

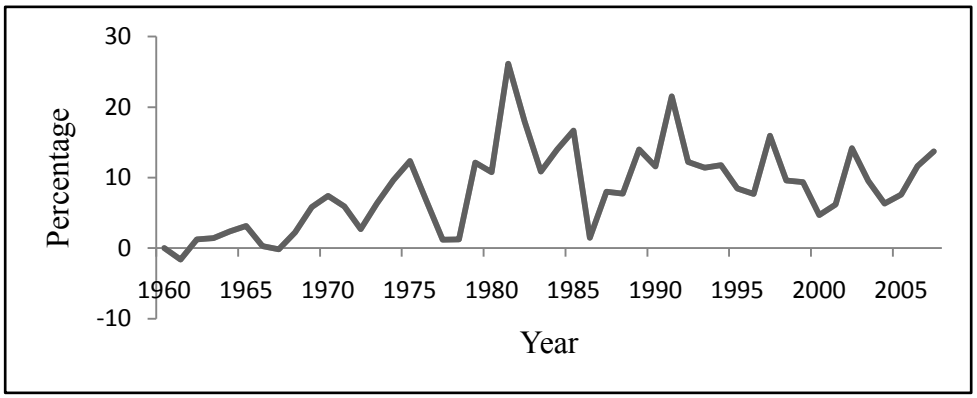
$$\gamma^n = \gamma^r + \pi$$

where, γ^n = nominal interest rate, γ^r = real interest rate,

π^e = expected inflation, π = actual inflation.

Real interest rate was calculated by applying ex-post equation.

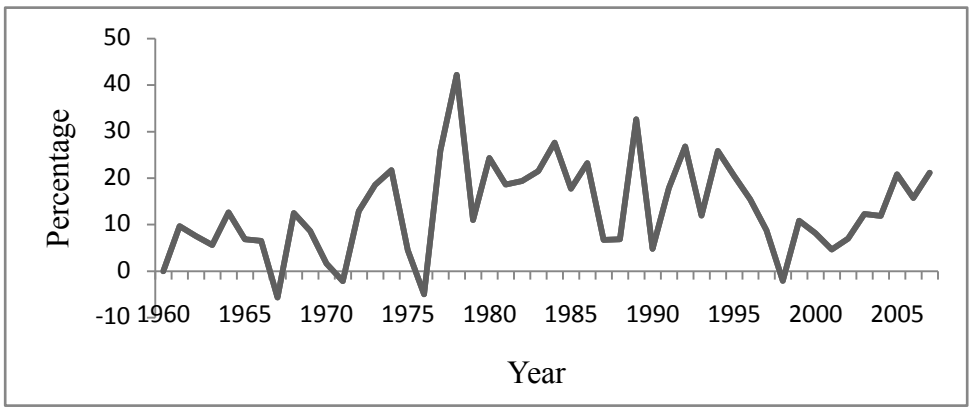
Figure 2: Real Interest Rate 1960 – 2007



Source: Authors' calculation based on CBSL data.

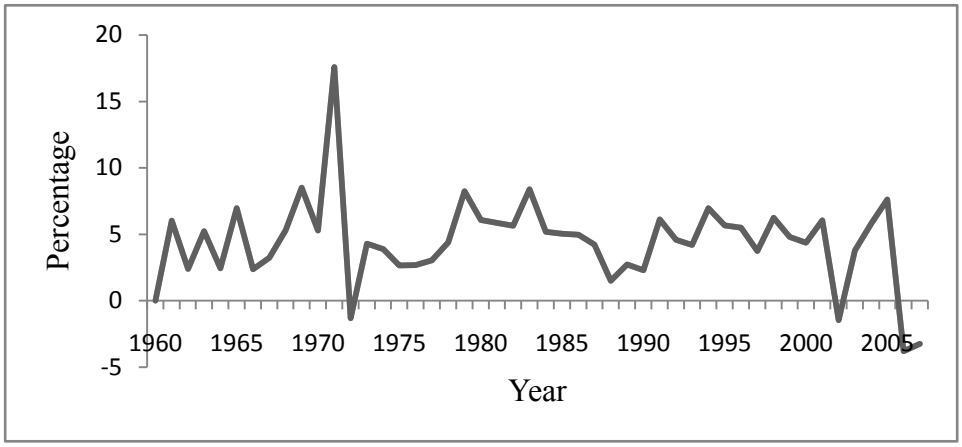
The overall budget deficit being equal to primary budget deficit plus interest, the growth rate of the budget deficit was calculated to test the relationship between budget deficit and interest rate.

Figure 3: Overall Budget Deficit Growth Rate : 1960 - 2007



Source: Authors' calculation based on CBSL data.

Figure 4: Money Supply Growth Rate : 1960 -2007



Source: Author's calculation based on CBSL data.

For the purpose of the analysis, broad money supply consisting of currency plus rupee denominated demand, and savings and time deposits held by the public was used.

The Rational Expectation Theory was adopted in calculating the expected inflation for Sri Lanka, which uses all available information, unlike the Adaptive Expectation theory (which considers previous year's inflation as the expected inflation).

Thus, it was assumed that the inflation expectation could be represented as follows :

$$\log \pi_t = f(MS_{2t}, BD_t, OG_t, \pi_{t-1}) \quad (24)$$

where, π_t =inflation rate in time t

MS_{2t} = money supply growth rate ; π_{t-1} = inflation rate in time t-1

BD_t = overall budget deficit growth rate; OG_t = output gap

Output gap index was estimated using the following model:

Output Gap = [(Actual GDP – Potential GDP)/Potential GDP]*100

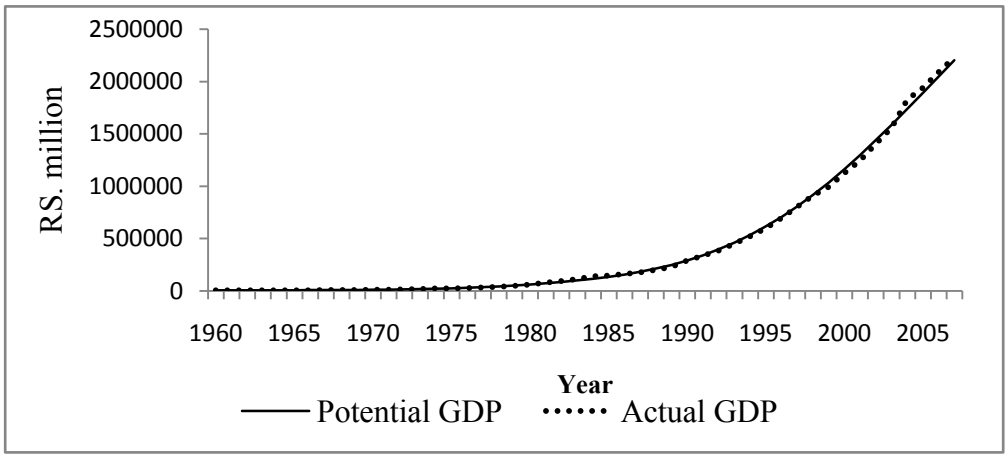
This is also known as the economic activity index. Potential GDP is higher than the actual output level, as the resource utilisation becomes maximised at the potential level. However, cyclical factors, such as recessions or booms, could cause the actual to be below or above the potential output, respectively (Tanzi 1985). The Hodrick-Prescott filter method was used to calculate the potential GDP. This method decomposes a non-stationary time series (such as actual output level) into a stationary cyclical component

and a smooth trend component by minimising variance of cyclical component, subject to the trend component.

$$Min \sum_{t=1}^{T} (Y_t - Y_t^*)^2 + \lambda \sum_{t=2}^{T-1} \left[\left(Y_{t+1}^* - Y_t^* \right) - \left(Y_t^* - Y_{t-1}^* \right) \right]^2 \qquad (25)$$

where, Y_t=logarithms of actual output, and Y_t^*= logarithms of potential output

Figure 5: Actual and Potential GDP: 1960 -2007

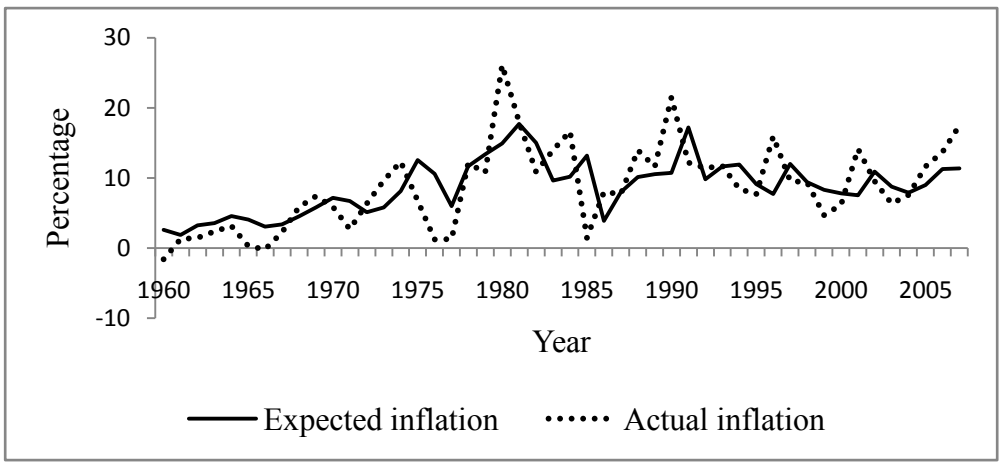


Source: Authors' calculation based on CBSL data.

An equation was thereafter built to estimate the expected inflation, as given below :

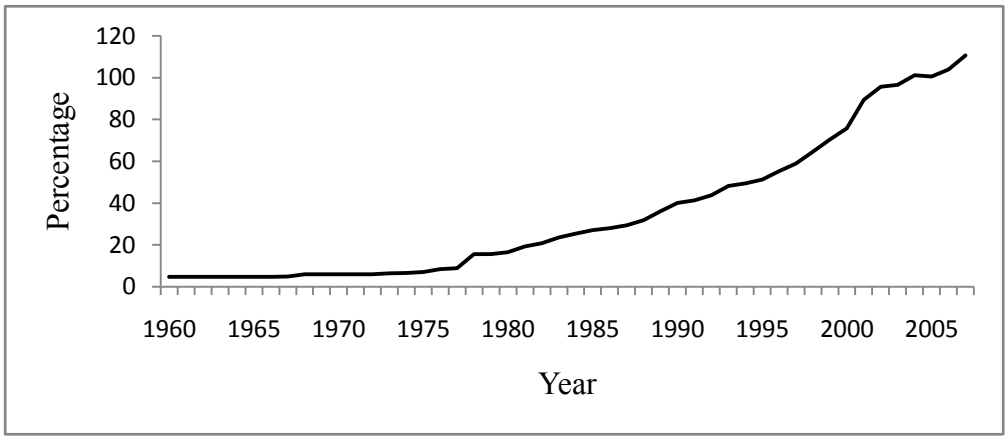
$$\log \pi_t = \beta_0 + \beta_1 MS_{2t} + \beta_2 BD_t + \beta_3 OG_t + \beta_4 \pi_{t-1} + U_t \qquad (26)$$

Figure 6: Expected and Actual Inflation 1960 - 2007



Source: Authors' calculation based on CBSL data.

Figure 7: Exchange Rate 1960 -2007



Source: Author's calculation based on CBSL data.

The quantity of rupees exchange for one USA dollar was taken as the exchange rate, which indicated an increasing trend since 1977 upon the introduction of the crawling peg system in 1977. Time series data obtained from the Central Bank of Sri Lanka for the period 1960 to 2007 were used in the analysis.

RESULTS AND DISCUSSION

Only the exchange rate variable displayed a structural break as a result of Sri Lanka's policy changes that took place after 1977. The significance of the break in the trend was ascertained through the Chow test. The results obtained are presented in the Table 1.

Table 1: Testing Exchange Rate for Structural Break

Break point	Estimated Chow Test F-statistic	Probability	Estimated Chow Test log likelihood statistic	Probability
1978	0.885007	0.420	1.893101	0.388077
1981	4.620362**	0.015	9.150433**	0.010304

Notes: ** indicate the 5% significance level

Source: Authors' calculations based on CBSL data

The results of Chow test in terms of F-Statistic and Log Likelihood statistic revealed that the exchange rate variable exhibited a break in trend in 1981. The statistics of both these were statistically significant at 5% level.

As expected, the F-statistic in the Chow test and the Log Likelihood statistic exhibited that there was no significant break in 1978, indicating that the economic liberalisation policy had not induced a break in the Exchange Rate evolution.

ADF and Phillips-Perron (PP) unit root tests were performed at level, including constant without deterministic trend, and constant with deterministic trend. Wherever the tests failed to reject the null hypothesis of unit root at level, the tests were carried out using first differences. Results of these tests indicated that all variables were either I(0) or I(1), and are presented in the Tables 2 and 3.

Table 2: ADF and PP Unit Root Tests at Level

Level	ADF		PP		Order of Integration I(d)
	Constant with no Trend	Constant with Trend	Constant with no Trend	Constant with Trend	
RI_t	-3.350115** (-2.9256)	-3.692485** (-3.5088)	-4.249307** (-2.9241)	-4.626756** (-3.5066)	I(0)
BD_t	-2.903361 (-2.9256)	-2.873762 (-3.5088)	-8.286219** (-2.9241)	-8.283176** (-3.5066)	H_0 not rejected
π_t^e	-2.137324 (-2.9271)	-2.076348 (-3.5112)	-2.895478 (-2.9241)	-3.313194 (3.5066)	H_0 not rejected
ER_t	-4.681407** (-3.5973)	-4.620479** (-4.41958)	-7.430387** (-3.5930)	-7.339235** (-4.1896)	I(0)
MS_{2t}	-2.556708 (-2.9256)	-2.507204 (-3.5088)	-3.022407** (-2.9241)	-3.044762 (-3.5066)	H_0 not rejected

Notes: ** represent 5% significance level.
Values in parenthesis are 5% McKinnon critical values.

Source: Authors' calculations based on CBSL data.

Table 3: ADF and PP Unit Root Tests in First Difference

First Difference	ADF		PP		Order of Integration I(d)
	Constant with no Trend	Constant with Trend	Constant with no Trend	Constant with Trend	
BD_t	-6.000449** (-2.9286)	-5.951330** (-3.5136)	-20.61688** (-2.9256)	-20.39708** (-4.1678)	I(1)
π_t^e	-4.791424** (-2.9286)	-4.707757** (-3.5136)	-9.700610** (-2.9256)	-9.662645** (3.5088)	I(1)
MS_{2t}	-6.044581** (-2.9271)	-5.999239** (-3.5112)	-8.925267** (-2.9256)	-8.849402** (-3.5088)	I(1)

Notes: ** represent 5% significance level.
Values in parenthesis are 5% McKinnon critical values.

Source: Authors' calculations based on CBSL data.

For the variables BD_t and MS_{2t}, however, the ADF results could not reject H_0 whilst the Phillips-Perron test indicated that it was I(0). A plot of the variable and its correlogram suggested that the order of integration was one. RI_t and ER_t were tested stationary at level, whilst other three variables were not stationary at level at 5% significant level. The critical values were based on finite sample values computed by McKinnon (1991).

When the variables were found not stationary at level, the ADF and PP unit root test statistics were calculated for the first differences including constant without trend and constant with trend. As reported in the Table 3, all three variables BD_t, π_t^e and MS_{2t} , in their first difference form, were found stationary of the order one or I(1) at 5 percent level of significance[1]. Thus, the study considered them stationary of I(1), even though both tests indicated mixed results with regard to BD_t and MS_{2t}, in their level form. These results indicate that the conditions for applying the ARDL bounds test approach have been satisfied with regard to both cases. In other words, none of the variables included in the model was I(2) or of greater order.

[1]This finding was also supported by the graphical representation (not shown here) of the data

In the first step of the ARDL analysis, the presence of long-run relationships was examined using conditional Vector Error Correction Model (VECM). AIC and SBC criteria was used to select the optimal lag order for the conditional ARDLVECM. The study adopted Pesaran and Pesaran (1997) procedure to estimate an OLS regression firstly for the first differences part of the conditional ARDLVECM, and then for the joint significance of the parameters of the lagged level variables added to the first regression. According to Pesaran and Pesaran (1997), "this OLS regression in first differences are of no direct interest" to the bounds co-integration test. The F-statistic indicated that the coefficients of the lagged level variables were zero (i.e. no long-run relationship exists between them).

Table 4 reports the results of the calculated F-statistics when each variable was considered a dependent variable (normalised) in the ARDL-OLS regressions. The calculated F-statistic $F_{RIt}(RI_t\backslash BD_t, MS_{2t}, ER_t, \pi_t^e)$ =5.210717 was found greater than the upper bound critical value of 4.85 at the 5% significance level. Hence, the presence of a long run co-integration between the Real Interest Rate and its determinants was confirmed based on the result of *bounds testing*. As suggested by AIC, SBC and Durbin Watson statistics, lag order 2 was selected.

Table 4: The Result of the F-test for Co-integration

Dependent Variable	AIC & SBC lags	F-statistic	Probability	Outcome
$F_{RIt}(RI_t\backslash BD_t, MS_{2t}, ER_t, \pi_t^e)$	2	5.21072**	0.000110	Co-integration
F_{BDt} $(BD_t\backslash RI_t, MS_{2t}, ER_t, \pi_t^e)$	2	4.98715**	0.000107	Co-integration
$F_{MS2t}(MS_{2t}\backslash BD_t, RI_t, ER_t, \pi_t^e)$	2	2.66379	0.011255	No Co-integration
$F_{ERt}(ER_t\backslash RI_t, BD_t, MS_{2t}, \pi_t^e)$	2	2.14389	0.037451	No Co-integration
$F\pi_t^e(\pi_t^e\backslash RI_t, BDt, MS_{2t}, ER_t,)$	2	7.25740**	0.000003	Co-integration

Notes: The critical value of F-statistics for lower bound and upper bound are 3.79 and 4.85 respectively, at 5% significance level Sources from Pesaran et al. (2001, p. 300), Table CI(iii) Case III unrestricted intercept and no trend.

** indicates the 5% significant level.

Source: Authors' calculations based on CBSL data.

Further, F_{BDt} (BD_t \ RI_t, MS_{2t}, ER_t, π_t^e) and $F_{\pi_t^e}$ (π_t^e \RI_t, BDt, MS_{2t}, ER_t,) were also found to be greater than the upper-bound critical value of 4.85 at the 5% level. Thus, the null hypotheses of no co-integration was rejected, implying the presence of long-run co-integration relationships amongst the variables with regressions normalised on both BD_t and π_t^e.

The calculated F-statistics for F_{ERt} (ER_t\ RI_t, BD_t, MS_{2t}, π_t^e) and F_{MS2t}(MS_{2t}\BD_t, RI_t, ER_t, π_t^e) were lower than the lower bound critical value of 3.79 at the 5% significant level& it implied that there was no long run co-integration between the Exchange Rate and the other four variables and also between the Money Supply and the four determinants considered.

Having established the existence of a long-run relationship, the ARDL co-integration method was used to estimate the long run parameters with maximum order of lag set to 4. Lag selection was based on the AIC and SBC criteria in view of searching the optimal lag length of the level variables of the long-run coefficients. The model was estimated using the ARDL (2, 0, 0, 0, 0) specification, and the results obtained by normalising on real Interest Rate, in the long run, are reported in the Table 5.

Table 5: The Result of the ARDL(2, 0, 0, 0, 0) Long Run Model
Dependent Variable: Real Interest Rate (RI_t)

Variable	Coefficient	Standard error	t-statistics	Probability
RI_t(-1)	0.696083***	0.167684	4.151151	0.0002
RI_t(-**2**)	-0.139204	0.133444	-1.043162	0.3036
BDt	-0.043906**	0.019397	-2.263578	0.0296
MS_{2t}	-0.033272	0.089349	-0.372384	0.7117
π_t^e	0.714369**	0.272016	2.626198	0.0125
ER_t	-0.014465	0.022866	-0.632617	0.5309
Dummy80	-12.83956***	4.362787	-2.942973	0.0056
Dummy90	-11.98072***	3.949614	-3.033391	0.0044
C	0.893632	2.243855	0.398257	0.6927

Notes: **, *** represent 5% and 1% significance levels respectively.

Source: Authors' calculations based on CBSL data.

The estimated coefficients of the long-run relationship indicated that the sign of the coefficient of Budget Deficit variable (BD_t) was negative and significant at 5% level. This would mean that, all things being equal, a 1% increase in Budget Deficit would leads to approximately 4% decrease in real interest rate. In other words, Budget Deficit, in the long term, has a negative significant impact on Real Interest Rate. Thus, this result brings evidence to conclude the absence of financial crowding out in Sri Lanka, and quite unexpectedly, to indicate the presence of financial crowding in.

The relationship between Real Interest Rate and Expected Inflation was positive and significant at 5% level. According to the Table 5, a 1% increase in expected inflation would increase the Real Interest Rate by approximately 71%. Thus, Expected Inflation would lead to crowd out private investment in Sri Lanka.

Money Supply Growth Rate and the Exchange Rate showed negative elasticity with Real Interest Rate, though not statistically significant. The first lag of Real Interest Rate appeared to have a positive effect on its current value and significant at 1% level, though the second lag of Real Interest Rate showed a negative effect on its current value and statistically not significant. Also observed that the dummy variables for 1980 and 1990 were highly significant and the Dummy80 carried a positive sign whilst the Dummy90 indicated a negative impact.

The regression for the underlying ARDL equation (22) fits well at R^2=53%. Overall regression model was significant at 1% level and F-statistic was 5.327. No serial correlation in the residual term was indicative with the Durbin-Watson statistic being 2.06>2.

Table 6: Diagnostic and Specification Tests for co integration

Test Objective	Test	Test Statistic	Probability
Normality	Histogram - Normality test - (Jarque-Bera)	1.21987	0.543386
Heteroskedasticity	White Heteroskedasticity Test-No Cross	15.1799	0.36597
Serial Correlation	Breusch-Godfry Serial Correlation LM Test	0.60773	0.737959
Stability	Ramsey RESET Test	1.02151	0.318907

Source: Author's calculation based on CBSL data.

This study applied a number of diagnostic and specification tests to the error correction model, the results of which tests are summarised in the Table 6. These tests did not produce any evidence of serial correlation in the disturbance of the error term. The White Heteroskedasticity test suggested that the errors were independent of the repressors. The model also passed the Jarque–Bera normality tests, suggesting that the errors were normally distributed. The RESET test indicated that the model was correctly specified.

The results of short-run dynamic coefficients associated with the long run relationships obtained from ECM equation are given in Table 7.

Table 7: ARDL (2, 0, 0, 0, 0) Model ECM Results
Dependent Variable: First Difference of Real Interest Rate (ΔRI_t)

Variable	Coefficient	Standard error	t-statistic	Probability
$\Delta RI_t(-1)$	0.767129	0.542898	1.413025	0.1665
$\Delta RI_t(-2)$	-0.174139	0.142174	-1.224830	0.2288
ΔBD_t	-0.065379*	0.036508	-1.790832	0.0820
ΔMS_{2t}	-0.008719	0.128507	-0.067850	0.9463
$\Delta \pi_t^e$	1.443751	0.948135	1.522726	0.3628
ΔER_t	-0.194086	0.260707	-0.744460	0.4616
DUMMY80	-12.47230**	4.877026	-2.557358	0.0150
DUMMY90	-12.26748**	4.801099	-2.555141	0.0151
ECM(-1)	-0.728690**	0.269623	-2.702629	0.0105
C	0.774226	0.924168	0.837754	0.4079

Notes: * represent 10% significance level, ** represent 5% significance level

Source: Authors' calculations based on CBSL data.

The equilibrium correction coefficient (ECM) estimated to be -0.729 was highly significant, carried the correct sign, and implied a fairly high speed of adjustment to equilibrium after a shock.

Approximately 72% of disequilibria from the previous year's shock appeared to be converging back to the long-run equilibrium in the current year, demonstrating the presence of a long run relationship between the variables. The results also suggest that the immediate impact of changes in the Budget Deficit growth rate on Real Interest Rate would be negative and significant at the 10% level. Money Supply Growth Rate, Exchange Rate and Expected Inflation did not indicate a significant impact on Real Interest Rate, in the short run. The coefficients of Money Supply Growth Rate and Exchange Rate were positive whilst the variable representing the Expected Inflation appeared to have a positive impact on it.

The two lagged changes in real Interest Rate were statistically insignificant. The two dummy variables also were statistically significant at 5% level and indicated having a negative impact on the Real Interest Rate in the short term. The ECM model also passed the diagnostic tests against serial correlation, heteroskedasticity, non-stability and non-normal errors (Table 8).

Table 8: Diagnostic and Specification Tests for Error Correction Model

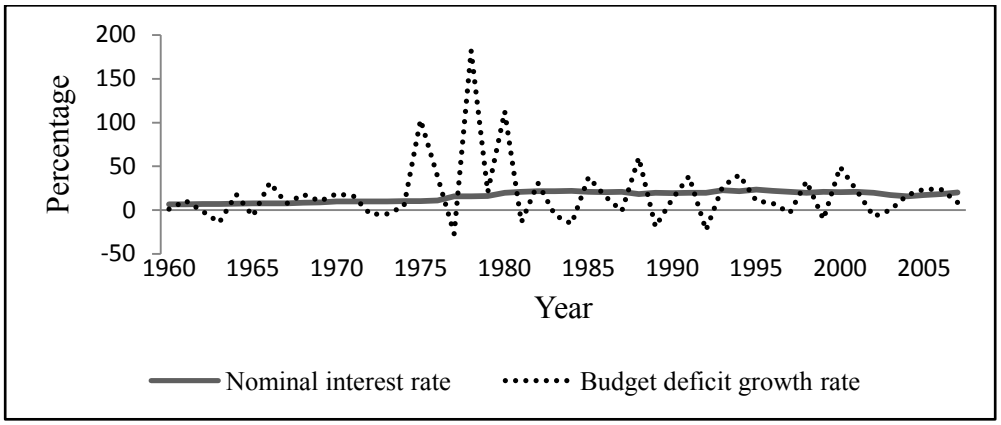
Test Objective	Test	Test statistic	Probability
Normality	Histogram- Normality Test - (Jarque-Bera)	1.78453	0.40972
Heteroskedasticity	White Heteroskedasticity Test-No Cross	10.1197	0.860301
Serial Correlation	Breusch-Godfry Serial Correlation LM Test	1.78453	0.409726
Stability	Ramsey RESET Test	0.51230	0.479034

Source: Authors' calculation based on CBSL data.

This study found that there could be a negative relationship between the budget deficit and the interest rates in Sri Lanka. The budget deficit would not lead to reduce private investment in Sri Lanka. Decrease in real interest rates would increase the possibility of getting loanable funds for investment. It is worth noting that the interest rates in Sri Lanka are directed by the Central Bank rather than automatically adjusted through the influences of the budget deficit.

This study assumed that the private investors, when making their investment decisions, would consider the real interest rate. However, the nominal values also could influence the investment decision. According to the Figure 8, nominal interest rates were not fluctuating as rapidly as the budget deficit growth rate changes.

Figure 8: Nominal Interest Rates and Budget Deficit Interest Rate 1960 – 2007

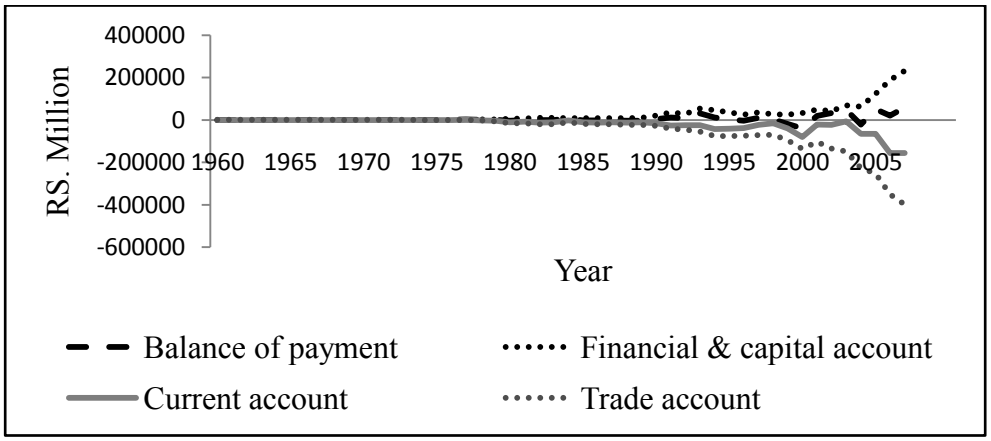


Source: Authors' calculation based on CBSL data.

It confirms that there would be no significant impact of budget deficit on nominal interest rate. Accommodative monetary policy appears to have been possible in Sri Lanka, and the country appears to have effectively used accommodative monetary policy to offset the pressure on interest rates and private investment in the long run.

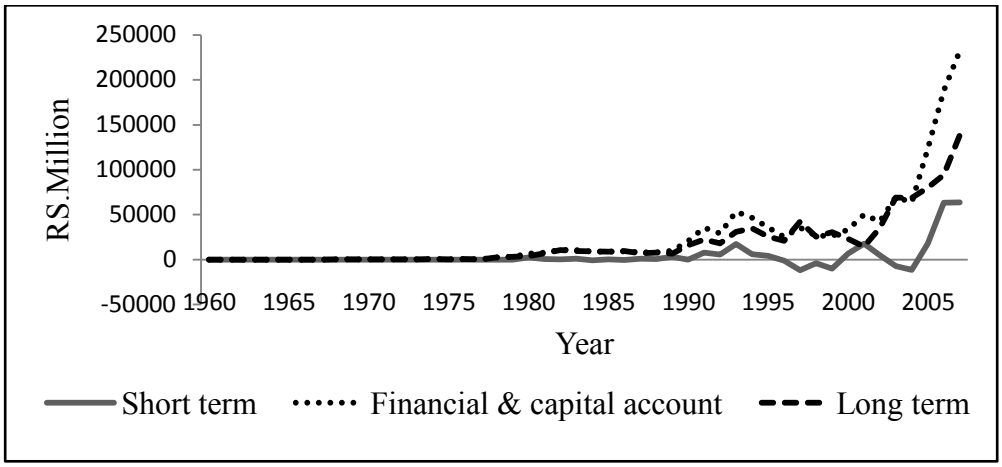
Sri Lanka also has been able to maintain a positive balance in the capital account and financial account of the balance of payments by adopting unilateral liberalisation of capital account (Figures 9, 10, 11). Sri Lanka appears to have been able to do this by borrowing heavily from multilateral financial institutions and bilateral donors as well as Euro dollar markets. The significant amount of worker remittances Sri Lanka has managed to receive also appears to have helped.

Figure 9: Balance of payment 1960 -2007



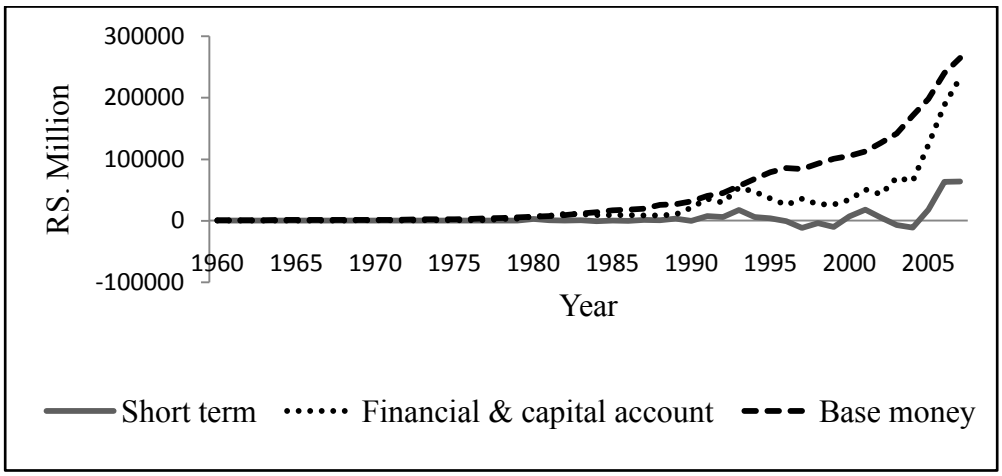
Sources: Authors' calculation based on CBSL data.

Figure 10: Finance and Capital Account 1960 - 2007



Sources: Authors' calculation based on CBSL data.

Figure 11: Base Money, and Finance and Capital Account 1960-2007



Sources: Authors' calculation based on CBSL data.

CONCLUSIONS

According to our empirical results, interest rates in Sri Lanka declined when the budget deficit increased owing to increased Government spending. This implies the absence of a financial crowding-out effect due to fiscal expansions. This result contradicts the hypothesis that higher budget deficits would increase real interest rates, thereby reducing private investment. In Sri Lanka, private investment appears to have increased with increasing budget deficits associated with fiscal expansions. The absence of the

crowding out effect could be attributed to accommodative monetary expansion, meaning that the Central Bank of Sri Lanka has effectively mitigated the crowding out effect of expansionary fiscal policy through accommodative monetary policy. The monetary expansions appear to have been financial through short term capital inflows resulted from financial liberalisation. Graduation from the poorest country status to the level of a middle income country would have caused reduction of Official Development Assistance (ODA). Though this could have reduced the scope for accommodative monetary policy, the Government of Sri Lanka appears to have managed to cope with this development by shifting away from her conventional foreign borrowing sources to emerging lenders such as China, India and Iran. Foreign remittances, which have increased during the last few decades, also appear to have eased the constraints. Thus, the Sri Lankan Government appears to still be capable of employing accommodative monetary policies to reduce the negative effects of the country's expansionary fiscal policy.

Such Keynesian-type demand management policies appear to be possible in Sri Lanka as the economy has been operating well below its full employment level.

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GLOBAL BANKS AND THE INTERNATIONALISATION OF RETAIL BANKING

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Abstract

Numerous banks have expanded internationally in recent years. Research reluctant to accept that retail will prove a successful banking segment within those operations is not scarce. This study questions that notion by reviewing banks that operate on a wide international scale, and analysing their retail banking developments.

This paper finds that global banks rely heavily on retail as a source of income, especially from operations in foreign markets. Global banks successful in international retail banking are those that drastically improve foreign subsidiary performance to cultivate income-earning opportunities which may insulate them from adverse financial shocks.

Under that notion, this paper shows specific examples of relatively successful global banks, while also finding examples of banks not yet able to claim the same level of success.

Keywords: *Retail Banking, Global Banks, Financial Globalisation, Foreign Bank Participation*

JEL Codes: G21, G34, F21, F23

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INTRODUCTION

The late 1990s and early 2000s saw a rising number of banking institutions venture into foreign banking systems. While other examples of international expansion exist, the major trend was for large banking institutions from developed nations to directly purchase locally operating banks (including branch networks), seeking to establish a foreign presence. Naturally, activities taken up by such *global* banks in host markets are the subject of increasing interest. Given that branch networks are essential to that segment (Grant and Venzin, 2009), retail banking may be a main part of services global banks provide in local markets. Yet, some previous research seems unconvinced that global banks can succeed in retail banking on a truly international level.

This paper takes aim at the notion that retail banking is unlikely to be successfully internationalised by global banks. Providing concrete examples, this paper concludes the retail segment is now perhaps the most important segment of bank income for banks operating on a wide international scale. This is especially important given the global financial climate following the 2008 collapse of Lehman Brothers. Banks operating in a wide variety of countries, on multiple continents, both in developed and emerging countries, generate diverse income from retail, and as a result, might realize more stable earnings. Conversely, banks that stay relatively close to home, or hold relatively few international operations, may underperform in adverse global financial circumstances because they lack diversity. Given retail's weight in total income, future success in global banking may hinge solely upon the geographical diversification of retail banking.

This paper's qualitative approach analyses global banks using a case study approach. We select four banks – HSBC, Citibank, Santander, and Unicredit – according to criteria outlined below, and analyse their retail banking segments within overall banking operations. Statistical data are employed from *The Banker* for comparisons on assets and returns on assets (ROA). Data on the structure of loans and bank earnings were originated from annual reports and financial statements from respective banks.

The rest of this paper is organised as follows. The next section outlines the paper's definitions, and establishes the framework for determining specific global banking institutions to be observed, and also reviews previous literature. The section that follows it statistically defines institutions classified as global banks. Then, we discuss international retail banking developments for each of the global banks, prior to presenting concluding remarks for this paper in its final section.

DEFINITIONS AND FRAMEWORK

Clark et al. (2007) classified retail banking "as the range of products and services provided to consumers and small businesses" (p. 1). Smith and Walter (1997) described retail as "that part of commercial banking concerned with the activities of individual customers, generally in large numbers" (p. 101). This study elects to exclude products and services allocated to small businesses (SMEs), where possible, to define retail banking as the segment of commercial banking that provides financial services to individuals[1]. The main reason this study focuses solely upon activities with individuals is because data from sources outlined below are commonly organised only by terms such as *individuals* and *corporations*. More specific data by size of corporate borrower is not usually available, which makes distinguishing between small, medium and large enterprises statistically impossible.

Establishing a concrete definition for global banking is no simple task. A 2010 Bank for International Settlements (BIS) paper indicated, for credit extension, international banking services can occur via, "(i) cross-border lending; (ii) local lending by affiliates established in the foreign country; (iii) lending booked by an affiliate established in a third country" (pp. 4-5). For our purposes, both the first and third types are somewhat problematic. Issues with exchange rate vulnerability and difficulties monitoring large quantities of transactions with many individuals across borders render both ill-suited to a discussion on retail banking. Therefore, we seek to focus on financial activities conducted through local subsidiaries. Often times, subsidiaries, and their branch networks, have been established through the cross-border acquisition of local banks.

In recent years, ownership of foreign subsidiaries has become so common that it warrants narrowing the discussion to grasp which banks are the most *global*. Therefore, we identify banks operating on a large scale (in size), and a wide global presence (geographic reach). Below, we select banks according to the following three criteria based upon data from *The Banker*'s Top 1,000 World Banks publications. First, banks reviewed in this paper measure up to a certain asset size. Each bank had at least 200 billion US dollars in total foreign subsidiary assets in the July 2011 publication[2]. Second, to ensure we capture truly global banks; banks observed here are present in

[1] Note that while the term commercial banking is used here, this does not equate to an exclusion of universal banks. This paper concentrates on retail banking activities whether part of a stand-alone commercial bank, or the commercial banking division within a universal bank.

[2] This paper focuses on the asset side of banking operations for two primary reasons: 1) assets provide an extremely valuable measure for bank size, and 2 retail loans, as examined below, are a share of total loans, themselves a common type of bank asset. Further meaningful research would do well to discuss liability developments. Asset sizes of 200 billion USD and 100 billion were selected as a means of preventing incomparability between very large banks and much smaller institutions.

multiple countries and regions. Banks must have been present in more than five countries (in the same publication), in more than one region, and in both developed and developing nations. Third, we establish a duration criteria whereby banks shall have relatively lengthy international experience. Specifically, we take banks with aggregate foreign subsidiary assets of at least 100 billion US dollars in the 2005 publication.

Previous Research

Foreign-owned bank entry has been the focus of research for well over a decade. A fair portion of that research has tended to focus on general characteristics of foreign entry. Thus research on global banks' international retail banking activities has room to grow. Wherever research has briefly discussed international retail, it has viewed the segment in a negative light. Smith and Walter (1990, 1996, 1997, 2012 with Gayle DeLong) highlighted shifts in corporate finance, deregulation, and technological development as important to the expansion of domestic retail banking. They also stressed globalisation has hastened the pace of financial innovation. While that allows global banks to transfer retail approaches to foreign markets, since financial products and services can easily be copied, maintaining an advantage is difficult. Additionally, they discussed difficulties in understanding local retail banking markets in foreign countries such as cultural intricacies and customer preferences. Eventually, Smith and Walter (1997) concluded, "failures in international retail banking are perhaps more common than successes" (p. 110).

Research falling into a similar camp on international retail is not in short supply. Heffernan (2005) indicated that multinational banks focused more on wholesale banking than retail, and that in the 21st century, many financial markets will internationalise, but the retail banking market will likely be an exception (p. 56). Grant and Venzin (2009) emphasized the complexity of local markets,

In retail banking, given that regulations and customer preferences vary greatly from county to country, the dominant feature is the need to adapt to national markets, and the potential to access cost economies from the international integration of function and activities is therefore limited. (p. 571).

Tschoegl (2005) similarly noted, "[f]oreign banks have not displayed any long-term *comparative* advantage in retail banking vis-à-vis host country banks" (p. 9). More specifically, "[a]s the banks, foreign and domestic-owned alike, become more competitive and adept, the foreign owners will no longer have a comparative advantage in general retail" (Tschoegl, 2005, p. 39).

Roberts and Amit (2003), Sturm and Williams (2004), and Fachada (2008), all provided statistical evidence showing domestic banks copied global banks in some capacity.

Roberts and Amit (2003) confirm domestically owned Australian banks copied financial innovations: "[o]f the numerous documented major innovations, none were conceived (in whole or in part) within Australia", but rather derived from foreign banks (Roberts and Amit, 2003, p.111). Furthermore, Sturm and Williams (2004) stated global bank entry was an important source of improvements in technology and operating efficiencies, and Fachada (2008) showed Brazil's domestic banks responded to foreign entry by improving operating efficiencies, and as a result, some global banks withdrew from the market in the mid-2000s.

The literature makes clear some challenging obstacles could prevent the internationalisation of retail banking. Acquiring local institutions may provide an opportunity to overcome prohibiting factors, but over longer periods of time, they may eventually lose advantages through competition. Locally owned banks should naturally have deeper knowledge of their home markets, putting global banks at a significant disadvantage. The nature of financial services and perhaps retail services in particular are such that competing institutions can easily copy products and strategies. That is the justification for the general consensus accepting that global banking institutions will find the retail banking segment too difficult, and as a result will likely be unsuccessful when internationalising operations.

This paper directly questions that notion. The central focus of this paper is actually to demonstrate the contrary: global banks can indeed successfully undertake retail banking operations on an international level. In doing so, this paper takes a case study approach to analyse global banks, verifying that international retail banking activities play a major role in global banking. Finally, we compare four global banks to consider which have achieved relatively greater success in international retail banking.

GLOBAL BANK SELECTION

This section statistically identifies the four global banks. We specifically describe which banks are most global in nature, the countries where they hold major foreign subsidiaries[3], the main entry method, and motivation for expansion. To begin, we statistically illustrate which banks are the largest in size and widest in international scale. Using the aforementioned threshold of 200 billion US dollars in assets and operations in more than five countries, we present banks in Table 1.

[3] Note that this list comprises of each global bank's *major* operations, and therefore may not include some smaller subsidiaries. We employ these data because they allow for a relatively smooth comparison of international presence and scale.

Table 1: Major Foreign Subsidiaries of Global Banks in 2011 and 2005

Global Bank	2011		2005	
	Countries (No #)	Assets (Billion US Dollars)	Countries (No #)	Assets (Billion US Dollars)
HSBC *(United Kingdom)*	14	1643.0	9	744.7
Citibank *(USA)*	8	265.1	7	112.7
Santander *(Spain)*	9	985.9	8	457.2
BBVA *(Spain)*	8	231.5	6	74.4
Standard Chartered *(United Kingdom)*	6	209.5	1	6.2
Unicredit *(Italy)*	15	1012.2	3	230.8
Paribas *(France)*	6	630.0	1	7.9

Source: The Banker, Top 1,000 World Banks, Issues 2005 and 2011[4]

These statistics *temporarily* narrow down the discussion to seven institutions: HSBC, Citibank, Santander, BBVA, Standard Chartered, Unicredit, and Paribas.

As one of our aims is to observe banks with longer international experience, we also include statistics for the same banks' major foreign subsidiaries in the July 2005 publication. We now eliminate banks with less than 100 billion US dollars in foreign subsidiary assets at that time. Specifically, three banks did not meet this measure: BBVA, Standard Chartered and Paribas. We take that to mean their international experience is relatively short, and focus the remainder of the discussion on four banks: HSBC, Citibank, Santander, and Unicredit.

Foreign Subsidiary Locations

The geographic distribution of global banks' foreign subsidiaries varies widely by institution. Table 2 shows the countries where each of the four global banks hold major foreign subsidiaries.

[4] Other banks, such as the Swedish bank Nordea, held over 200 billion USD in foreign subsidiary assets in 2011, however, their geographic distribution did not meet this paper's criteria.

Table 2: Countries Where Global Banks Hold Major Foreign Subsidiaries – July 2011

Assets are in Billion US Dollars

Global Bank	HSBC		Citibank		Santander		UniCredit	
Country	Presence	Assets	Presence	Assets	Presence	Assets	Presence	Assets
Argentina *	X	4.9			X	9.0		
Austria							X	258.1
Bermuda	X	11.8						
Bosnia-Herz.*							X	2.5
Brazil *	X	72.0	X	33.4	X	222.2		
Bulgaria *							X	7.7
Canada	X	71.4						
Chile *					X	47.1		
China *	X	31.0	X	19.2				
Croatia *							X	17.3
Czech Rep*							X	14.4
Egypt *	X	7.8						
France	X	281.9						
Germany							X	497.2
Hong Kong *	X	648.2						
Hungary *							X	7.4
Indonesia *	X	4.7						
Ireland							X	31.7
Japan			X	49.3				
Luxembourg							X	38.5
Malaysia *	X	20.7						
Mexico *	X	35.2	X	93.0	X	54.7		
Panama *	X	14.6						
Poland *			X	12.7	X	17.9	X	45.2
Portugal					X	64.4		
Puerto Rico *					X	6.9		
Romania *							X	6.5
Russia *			X	8.4			X	18.9
Serbia *							X	2.1
South Korea			X	47.4				
Switzerland	X	95.1						
Turkey *							X	59.6
U. K.					X	474.0		
Ukraine *							X	5.2
U.S.A.	X	343.6			X	89.7		
Venezuela *			X	1.6				

Note : * indicates Emerging markets

Source: The Banker, Top 1,000 World Banks, Issues 2005 and 2011

Three important observations can be taken from this data. First, the foreign subsidiaries of two global banks, Unicredit and Santander, appear somewhat concentrated in two markets. Unicredit has concentrated its subsidiaries more in Central and Eastern Europe, with the majority of its subsidiaries operating in countries in that region. At the same time though, by being present in Turkey and Russia, Unicredit has demonstrated a willingness to expand beyond the European Union. At first glance, Santander's foreign subsidiaries seem concentrated in Latin America, with operations in countries such as Argentina, Brazil, Chile, Mexico, and Puerto Rico. However, it is important to point out that Santander's operations are not limited to Latin America, as they include subsidiaries in the United States and various countries in Europe such as the United Kingdom, Portugal and Poland.

Secondly, Citibank and HSBC's major foreign subsidiaries are more spread out geographically. Citibank holds major operations in emerging Europe (Poland and Russia), Latin America (Brazil, Mexico, Venezuela) and Asia (China, Japan, South Korea). HSBC operates major subsidiaries in 14 countries, spread out across Latin America, Asia, North America, Africa and Europe. Perhaps significantly though, HSBC does not hold a major subsidiary in Eastern Europe, a place where all three of the other global banks operate.

The third observation is emerging markets comprise the majority of nations for each of the four banks. Certainly, major positions in developed countries account for a sizeable share of total assets, but in terms of the numbers of countries, more than half are emerging markets. Of the 15 countries where Unicredit operates 11 are emerging markets. Similarly, emerging markets account for 6 of 9 countries for Santander, 5 of 8 for Citibank, and 9 of 14 for HSBC, signifying global banks view emerging markets as an essential portion of their global business.

Entry Method

Another important element to consider is the method banks chose when venturing abroad. There are at least three ways in which banks domiciled in one nation could attain a presence in another country: 1) direct acquisition of local banks 2) organic growth of a branch network, or 3) partnering with a local institution. While examples of all three exist, by far and away the method most commonly selected by these four global banks has been the first, direct acquisition of locally owned banks. However, some major subsidiaries have taken shape via the other two approaches as well. Examples include Citibank's organic growth in Brazil, China and Russia, as well as HSBC's operations in China and Indonesia, and Unicredit's joint acquisition with a local institution in Turkey.

Table 3 (A) : Major Foreign Bank Acquisitions by the Four Global Banks[5] - HSBC and Santander

Bank : HSBC			Bank : Santander[6]		
Year	Bank	Country	Year	Bank	Country
1997	Banco Roberts	Argentina	1990	Caguas Central Federal Savings Bank	Puerto Rico
1997	Banco Bamerindus	Brazil	1995	Banco Interandino & Intervalores	Peru
1999	Republic Bank	U.S.A.	1995	Banco Mercantil	Peru
2000	Credit Commercial de France	France	1996	Banco Osorno y La Union	Chile
2001	Demirbank	Turkey	1996	Banco Central Hispano Puerto Rico	Puerto Rico
2002	Bital	Mexico	1996	Banco de Venezuela	Venezuela
2003	Household International	U.S.A.	1997	Banco Rio de la Plata*	Argentina
2003	PolskiKredyt Bank	Poland	1997	Banco Noroeste	Brazil
2004	Bank of Bermuda	Bermuda	1997	Banco Geral Do Comercio	Brazil
2004	Bank of Communications of Shanghai **	China	1997	Banco Comercial Antioqueño	Colombia
2005	Metris Companies	U.S.A.	1997	Grupo Financiero Inver Mexico	Mexico
2005	Dar Es Salaam Investment Bank	Iraq	1999	BancoSerfin	Mexico
2006	Banca Nazionale del Lavoro	Argentina	2000	Grupo Meridonial	Brazil
2006	Grupo Banistmo	Panama	2001	Bane spa	Brazil
2007	Banex	Costa Rica	2004	Abbey Bank	U.K.
2007	Chinese Bank	Taiwan	2006	Sovereign	U.S.
			2008	Banco Real	Brazil
			2010	Zachodni	Poland

Notes : * 35% initial stake raised to 98.9% in 2002.

**19.9% equity acquired.

[5]Acquisition refers to when the global bank took a controlling stake (50% or more) in the local bank unless otherwise stated. Includes subsidiaries in countries not listed in statistics from The Banker above.

[6] Santander has since sold the following operations: Banco Interandino & Intervalores, Banco Mercantil, Banco de Venezuela, Banco Comercial Antioqueño.

Table 3 (B): Major Foreign Bank Acquisitions by the Four Global Banks – Unicredit and Citibank

Unicredit[7]			Citibank		
Year	Bank	Country	Year	Bank	Country
1999	Bank Pekao	Poland	1998	Banco Mayo Cooperativo	Argentina
2000	Bulbank	Bulgaria	2001	Confia	Mexico
2000	Splitska Bank	Croatia	2001	Banco Nacional de Mexico (BanaMex)	Mexico
2000	Pol'nobanka	Slovakia			
2000	Pioneer Group	U.S.A.	2001	Bank Handlowy w Warszawie	Poland
2002	Zivnostenska Bank	Czech Republic	2004	KorAm Bank	South Korea
2002	Zagrebacka Bank	Croatia	2006	CrediCard Ownership#	Brazil
2005	Bank Austria (Creditanstalt)	Austria	2007	Grupo Financiero Uno	Central America
2005	HypoVereinsbank (HVB)	Germany	2007	Grupo Cuscatlán	Central America
2006	Aton	Russia	2007	Bank of Overseas Chinese	Taiwan
2006	YapiKredi##	Turkey	2007	Egg	U.K.
2008	Ukrsotsbank	Ukraine	2008	Nikko Cordial	Japan

Notes : # In 2006, Citigroup and Brazilian BancoItau dissolved their joint venture 'CrediCard', a consumer credit card business. In accordance with the dissolution agreement, BancoItau received half of CrediCard's assets and customer accounts in exchange for its 50% ownership, leaving Citigroup as the sole owner of Credi Card.

Joint acquisition via 50-50 joint venture within Turkey.

Sources: Grant &Venzin (2009), Schulz (2006), Guillén &Tschoegl (1999, 2008), Fachada (2008), and annual reports

Table 3 [3(A) and 3(B) above] represents a list of major international acquisitions by the four global banks. Until recently, Unicredit and Santander both exhibited a clear geographic strategy to their acquisition activities. Unicredit focused on acquisitions in

[7] Unicredit includes information from subsidiary websites. Unicredit has since sold Splitska Bank. Acquisition of Creditanstalt and HVB included the direct acquisition of banks in other Central and Eastern European countries.

Central and Eastern Europe, while Santander focused on Latin American acquisitions. In recent years though, each has made further acquisitions into countries further afield. Santander's purchase of Poland's Zachodni and Unicredit's joint-purchase of Turkey's Yapi Kredi are examples[8]. On the other hand, both HSBC and Citibank have spread their acquisitions over a wider range of countries and regions. In fact, they were the only banks to make acquisitions in Asia. Essentially, foreign acquisitions were a key element of international expansion for all four banks.

Motivation

Factors contributing to global banks' international expansion are commonly divided into microeconomic and macroeconomic-specific factors. Herrero and Simon (2003) pointed out banks may be profitable in foreign markets if they are able to realise gains from microeconomic factors such as competitive and efficiency advantages, and risk diversification. Similarly, Hernando et al. (2009) found evidence to support the claim banks with high levels of inefficiency were likely to be acquired. Global banks specifically targeted inefficient banks because they intended to improve efficiencies, and realise gains from their investments. Berger (2007) further discussed this idea by introducing the *lion's den* theory, whereby banks from developed nations are rarely eager to enter the *den* of other global banks' home countries. This explains, in large part, that banks from developed countries venture to emerging markets because they realize greater gains from acquisitions in those countries and are less likely to face fierce competition with banks of equal abilities.

Typically macroeconomic specific-factors are divided into push and pull factors. Push factors relate to conditions in home markets that provide banks incentive to expand internationally, or *pushing* them away. Contrastingly, promising conditions in host countries attract global banks, *pulling* them in. Some of the most important push factors include increasingly limited opportunities (i.e. market-saturation) and low interest rates in the home market (Guillén and Tschoegl (1999); IMF Global Financial Stability Report, 2010). Pull factors focus largely on host market conditions that present global banks with opportunities to capture earnings. Expectations for high economic growth and relatively low levels of financial development in emerging markets have indeed been driving forces in international banking (Focarelli and Pozzolo 2001). Thus, global banks have probably been pulled towards emerging markets with the hopes of gaining a slice of their growing banking sectors, and earning high returns in the process.

[8] Unicredit's subsidiary in Turkey is Yapi Kredi Bankasi, which is the result of its 50-50 venture with Koç Financial Services. The Banker's July 2011 publication treats Yapi Kredi Bankasi as a foreign-owned subsidiary, and thus so does this paper.

GLOBAL BANKS AND INTERNATIONAL RETAIL BANKING

Next, we take the analysis a step further to explore which segments of global banking are the most prominent. Specifically, this section looks at the four global banks to statistically demonstrate the role international retail banking plays in their overall operations. We begin by looking into their lending structures, then income structures, and lastly offer reasons to explain why retail plays the role it does in global banking.

Loan Structure

By examining the structure of loans we can grasp which segments global bank emphasise. In this subsection we analyse loan structure in two ways. First, we examine retail as a business segment by showing its share in total loans, and then we illustrate share of total lending by geographic segment[9].

Retail loans accounted for significant portions of lending for each bank over the last ten years. Table 4 below outlines developments in retail loans as a percentage of total loans from the early 2000s until year-end 2011.

Table 4 – Global Bank Retail Loans as a Share of Total Loans at Year-End 2001-2011

Figures are in percentages

Year	HSBC	Santander	Citibank	Unicredit
2001	39.53	na	71.02	na
2002	42.22	86.99	75.41	35.87
2003	56.32	88.91	79.48	38.52
2004	56.56	89.65	79.30	40.36
2005	55.96	92.85	73.29	38.99
2006	54.00	91.39	71.23	na
2007	50.05	90.60	71.14	na
2008	46.01	89.62	69.34	29.43
2009	47.11	90.71	71.69	31.02
2010	43.47	89.83	70.24	46.42
2011	41.09	87.93	65.47	45.43

Source: Annual Reports and Financial Statements of Respective Bank

[9] Due to issues with the impact of foreign exchange rates on loan developments over time, we limit the discussion on geographic segments to year-end 2011.

Three important findings emerge from this data. First, all four banks increased retail lending during the first part of the decade. Admittedly, banks began the period at various levels, but all banks pushed retail lending to at least 40 percent of total lending by 2004. At 40 percent or more, retail comprised the largest loan type for all banks but Unicredit. Even in the case of Unicredit, that number may be much closer to the numbers achieved by the other global banks[10]. Second, all banks devoted a third or more of total loans to retail over the entire period. While Citibank and Santander devoted much higher amounts than HSBC or Unicredit, a third of the loan portfolio is a noteworthy share. Plus, as pointed out with the case of Unicredit above, this is likely to be much higher. Third, the global financial crisis appears to have had an impact on retail lending at all four banks. Furthermore, the impact may be ongoing for Santander, HSBC, and Citibank as their levels continued to fall after 2009. Unicredit however, saw retail loans jump up in 2010 and 2011, approaching half of the loan portfolio.

Observing loan share by geographic segment deepens our understanding of retail lending diversification. Table 5 depicts total loans by region for each bank at year-end 2011. Three important findings appear out of these statistics[11]. First, in three cases the home market was the largest for retail loans. Of course, this varies by institution, but for retail loans, the home market was the largest geographic location for HSBC, Citibank, and Unicredit. Santander's home market too was significant, but was slightly behind the U.K. Nonetheless, the second, and perhaps more interesting finding is that in all cases foreign markets contributed for a sizeable share of loans. Santander led all banks with over 70 percent of loans in foreign markets. HSBC came a close second with just over 65 percent. Unicredit was probably somewhere just behind HSBC depending upon Central and Eastern Europe levels. Data for Citibank makes it somewhat difficult to compare, but international retail loans comprised just less than one quarter of all loans. Third, emerging market retail lending accounts for a third or less of the total for all banks. Nevertheless, emerging markets are a rather significant location for lending.

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[10] Data available from Unicredit does not separate the Central and Eastern European division into corporate and retail segments. Therefore, retail unquestionably consists of a larger share of lending (and earnings below as well), but this cannot be statistically demonstrated. So Unicredit too probably devoted the largest share of loans to retail. Ghizzoni, F. (2010), Kornasieqicz, A. (2010), Unicredit Group. (2010), and Alekseev, M. (2010) each agrees with this supposition.

[11] Santander and Unicredit's statistics require some explanation. Santander does not segment retail loans by geographic location. However, since retail accounted for over 85 percent, and sometimes 90 percent, of loans we take these statistics to be an accurate reflection of overall geographic distribution (see table 4). Second, Unicredit does not breakdown Central and Eastern Europe statistics by business segment, so in their case, retail probably holds more weight within Unicredit's overall operations.

Table 5: Retail Loans by Geographic Distribution at Year-End 2011

Santander[@]	
Spain	29%
Portugal	4%
Germany	4%
Poland	1%
Other Europe	4%
U. K.	34%
Brazil	11%
Mexico	3%
Chile	3%
Other Latin America	2%
United States	5%

Citibank	
North America	43%
Latin America	6%
Asia	14%
Middle East, North Africa & Europe	1%
Other	2%
Corporate Loans	35%
Brazil	11%

Unicredit [#]	
Italy	38%
Germany	13%
Austria	7%
Poland	3%
Central and Eastern Europe	17%
Other	22%

HSBC[Ω]	
U K	34%
France	3%
Switzerland	3%
Middle East & North Africa	1%
Turkey	1%
Hong Kong	16%
Australia	3%
China	1%
Malaysia	2%
Singapore	3%
Taiwan	1%
United States	17%
Canada	7%
Argentina	0%
Brazil	3%
Mexico	1%
Other	4%

Notes :

 # Excludes inter-group loans.

** Retail loans only, by geographic distribution. No other loan type included.*

[@] Includes some loans to corporate entities. Since Santander's retail loans comprise such a large share of total loans, we treat these statistics as an accurate depiction of retail loan geographic distribution

Source: Annual Reports and Financial Statements of Respective Bank

Global Bank Income Structure

Examining earnings structures sheds further light on the weight international retail activities have in global banking. Below, the earnings of the banks are examined in three ways. First, each bank's return-on-assets (ROA) at home and abroad are discussed. Second, retail banking is looked into specifically as a source of earnings. Third, global bank earnings are reviewed by geographic location.

First, we look at ROA for global banks in home and host markets. This comparison allows us to make important comparisons on how much higher (or lower) bank performance was at home, as opposed to in foreign subsidiaries. Tables 6(A), 6(B), 6(C) and 6(D) show ROA figures for the four respective banks pertaining to 2006 and 2010.

Table 6(A): Global Bank Return on Assets in Home and Major Host Markets - HSBC

Bank : HSBC	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
U.K.	1.19%	13th	0.78%	6th
Argentina	Na	na	3.52%*	6th
Brazil	2.38%*	8th	1.46%*	13th
Canada	1.60%*	1st	0.98%*	5th
China	Na	na	0.49%	103rd
Egypt	Na	na	2.73%*	2nd
France	0.97%	3rd	0.24%	8th

Bank : HSBC	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
Hong Kong	1.65%*	5th	1.43%*	5th
Indonesia	na	na	2.87%*	6th
Malaysia	na	na	1.64%*	7th
Mexico	2.58%*	6th	0.55%	9th
Panama	na	na	1.08%*	5th
Switzerland	1.44%*	12th	0.97%*	7th
United States	0.90%	176th	-0.20%	160th

Table 6(B): Global Bank Return on Assets in Home and Major Host Markets – SANTANDER

Bank : Santander	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
Spain	1.05%	16th	0.99%	2nd
Argentina	1.43%*	7th	6.23%*	1st
Brazil	1.49%*	9th	2.67%*	5th
Chile	2.32%*	1st	2.53%*	2nd
Mexico	3.35%*	6th	2.41%*	2nd

Bank : Santander	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
Poland	na	na	2.55%*	1st
Portugal	1.63%*	2nd	1.13%*	1st
Puerto Rico	na	na	0.93%	1st
U.K.	0.22%	28th	0.70%	9th
U.S.	0.72%	185th	1.14%*	70th

Table 6(C): Global Bank Return on Assets in Home and Major Host Markets – CITIBANK

Bank : Citibank	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
U.S.	1.57%	114th	0.64%	117th
Brazil	1.86%*	14th	2.46%*	8th
China	na	na	0.91%*	88th
Japan	na	na	0.50%	12th
Mexico	4.75%*	2nd	2.40%*	3rd

Bank : Citibank	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
Poland	2.31%*	6th	2.51%*	2nd
Russia	0.84%	33rd	4.64%*	3rd
South Korea	0.92%	9th	0.77%*	7th
Venezuela	na	na	1.80%*	6th

Table 6(D): Global Bank Return on Assets in Home and Major Host Markets – UNICREDIT

Bank : Unicredit	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
Italy	1.00%	22nd	0.27%	20th
Austria	2.12%*	2nd	0.59%*	8th
Bosnia Herzegovina	na	na	1.03%*	1st
Bulgaria	3.26%*	2nd	1.63%*	2nd
Croatia	1.74%*	3rd	1.62%*	2nd
Czech Rep.	na	na	1.29%*	5th
Germany	0.32%	53rd	0.51%*	7th
Hungary	na	na	1.51%*	2nd

Bank : Unicredit	Dec 2006		Dec 2010	
	ROA	Rank	ROA	Rank
Ireland	na	na	0.43%*	2nd
Luxembourg	na	na	1.08%*	1st
Poland	3.26%*	3rd	2.31%*	4th
Romania	na	na	0.98%*	3rd
Russia	na	na	2.21%*	14th
Serbia	na	na	2.39%*	2nd
Turkey	na	na	3.05%*	5th
Ukraine	na	na	0.40%*	4th

Cells marked with (*) indicate foreign subsidiary ROA outperformed home-market ROA.
2006 statistics for France, Bulgaria, and Croatia are actually from December, 2005.

Source : The Banker, Top 1,000 World Banks, July 2007 and 2011

Three meaningful observations can be made from these data. First, for the most part, global banks achieved higher ROA performance in foreign subsidiaries than in home markets. While it is true that this development became more protracted after the 2008 financial crisis, in many cases host-market ROA was significantly higher before the crisis as well. Second, the best performance occurred mainly in emerging markets. Even after the crisis, global banks managed to earn relatively impressive returns in faster growing economies. Third, in many emerging markets, global banks ranked quite high in terms of ROA performance. Thus, the four global banks were outperforming host-market domestically-owned banks in most cases, which indicates global banks were relatively successful in their operations.

Next we turn to determining what role retail played within overall earnings by investigating earnings by business segment. Below tables 7 through 10 compare retail banking's position for each global bank. On aggregate, retail comprised the largest income segment for all four banks. Beginning with HSBC in Table 7, retail grew larger over the decade. In 2000, retail constituted fewer than 40 percent of the total. By 2005 though, retail had grown to nearly 60 percent. Other segments, such as commercial, investment, and corporate banking shrank drastically in those five years. Over the next six years retail regressed somewhat, accounting for just less than 50 percent in 2011, but was still by far the largest income segment of its global business.

Table 7: HSBC's Total Operating Income by Segment at Year-end

Business Segment (* : Corporate, Investment Banking & Markets)	**2000**		**2005**	**2011**
Retail Banking & Wealth Management	40%		58%	48%
Commercial Banking	22%		15%	19%
*Global Banking and Markets**	28%		18%	19%
Global Private Banking	5%		4%	4%
Other	5%		5%	10%
Geographic Segment (* : Asia-Pacific Mid-East in 2002,separate in 2011)		**2002**		**2011**
United Kingdom		30%		16%
Other Europe		10%		5%
Hong Kong		35%		27%
*Rest of Asia-Pacific**		12%		34%
North America		13%		1%
Middle East North Africa		na		7%
Brazil		1%		6%
Other Latin America		-2%		5%

Source: HSBC Annual Reports, All Information from most recently available report

Table 8: Citibank's Revenue by Business Segment at Year-End

Business Segment	**2003**	**2005**	**2011**
Consumer Banking	55%	53%	51%
Corporate & Investment Banking	31%	34%	na
Other Investments & Services	14%	7%	na
Global Wealth Management	na	6%	na
Securities Banking	na	na	33%
Transaction Services	na	na	16%
Geographic Segment		**2005**	**2011**
North America		57%	37%
Asia		20%	23%
Latin America		15%	21%
Europe, Middle East & Africa		8%	19%

Source: Citibank Annual Reports, all information from respective years' annual reports

Likewise, the majority of Citibank's income was from what they label as 'consumer banking', but we treat as retail banking. Actually, retail comprised more than half of income from early on, at 55 percent in 2003. On top of that, data from Citibank's 2008 annual report showed that figure went as high as 66 percent in 2007. The 2008 crisis had an impact though, as retail dropped to 50.46 percent in 2011. Nonetheless, for Citibank too, retail was by far the largest segment of banking income.

Santander saw retail grow to even higher heights than the previous two banks. Already at 60 percent in 2000, Santander's retail income was high by comparison even at that time. Thereafter, retail grew to nearly 80 percent of income in 2005, slipping slightly to 75 percent in 2011: suggesting that, for Santander too, the 2008 crisis impacted retail earnings. Still, at 70 percent or more of income every year after 2001, Santander's retail segment is obviously its most important business segment.

Table 9: Santander's Percentage of Total Profits by Business Segment at Year-end

Business Segment ('Other' segment only classified separately in 2000)	**2000**	**2005**	**2011**
Retail Banking	60%	78%	75%
Global Wholesale Banking	11%	13%	20%
Asset Management & Insurance	8%	9%	5%
Other	21%	Na	na
Geographic Segment (Spain differentiated from Continental Europe from 2009)		**2005**	**2011**
Spain		na	13%
Continental Europe		54%	12%
United Kingdom		14%	12%
Brazil		11%	28%
Other Latin America		21%	23%
United States		na	12%

Source: Santander Annual Reports, all information from most recently available report

Unicredit's retail segment increased to account for larger portions of income as well. In 2003, retail banking comprised over 43 percent of income. By 2011 that figure increased to just over 50 percent of total income from their Italian, German, Polish, Austrian and 'other' retail segments. Unfortunately, Unicredit's data does not permit us to nail down a percent of Central and Eastern European income originated from retail. Other recent reports published by Unicredit suggest retail is a significant portion of total

earnings within major Central and Eastern European subsidiaries[12]. In fact, the figure may be as high as 60 percent of the Central and Eastern European total, which means total retail income may also be over 60 percent for Unicredit.

Table 10: Unicredit's Operating Income

Business Segment	**2004**
Retail Banking	40%
Corporate & Investment Banking	29%
Central & Eastern Europe	17%
Private Banking & Asset Management	12%
Other	2%
Geographic Segment	**2004**
Italy	75.1%
Other Western Europe	5.1%
Other Eastern Europe	17.6%
The Americas	2.1%
Asia & Rest of World	0.1%

Combined Segments	**2011**
Italy Retail	27%
Germany Retail	6%
Austria Retail	5%
Poland Retail	5%
Other Retail	8%
Private Banking & Asset Management	7%
Corporate & Investment Banking	30%
Central & Eastern Europe	19%
Adjustments	-7%

Source: Unicredit's Annual Reports (From most recently available report)
Data for geographic distribution only available from 2004

Lastly, analysing developments according to geographic location demonstrates where the majority of retail income originated. Income by geographic segment is also represented in tables 7 through 10.

12 As mentioned above, these include: Ghizzoni, F. (2010), Kornasieqicz, A. (2010), Unicredit Group. (2010), Alekseev, M. (2010).

For HSBC, the United Kingdom and Hong Kong comprised 65 percent of income in 2002. Since HSBC is domiciled in the United Kingdom, we consider that to be its home market. However, it does have a long history in Hong Kong, and so we might consider that to be a special case. Almost a decade later, the United Kingdom and Hong Kong did not combine to form half of total income. In 2011, income was much more globally distributed, with more than 50 percent of income coming from other international markets. In particular, Latin America, Brazil, the Middle East, North Africa, and Asia-Pacific drastically expanded in importance, meaning those markets now contribute to over half of HSBC's total income.

Similarly, earlier in the decade, more than half of Citibank's income was generated in its home market[13]. Thereafter emerging markets grew, by 2011 Asia and Latin America combined to form 44.6 percent of income. In fact, when combined with Europe, the Middle East, and Africa, foreign markets totalled 63.4 percent of income. North America attributed less than 37 percent in 2011, a drop of more than 20 percent of income in just six years.

Santander too drew most of its income from familiar markets as recently as 2005. Regrettably, data published by Santander for 2005 does not distinguish between continental European countries, so where exactly its home market of Spain fell in that year is difficult to discern from available statistics. Nonetheless, since some of its continental European expansion, occurred after 2005, we might accept that Spain constituted a large share of 2005's continental European income. Even so, by 2011 the situation changed drastically, with 51 percent of income originating from Latin America alone. In fact, Brazil became the largest overall contributor to income at 28 percent, while the rest of Latin America brought in another 23 percent. Spain on the other hand, only contributed 13 percent, and together with continental Europe just 25 percent, or less than half of its contribution six years earlier.

Likewise, Unicredit witnessed an expansion in income from international operations between the first part of the decade and the end of 2011. In 2004, operations in Unicredit's home market comprised the lion's share of income at 75 percent. Eastern Europe accounted for just 17 percent of income in that year. By 2011, retail in Germany, Austria, and Poland contributed 14 percent of income. Central and Eastern European operations contributed another 16 percent. Of which, the most noteworthy countries in 2011 were Turkey at 21.5 percent, Russia 15.3 percent, Croatia 12.6

[13] 2005 data stipulates 57% of income originated in the "U.S.", while data for 2011 indicates 36.6% originated from "North America." The author treats both as Citibank's home market for two reasons. First, Mexico is included in statistics for Latin America in all cases. Second, even within the wider classification of North America, it is expected the United States comprises a much larger share than Canada.

percent, Czech Republic 8.4 percent, and Ukraine with 5.6 percent of the Central and Eastern Europe total. Ultimately, a minimum of 30 percent of Unicredit's retail income comes from abroad, and inserting Central and Eastern Europe would probably make that figure much higher. Similar to the other three banks, the share of Unicredit's home market earnings in overall retail banking earnings shrank over the 2000s.

Despite some slight statistical imperfections, we can emphatically say international retail banking plays a vital role in global banking. Foreign subsidiaries, especially those in emerging markets, contribute sizeable portions of overall earnings. In fact, banks observed here have some of the lowest home market retail income as a share of total income ratios in the banking industry (Capgemini, EFMA, and ING, 2008). Unicredit's domestic income, in comparison, is on the higher side but it still has a higher international retail income share than a number of banks not observed in this paper. Thus, the bottom line is, global banks now rely on international retail banking operations for huge portions of their earnings.

Reasons for Retail

This subsection formulates reasons retail has become a vital part of global banking. We draw three reasons from literature, and offer another possible reason for retail's importance.

First, a larger negotiation capacity gap exists between financial institutions and individuals than between financial institutions and corporations. Urdapilleta and Stephanou noted the "small size of individual clients does not typically allow them to negotiate rates" (2009, p. 19). Corporations are not only much larger than individuals in scale; they are also more adept to negotiation. When negotiating the terms of a loan, we should expect corporations borrow at more favourable terms for themselves than for individuals. Which means that loan rates to individuals are relatively higher than those to corporations, providing banks with a valuable incentive to increase retail loans: their comparatively high returns.

Second, Bertola, Disney, and Grant (2006) pointed out the "sharp increase in lending to households over the past decade…was spurred by financial liberalisation" (p. 94). Interest rate liberalisation opened the margin within which banks operate when extending loans. Rigid interest rate regulation priced individuals outside the upper interest rate band because, generally, individual borrowers are more opaque, and thus riskier than corporations. Even if banks had been eager to extend loans to individuals, they were unable to do so because regulation prohibited them from adjusting interest rates to levels that would compensate for higher risks. Through liberalisation, banks could adjust rates according to individual risk assessments.

Third, Berger's (2007) *concierge effect* theory may push non-financial corporations to relationships with local banks when venturing abroad. This effect occurs when non-financial corporations operating in foreign markets where a home country bank also simultaneously operates actually prefer the financial services provided by locally-owned banking institutions because they provide information on the host market that global banks cannot provide. Thus, if lending to home country corporations (while abroad) is not a reliable international segment, global banks could be substituting for that void with retail.

Fourth, limits to financial accessibility and expertise make the benefits of banking services greater for individuals than for corporations. Corporations have alternative means of accessing finance. Unlike corporations, individuals cannot procure funding via equity markets, bond issuance, or commercial paper. Furthermore, many individuals have limited financial expertise and a banking relationship offers support. Banks offer fee-based financial advice and asset management products, which many individuals may otherwise be unable to access. Plus, deposit insurance (where available) also offers a relatively secure method of storing savings. Suggesting that a relationship with a banking institution is perhaps the easiest, most effective, and secure method individuals have for accessing financial services.

Table 11: Global Banks' Average Return-on-Assets 2007-2011 (%)

Global Bank	Average ROI
HSBC	0.67%
Santander	0.99%
Citibank	-0.29%
Unicredit	0.23%

Source: The Banker, Top 1,000 World Banks, Various Issues

Global banks have been able to geographically diversify income via the extension of retail financial services in both emerging and developed markets. When considering which of the four global banks were more successful, we can point to some striking statistics in Table 11 above. Average ROA figures from 2007 through 2011 for the four global banks show HSBC and Santander had much higher ROA performance than Unicredit, and certainly Citibank, which was actually negative. Coincidentally, HSBC with an average of 0.67 percent and Santander with 0.99 percent were also the more geographically diverse banks. Both hold sizeable positions in numerous countries and multiple regions. Citibank is diverse in terms of regional distribution, but its number of countries is comparatively low, while Unicredit is unquestionably concentrated in Emerging Europe.

As we saw from the ROA rankings, in a number of cases the four global banks outperformed other banks operating in the same markets. Access to more emerging markets will be essential for global banks in years to come because emerging markets will contribute larger shares of global retail banking revenue (Table 12).

Table 12 : Total World Retail Banking Revenues

Region	2006 (Billion Euros)	2017 (Billion Euros)	Growth (%)
North America	433	580	33.95%
Western Europe	350	460	31.43%
Japan	125	160	28.00%
Australia	30	40	33.33%
Other America	95	145	52.63%
Other Europe	85	145	70.59%
China	35	110	214.29%
India	25	63	152.00%
Other Asia	35	90	157.14%
Middle East & North Africa	50	65	30.00%
Total	1,263	1,858	47.11%

Note: Figures for 2017 are forecasts

Source: Capgemini, EFMA, and ING (2008)

Some notable emerging markets, such as China and India, have yet to see major expansions by foreign-owned banks. Going forward, banks could miss out on the opportunity to further distribute and possibly stabilize bank income through wider geographic diversification if access to more diverse opportunities does not materialise.

CONCLUSIONS

This paper demonstrated retail is a very important segment within global banking. In fact, retail constituted the largest type of loans and source of income for each bank observed here, showing international retail operations play a particularly important role. ROA developments revealed the four global banks were able to generate higher rates of return abroad than at home. Local bank acquisition probably provided global banks with a means of lowering obstacles associated with operating in foreign markets.

Reconsidering the notion of success in international retail banking is now quite necessary. Deeper geographical diversification has the distinct benefit of augmenting bank income in the event of negative financial shocks. However, geographical diversification does not simply mean entering one or two foreign markets, rather it means being diverse across countries, regions, and types of economies. Therefore, the only way to conceptualise success in international retail banking are banks that achieve relatively strong performance in multiple foreign subsidiaries, cultivating various income-earning opportunities, and insulating itself from adverse financial shocks.

According to that notion, two banks were more successful in international retail. As noted above, HSBC and Santander had much higher ROA performance than Unicredit and Citibank. The reason HSBC and Santander showed higher performance may likely be that their retail banking operations are, comparatively speaking, more *geographically diverse*. HSBC operates in multiple regions, including Asia, which became a huge source of income by the end of the period. Santander may appear concentrated in Latin America, but its operations in the United Kingdom, the United States, Poland, and continental Europe actually provided diversity, to support income. While Citibank is present in Asia, Latin America and other markets, the number of countries in which it has a significant presence is low. Unicredit is unquestionably overly concentrated in Central and Eastern Europe. These facts limited the countries Citibank and Unicredit could draw upon to support earnings after the global financial crisis. Therefore, the results from this paper suggest promoting the internationalisation of retail banking may be a positive method for increasing financial stability.

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IMPACT OF CREDIT-PLUS APPROACH OF MICROFINANCE ON INCOME GENERATION OF HOUSEHOLDS

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Abstract

This paper examines the impact of the credit-plus approach of microfinance on household income-poverty. A multistage random sampling method was used to select a cross – institutional sample of 268 households from the Kandy District of Sri Lanka. Two leading microfinance institutions in Sri Lanka, namely, Thrift and Credit Co-operative Societies (TCCSs) and Sarvodaya Economic Enterprise Development Services (Guarantee) Limited (SEEDS), were selected for the purpose. To understand the impact of microfinance on income generation of households and to examine the effect credit-plus services have on the amount of cumulative credit received by households, three regression models were estimated. The study revealed a positive impact of microfinance in increasing income, thereby reducing poverty in households. Credit-plus services were found to have made a higher positive impact on the households that had taken more credit than the average household indicating that greater the credit provided by credit-plus services, the higher the potential for households to generate income.

Key Words *: Microfinance, Households, Credit-plus Services, Poverty, Minimalist Approach, Income*

JEL Codes : G20, G21, and G23

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INTRODUCTION

Access to financial services has long been recognised as an important means of improving income generation opportunities and overall living conditions among poor households. As an approach, microfinance appeared as a strategy to address the institutionalised exclusion of the poor from formal financial systems. Microfinance can be defined as the provision of a broad range of financial services such as deposits, credits, and payment services to the poor and to low income households and their microenterprises (ADB 2000). As a tool of poverty reduction, microfinance is based on the premise that improved access to credit by the poor is crucial in improving the returns to economic activities; it not only expands self-employment and promotes business and entrepreneurial activities, but also allows incomes to grow and provides a 'safety net' for the poor who are vulnerable to income fluctuations.

Over the past three decades, Microfinance Institutions (MFIs) have adopted innovative modes of providing services to the entrepreneurs in low income groups, especially in developing countries. Remenyi (2002) says that it is possible to identify two main approaches in relation to the role of microfinance intermediation in poverty reduction. In terms of the first approach that is portrayed as the *Minimalist Approach,* the MFIs offer only financial services in the form of credit. These MFIs are unwilling to provide non-financial services due to multiple reasons ranging from high administrative costs to high transaction costs. In that sense, the primary focus of these MFIs is institutional profit, disregarding the social and poverty alleviation dimensions of microfinance. On the other hand, MFIs that follow the *Credit-plus Approach* provide other services in addition to financial services. These non-financial services include skills development, training, educational activities, marketing assistance, supply of inputs and business development[1]. These include the services that would assist entrepreneurs and the self-employed in developing their businesses, which are provided prior to the provision of key financial services, namely, credit facilities. According to advocates of this approach, the provision of credit alone cannot guarantee that recipients of credit would use scarce capital in productive manner, and therefore, the recovery of loans cannot be ensured under the *Minimalist Approach*. It is interesting to note that such non financial services are increasingly being recognised as an important component of microfinance intermediation as they are associated with the viability and sustainability of enterprises. Moreover, it is believed that the viability and sustainability of enterprises will in turn ensure financial viability and sustainability of the relevant MFIs. Even though the provision of the above services is not a direct financial service, it is part of the financial package offered by a financial institution and should be kept in mind when the outreach of financial intermediation is investigated.

[1] Business development services include technical assistance and services such as training on business and financial management, and accounting/book keeping.

This study attempts to investigate the impact of the above mentioned microfinance intermediation approaches on income generation by households. In addition, the study also examines the impact of credit-plus services with reference to the cumulative credit amount received by households. To understand the impact on clients' economic position through income generation, two leading MFIs called TCCSs and SEEDS operating in Kandy District, Sri Lanka, were studied. The district was selected because of its relatively high poverty rate (30.9% in 1990 and 25% in 2002)[2]. The World Health Organisation (WHO) in its Nutrition Country Profile for Sri Lanka (2000) indicated that 52% of the people in Kandy district were undernourished. This high level of poverty has led to the government's implementation of a number of poverty alleviation programmes including several microfinance schemes in the district; itself reflective of the significance given to microfinance as a strategy for poverty alleviation in Sri Lanka[3].

MICROFINANCE AND POVERTY REDUCTION: A LITERATURE REVIEW

Attention to 'income poverty' is usually associated with the conceptualisation of poverty reduction as moving of low income groups from a stagnating 'below poverty line' situation to a stable 'above poverty line' situation. This leads to focus on promotional strategies 'raising persistently low incomes', in terms of financial services, emphasising (often exclusively) the provision of credit for income generation through self-employment (Dreze and Sen 1989). However, the current substantiation of the impact of microfinance on poverty reduction is vague. Some research findings have suggested that access to microfinance has the potential to diminish poverty considerably through establishing crisis-coping mechanisms, diversifying income-earning opportunities, and improving the socio-economic condition of the poor (Hashemi et al.:1996, Montgomery et al: 1996, Khandker: 1998, Husain: 1998). Other studies have found that Microfinance has a minimal impact on poverty reduction (Adams and von Pischke: 1992, Rogaly: 1996, Buckley: 1997, Wood and Shariff: 1997, and Morduch: 1998,). Kabeer (2001) has shown that small-scale credits lead to negative empowerment and lead to a debt trap for women.

In the recent years, poor women have been particularly empowered by microcredit, as it gives them ability to earn an income and thus improve their bargaining positions *vis-a-vis* their male counterparts (Gunathilake and de Silva: 2010, Chang 2010). Morduch and Haley (2002) argue that microfinance has proven to be an effective and powerful tool

[2] A widely used and important index on poverty in Sri Lanka is Headcount Index. It is defined as the percentage of population below the poverty line (Department of Census and Statistics – Sri Lanka, 2002).

[3] In Kandy district, microfinance initiatives seeking poverty reduction generate conflicting results. While they have worked satisfactorily in some programmes, they have not shown such progress in many others. The impact of MFI on households' socioeconomic conditions has therefore been diverse.

for poverty reduction. Further, the evidence shows positive impact of microfinance on poverty reduction as it relates to the first six out of the eight Millennium Development Goals. Robinson (2001) stated that there is strong demand for small-scale commercial financial services from the economically active poor. According to Hossain (1988), the earnings of Grameen Bank members in Bangladesh were 43 per cent higher than the target group in the control villages, and about 28 per cent higher than the target group of non-participants in the project village. Otero and Rhyne (1994), Holcombe (1995), Schuler, et al. (1996), and Remenyi (1997) also confirmed that microfinance would bring about immense socioeconomic benefits including the ability to generate income and to reduce vulnerability of clients. Cuong et al. (2007) in Vietnam has confirmed the positive and statistically significant impact of participating in microfinance programmes on per capita consumption expenditure and per capita income. Parallel confirmations were reported by Khandker (2005) and Chowdhury (2007) in Bangladesh. Positive effects of microfinance on clients' income empowerment in Pakistan have also been reported by Abbas et al. (2005) and Javed et al. (2006).

As microfinance is recognised as a valuable strategy for increasing the livelihoods and reducing vulnerability, many development practitioners and project planners have been eager to include microfinance with credit-plus components in social funds and other multi-sectoral projects (Alexandra and Silva 2002). Remenyi (1997) points out that microfinance is increasingly recognised as an effective instrument for poverty reduction.

Studies on microfinance in Sri Lanka also have shown similar results. As reported by Wickrama (1998), Dias (2001), and Mithrarathna (2003), clients' socio-economic conditions have improved with the intervention of microfinance. Colombage (2004) and Thilakarathne et al. (2005) have also argued that microcredit has had a significant positive impact on households' socio-economic condition. Ministry of Finance and Planning of Sri Lanka and GTZ (2008) have concluded that there was still a large unmet demand for credit, and that poorer income groups were less able to derive the benefits of utilising financial services than richer income groups. Colombage et al. (2008) have claimed that Microfinance would have a positive impact on clients' socio-economic development at family, business, community and individual levels. Premaratne (2009) investigated the accessibility and affordability of rural Microfinance services in Sri Lanka and described the constraints and opportunities in MFIs in the rural economy. Gunathilake and de Silva (2010) have found that owning a loan (if woman as the head of a household has the right to use the loan) increases a woman's control over a loan-assisted project, which that has a significant positive impact on her level of empowerment.

Even though the above studies have investigated the impact of microfinance on poverty, the impact and significance of the *Credit-plus approach* of microfinance intervention on poverty reduction among rural households has not yet been adequately examined. This research is an attempt to fill this lacuna by studying the impact of microfinance on poverty reduction and impact of credit-plus services by the selected two leading MFIs, SEEDS and TCCSs in the Kandy District of Sri Lanka.

Following the income-poverty approach of microfinance intervention, this study assessed the effects of microfinance on household income, comparing the current household income[4] level with the official household poverty line. Categorisation of households according to poverty line was based on household income and expenditure survey 2001/2002 conducted by the Department of Census and Statistics of Sri Lanka[5], according to which, the official poverty line of Kandy District was Rs. 2915 per person per month[6] in 2008. The total household expenditure for each household was estimated multiplying this number by the number of family members in a household, which was considered as the official poverty line for a household. Accordingly, it was revealed that there were 117 households above the poverty line after borrowing. However, there were 58 households (one-third of the total of 175 households) who were not empowered financially by the microfinance services received.

In the backdrop of these initial estimations, three regression models were estimated to analyse the impact of microfinance on income-poverty and impact of credit-plus services and also to assess the income empowerment capability of microfinance intervention by TCCSs and SEEDS.

METHODOLOGY

This study was conducted mainly based on primary data that were collected from microfinance clients, using a structured questionnaire. According to the National Microfinance Study of Sri Lanka 2002, there were sixteen microfinance actors operating in Sri Lanka. Among them, TCCSs and SEEDS were selected purposely for the present study because they have been having well established branch network all

[4] Household income was calculated in the field survey as follows: Income from paid employment/s during last month, other cash receipt of the household members during last month, income from non-agricultural activities during last month, income from agricultural activities paddy, other seasonal crops and tobacco, income from other agricultural activities, income in kind during last month and monthly rental value of owner occupied house.

[5] Average households income level of each Divisional Secretary Division was calculated basing the income and expenditure data from household income and expenditure survey 2001/2002, Department of Census and Statistics Department, Ministry Finance and Planning, Sri Lanka.

[6] Minimum expenditure per person per month to fulfil the basic needs. CCPI based year 2002 = 100. Department of Census & Statistics – Sri Lanka.

over the island, except in several areas in the Northern and Eastern provinces. Sarvodaya was the most prominent and largest commercialised local NGO, and SEEDS was its financial arm. SANASA was the dominant MFI having the highest number of clients and outreach among the semi-formal MFIs in Sri Lanka. SEEDS had 108 units and SANASA had 125 units in the Kandy District by 2007, though the numbers were was higher in 2002.[7] These two MFIs, unlike many other similar suppliers of microcredit, appeared unaffected by politics in the country.

The Table 1 presents a summary of the Microfinance units belonging to each institution and their respective membership in the Kandy District by 2007.

Table 1: Composition of TCCSs and SEEDS in Kandy as of December 2007

Institution	Units	No. of clients
SEEDS	108	23,209
TCCSs	125	1,442
Total	**233**	**24,651**

Source: Annual Reports of TCCSs and SEEDS.

The survey covered 268 households in 50 selected Microfinance units of TCCSs and SEEDS in the Kandy district. The multistage random sampling approach was adopted in selecting the sample. Accordingly, microfinance units/branches of TCCSs and SEEDS were categorised into *minimalist* and *credit-plus* approaches. Since there was not much of a difference in the number of units between the two institutions by 2007, twenty-five units were selected from each institution, totalling the number of units surveyed to 50, which was 21% out of the total number of units existed in 2007. Accordingly, household's data on services rendered by the selected 50 units belonging to TCCS and SEEDS were collected for the years 2005, 2006 and 2007.

According to the discussions conducted with officers in the Head Offices of the two institutions, all units/branches would follow *credit-plus approach*. However, it was revealed later, from discussions conducted with unit managers/officers, that some of the microfinance units of these two institutions followed only the *minimalist approach*. Among the reasons that have led to this practice, the management/operational costs, the inadequacy of staff and the lack of participation by the clients appeared relatively more

[7] In 2002, SEEDS had 160 units in Kandy and 2369 in Sri Lanka, while SANASA had 258 units in Kandy District and 1922 in Sri Lanka.

important. Thus, for the purposes of the present survey, the interventions by both institutions were categorised into *minimalist* and *credit-plus* approaches (Table 2).

Table 2: Approach of MFIs

MFI	Approach Category	Number	%
TCCSs	Minimalist Approach	6	24
	Credit-Plus Approach	19	76
SEEDS	Minimalist Approach	4	16
	Credit-Plus Approach	21	84

Note : Percentages calculated out of the total number in each type and approach of MFIs

The Number of households selected from each unit was proportional to the approach which was followed by the units. Therefore, 5% of the total number of clients falling into each of the two approaches adopted by the two institutions was selected, enabling altogether 268 clients being surveyed.

Table 3: The Sample

	Minimalist		Credit Plus	
	TCCSs	SEEDS	TCCSs	SEEDS
Total population	656	380	2227	2094
Sample (5%)	33	19	111	105

ANALYTICAL PROCEDURE

To study the impact of microfinance on income generation of households and to examine the impact of credit-plus services with reference to cumulative credit amount received by households, three regression models were estimated.

Model 1: The primary objective of this model was to examine the impact of determinants on income of households after microfinance facilities were received. Dependent variable Y is household's total monthly income after intervention through microcredit. Number of observations in the model is 267 households. Regression model was estimated using the following empirical specifications.

$$Y = X\,\alpha + D\,\beta + U \qquad (1)$$

Where,

Y = n x 1 vector of household income level after micro financing

X = n x 8 matrix of eight continuous variables

D = n x 3 matrix of three qualitative variables (D_1, D_2 and D_3)

U = n x 1 vector of unmeasured household and credit related characteristics that determine income.

β = 3 x 1 vector of the parameters of eight continues variables to be estimated

α = 8 x 1 vector of the parameters of tree qualitative variables to be estimated

Table 4: Definition of Variables for Regression Analysis

Variable	Definition
Yafter = Y	Household's total monthly income after receiving microcredit (Rs.)
Ybefore = X_1	Household's income level before microcredit (Rs.)
Distance = X_2	Distance to closest microfinance institution (meters)
Members =X_3	Number of family members in the household
Age = X_4	Age of the head of household in years
Timeyrs = X_5	Number of years the credit has been in use
Intrestr = X_6	Rate of interest on credit (percentage)
Credit = X_7	Credit amount (Rs.)
Edu = X_8	Education level of the head of household (Number of years of schooling)
Cpemp = D_1	Cpemp = 1, if credit plus services affected income and empowerment, = 0, otherwise
Ownership =D_2	Ownership = 1, if household head owned a micro enterprise when obtaining credit = 0, otherwise
Mkts = D_3	Markets = 1, if markets were available for produce of micro enterprise, = 0, otherwise
Cpempsmall = D_4	Credit ≤ 40824: respondents who received credit with credit plus services but cumulative credit amount was less than or equal to average credit. They were empowered by the services.
Cpempbig = D_5	Credit > 40824: respondents who received credit with credit plus services but cumulative credit amount was larger than the average. They were empowered by the services.
Cpemp0small = D_6	Credit ≤ 40824*: respondents who obtained credit with credit plus services but were not empowered. Their cumulative credit amount was less than or equal to the average

Detailed definition of variables used in the regression analysis is given in Table 4 above. Households' total monthly income after micro financing was used as the dependent variable. It was derived purposely because its change is a good proxy for measuring income poverty of households. Distance, Cpemp[8], timeyrs, interest, credit and mkts were used as credit related independent variables in the analysis, while Ybefore, members, age, education and ownership were introduced as the household-related independent variables.

Credit Related Independent Variables

Distance to the nearest MFI is a factor affecting accessibility to Microfinance services. Shorter the distance to MFI, greater the accessibility to microfinance, and further away the MFI from residence, the more difficult the access to microfinance. The accessibility and availability of MFI would enhance transactions (credit, savings, and investment) of households, which would lead to income empowerment and mobility. The credit-plus services[9] would facilitate the economic empowerment and diminish the vulnerability of households. Duration of credit that has been taken was also considered as an independent variable, represented by Timeyrs, where the longer the time elapsed since obtaining the credit, greater would be the beneficiary's experience on enterprise development. Thus, the anticipation is that experience and mobilisation in the field would increase earnings and minimise poverty. Also, the cumulative loan amount may increase with time, and might affect positively to enhance earnings from the occupation.

Although the interest rates on lending by TCCS units and SEEDS units did not vary among the branches and groups of the same institution, there was a difference between the two institutions. The expectation would be that greater benefits to borrowers with credit offered at lower interest rates would enhance access to microfinance and also increase incomes through favourable changes effected on profitability of micro enterprises. It is also expected that the borrowers would be benefited if the if the total credit received was greater. This was because greater credit would enable starting or renovating a micro enterprise, which would be capital/working capital intensive within the prevailing economic context, and the borrower might engage in a relatively larger scale of entrepreneurial activity given the possibility of obtaining higher amounts of credit. It might also help the enterprise by increasing earnings and trimming down vulnerability of clients. Also, the larger the loan amount, the stronger would be the ability to make decisions.

[8] Cpemp = credit-plus services impact on the income empowerment of household. To generate this independent variable we used the total sampled households. If a household was empowered by micro credit with credit-plus services, Cpemp = 1, otherwise Cpemp = 0.

[9] Credit-plus services refer to non-financial services such as vocational training, marketing assistance, other business development services, social welfare and consultancy services, which are provided prior to the provision of credit facilities.

Market facilities are vital for the development of micro enterprises. Availability of markets would make profit making easier, motivate the clients to invest more, provide them with greater mobility and also would help minimise business risks. Consequently, it is believed that market availability for the products would have a positive influence on income earning capacity of microfinance clients.

Household Related Independent Variables

Households' income level before receiving microcredit is crucial for income generation because their ability to cope with risk may be greater than those in the low income category in the beginning. For instance, borrowers spending more than the minimum expenditure per family per month to fulfil the basic needs (official poverty line) applicable to the Kandy district would be having relatively greater incomes, and thus would belong to more advantaged and capable group of borrowers compared to those households below the official poverty line. It is expected that such high income borrowers would have a greater ability to enhance their incomes, as those who were in a strong position even before obtaining the loan could better organise the capital formation as well as the operational and maintenance activities intended to be financed through micro credit.

The impact of the number of family members in the household on income is ambiguous. If the number of dependents is higher than the number of income earners in a family, the impact might be lower, and vice-versa even for a given number of total family members. Further, the families having active supporters for credit related project activities might secure greater income/benefits. A healthier family with more members able and willing to work, especially in agriculture related projects, would have a greater chance of reducing vulnerability in relevant projects and thereby increasing earnings than a family without such capabilities but lesser number of members.

The age of the household head is another ambiguous explanatory variable. Greater the age could be associated with greater experiences on various fields such as monetary management, social relations and networks, project management, self confidence, or market experience, but this is not always the case. Many younger entrepreneurs could better possess such qualities, and therefore, it would be difficult to hypothesise the expected direction of the impact the age of the household chief might bear. The education level of the household head, on the contrary, would be hypothesised as having a positively impact on income generation and on coping up with project related risks. Therefore, it is expected that education level of the household chief would have a positive impact on income increases and reduced vulnerability.

Household head as owner of a micro enterprise when obtaining credit is used as a dummy variable in the model. This variable is also associated with experience, social

relations, confidence on the project and market networks, and therefore it is expected that the variable would have a positive correlation with income enhancement and risk mitigation.

Relationship between Credit-plus Services and Credit Amount when Determining Empowerment

Econometric models were estimated to examine the effectiveness of the Cpemp (Cpemp = 1 if credit-plus services empowered, and Cpemp = 0 otherwise) across different credit amounts (i.e. small and large). Small and larger credit amounts were identified in this study based on the average credit amount. According to the survey findings, average credit amount is Rs. 40824 per month.

Model 2: Variable Cpemp Removed as an Explanatory, Included some Dummy Variables

Three explanatory variables, namely, Cpempsmall, Cpempbig and Cpemp0small were included into the model. If Credit ≤ 40824, and the respondents have received credit with credit-plus services, and also are empowered by the services, that category is named as *Cpempsmall*. If Credit > 40824, and the respondents have received credit with credit-plus services and are empowered by the services, the category is named as *Cpempbig*. If Credit ≤ 40824* and the respondents are not empowered even though they have taken credit with credit-plus services, then the category is named as *Cpemp0small*. Omitted group was *Cpemp0big* which represents the case where Credit > 40824* and respondents taken credit with credit-plus services but not empowered. Their cumulative credit amount is greater than the average. This was to distinguish between the ability of financial empowerment of different amount of credit recipients with credit-plus services. Regression model was done with 267 observations.

Regression models 2 and 3 were estimated using the following empirical specifications.

$$Y = X\alpha + D\beta + U \qquad (2)$$

where, Y = n x 1 vector of household income level after micro financing

X = n x 8 matrix of eight continuous variables

D =nx5 matrix of five qualitative (D_2, D_3, Cpempsmall, Cpempbig, Cpemp0small) variables

U= n x 1 vector of unmeasured household and credit related characteristics that determine income.

β = 5 x 1 vector of parameters of eight continuous variables to be estimated

α = 8 x 1 vector of parameters of five qualitative variables to be estimated.

Model 3: All are the same as Model 2 without the Explanatory Variable 'Credit'.

This model was constructed purposely to investigate the significant level of explanatory variables without cumulative credit amount. Since some dummy variables created using the credit amount received by household's cumulative credit amount was removed from the original model.

RESULTS AND DISCUSSION

As mentioned earlier, this paper attempts to analyse the impact of microfinance on income empowerment of households, and impact of credit-plus services on income poverty reduction quantitatively. Three regression models were used for the analysis.

The Durbin-Watson test was used to examine and thereby avoid autocorrelation problem which is highly likely in models specified with lagged dependent variable as an explanatory variable. Since the *DW* values obtained for the models 1, 2 and 3, were 1.94, 1.91 and 1.89 respectively, it could be concluded that there is no first-order autocorrelation in the models. Moreover, we re-estimated the model without having Ybefore as an explanatory variable, and found our main results still holding ground.[10] Similarly, the Robust standard errors were used to avoid the heteroscedaticity problem.

Model 1 estimated the income-poverty impact of microfinance service received by clients. Number of observations in this model was 267 and the dependent variable was Yafter: Household's total monthly income after microcredit was taken. The summarised results of the estimated models are presented in Table 5.

According to regression model 1, seven explanatory variables (Ybefore, Distance, Cpemp, Timeyrs, Credit, Edu and Mkts) are statistically significant at 5% level. The head of household being an owner of a micro enterprise when taking credit indicated statistical significant at 10% level. Only three variables (Members, Age and Intrestr) were not significant. All the dummy variables used in this model Cpemp, Ownership and Mkts were statistically significant.

Regression results reveal that there is a significant difference in income generation between households that received credit with credit-plus services and households that received credit without credit-plus services. Therefore, it clearly indicates that credit-plus services benefited the households to enhance their income by the micro projects. Households that borrowed with credit-plus services have increased their income by Rs. 1312 per month compared to households that did not benefit from credit-plus services. As mentioned earlier credit-plus services refer to non-financial services such as

[10] Absence of autocorrelation is possible given the relatively long period between Ybefore and Yafter

vocational training[11], social welfare services, and consultancy services, marketing assistance,[12] and other business development services, which are provided prior to the provision of key financial services (mainly credit facilities), and are mainly intended to assist entrepreneurs and the self employed in developing their businesses.

Table 5: Summary Results of the Regression Models
Dependent variable of the models is Yafter

Variable	Model 1	Model 2	Model 3
	Coefficients	Coefficients	Coefficients
Ybefore	1.186** (.0794)	1.179** (.074)	1.196** (.074)
Distance	-1.024** (.282)	-.814** (.260)	-.858** (.266)
Cpemp	1312.5** (471.863)		
Members	278.2183 (366.351)	232.307 (355.154)	257.343 (363.252)
Age	16.184 (42.392)	13.544 (40.539)	12.603 (40.330)
Timeyrs	879.882** (228.580)	828.872** (214.309)	836.600** (217.431)
Intrestr	17.533 (63.606)	4.920 (63.775)	1.376 (64.666)
Credit	.0350** (.0144)	.0181 (.0121)	
Edu	633.275** (152.329)	486.416** (144.782)	440.591** (138.568)
Ownership	1843.664* (779.029)	1745.884** (738.233)	1648.868** (735.655)
Kkts	1326.785** (686.596)	1214.925* (732.387)	1416.562* (744.604)
Cpempsmall		-267.710 (811.490)	-835.187 (742.578)
Cpempbig		4610.082** (1274.32)	5094.723** (1244.637)
Cpemp0small		-391.954 (772.272)	-962.375 (664.056)
Intercept	-9560.225** (2985.581)	-7016.606 (3055.35)	-5846.244 (3019.804)
No. of observations Prob>F R-squared	267 0.000 0.687	267 0.000 0.708	267 0.000 0.708

Note: Robust standard errors are in parenthesis
** Significant at 5% level * Significant at 10% level

[11] Also includes self employment training – i.e. training on how to start your own business.

[12] Marketing assistance includes such help as informing borrowers about new markets for products that are produced i.e. conducting exhibitions of handicrafts and garments for super market buyers of curd and vegetables.

The variables used in the model are dichotomous: whether the head of household is an owner of a micro enterprise when receiving credit and whether markets are available for products by micro enterprises. Results indicate that the difference of income increases between households that owned a micro enterprise when taking credit and those that did not have ownership of an enterprise is statistically significant. When the income of the two groups of households is compared, the difference of income increase between households that own of micro-enterprises and the households that do not is greater than Rs. 1843. Similarly, if markets are available, the possibility of empowerment is greater than in instances of non-availability of market facilities. Households with access to marketing receive approximately Rs. 1327 per month more.

The Relationship between Credit-plus Services and Credit Amount in Determining Empowerment

Two regression models (Model 2 and 3) were estimated to analyse the linkage between credit-plus services and credit amount on empowerment.

Model 2: without CPEMP as an Explanatory but Including some Dummy Variables

Three explanatory variables, namely Cpempsmall, Cpempbig and Cpemp0small, were included into the model. Cpemp0big was omitted. The purpose of this model was to distinguish between the ability of financial empowerment of different amount of credit receivers with credit-plus services. Regression model was estimated with 267 observations.

According to the results (Table 5), the model was statistically significant (prob > F 0.0000 and R squared 0.7083). Results regarding explanatory variables indicate that seven independent variables, Ybefore, Distance, Cpempbig, Timeyrs, Edu, Ownership and Mkts were statistically significant (Mkts at 10% level and other variables at 5% level) in affecting income empowerment. However, Cpempsmall, Cpemp0small, Members, Age, Interestr, and Credit were not significant factors regarding income empowerment of households. Credit-plus services showed a significant impact on households who have taken credit above the average credit amount. The message to policy makers here would be that greater the credit amount with credit-plus services, the higher the income empowerment ability of households.

Testing the Probability of Empowerment between Cpempsmall and Cpempbig Groups

The results indicated that, if cumulative credit with credit-plus services was greater than the average cumulative credit, the probability of empowerment would be significantly higher in that group than in the group having cumulative credit with credit-plus services less than the average cumulative credit. Therefore, if MFIs lend with credit-plus

services, the amount of credit should be larger than the average cumulative credit. If not, these services may not be worthwhile tools for empowerment of the poor. Colombage, et al. (2008) have also confirmed that loans taken by microfinance clients are very small and that by investing such small loans, the clients are not in a position to start an enterprise of substantial size. As a result, they are compelled to continue with their very small cottage industries. Hulme and Mosley (1996) have shown that increases in income of microcredit borrowers are directly proportionate to their initial levels of income – the poorer they are, the lesser the impact of the loan. A vast majority of those who are starting below the poverty line actually end up with less incremental income after getting the micro loan. Nawaz, (2010) showed that credit-plus services such as technical and business skills training could improve productivity of traditional rural economic activities, which generally have low returns, or enable borrowers to start non-traditional enterprises which may produce higher income.

Model 3: Identical to the Model 2, but without the explanatory variable 'credit'

This model was constructed with the purpose of investigating the significant level of explanatory variables without cumulative credit amount. Dependent variable and all independent variables except credit were as same as with model 2. The results of this model also are included in Table 5 (above). When compared with model 2 there is no significant difference in the level of significance of explanatory variables. Again in this model Cpempbig is highly statistically significant in determining income empowerment.

CONCLUSION

The study conducted in the Kandy district of Sri Lanka with two purposely selected MFIs, namely SEEDS and TCCS, suggests through its findings that there is a positive impact on income generation and poverty reduction resulting from microfinance with credit-plus services. Three regression models were applied to investigate the impact of microfinance on income of borrowers. Accordingly, the first model demonstrated that eight explanatory variables, Ybefore, Distance, Cpemp, Timeyrs, Credit, Edu, Mkts, and Ownership are statistically significant. Only three variables, Members, Age and Intrestr were not significant.

Regression results clearly indicate that credit-plus services benefited households in enhancing their income from the micro projects. Households that borrowed with credit-plus services have increased monthly income compared to households that have not received the services. Further, the results of the first model explain that the difference of income increases between the households that owned a micro enterprise when receiving credit and households that do not is significant. When the two groups of households,

namely those that are owners of micro enterprises and those that are not, are compared, the difference of income between the two groups is greater than Rs. 1843. Similarly, if markets are available, the possibility of generation of income is greater than under conditions of non-availability of market facilities for the final product.

According to the results of the two regression models estimated to distinguish between the probabilities for recipients of different amounts of credit with credit-plus services achieving financial empowerment, seven independent variables, Ybefore, Distance, Cpempbig, Timeyrs, Edu, Ownership and Mkts were statistically significant in affecting income empowerment. Cpempsmall, Cpemp0small, Members, Age, Interestr, and Credit were not significant determinants of income empowerment of households. Credit-plus services have a greater positive impact on households that take credit above the average of Rs. 40824.

Therefore, it could be concluded that the greater the credit amount with credit-plus services, the greater the income generation ability of households. If MFIs engage in lending with credit-plus services, the amount of credit should be greater than average. If not, credit-plus services may not be a meaningful tool for empowering the poor and reducing poverty.

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THE RELATIONSHIP BETWEEN THE TRANSITION OF INCOME POVERTY AND ASSET BASE OF A HOUSEHOLD: A MULTINOMIAL LOGISTIC REGRESSION ANALYSIS

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Abstract

This paper examines the relationship between the transition of income poverty and development of asset base of a household using the data from a randomly selected sample of 170 beneficiaries of the Samurdhi (prosperity) Development Programme (SDP) in the Ratnapura District of Sri Lanka during the period from 1995 to 2009. The study was conducted categorising households into "poverty levels" and "poverty groups" in order to examine how and to what extent the development of five capital assets (namely natural, physical, human, financial and social capital ameliorated by the SDP) were related to the dynamic nature of the income poverty level of a household. Multinomial logistic regression analysis was used to understand the relationship between the transition of income poverty and development of asset base of a household. Results confirm that those who were unable to develop natural, physical and human capital assets were more likely to remain in vulnerable poverty for a long period, and the mean probability of a household falling into this category was as high as 0.68. The study concludes that strengthening the asset base of beneficiaries of SDP is pivotal to alleviate their poverty.

Keywords: Transition of income poverty, Asset base, SDP, Multinomial logistic regression, Ratnapura District, Sri Lanka

JEL Codes: C00, C25, I32, I38

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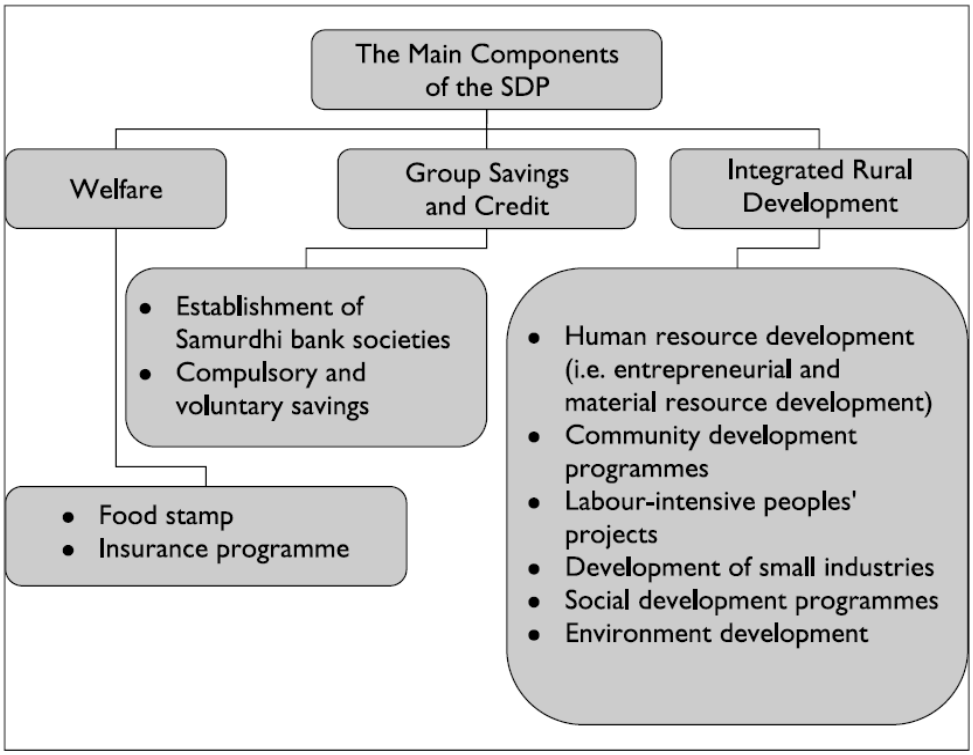
INTRODUCTION

Alleviation of poverty has been a main focus the world over for a long period of time and numerous ways of intervention have been developed and implemented with this objective. The Samurdhi Development Programme (SDP) was one such attempt in Sri Lanka, implemented in 1995 by the People's Alliance Government.

The SDP has both 'protection' and 'promotion' objectives. The programmes implemented with protection objectives mainly focused on assisting the poor in the face of adverse shocks. The other programmes such as group-savings, the credit component and human resource development have focused on long-term poverty reduction goals through empowering and enhancing the asset base of the poor to achieve promotional objectives (Salih 2000). These key objectives work towards the eradication of poverty through ensuring participation of beneficiaries of the SDP in the rural farm and non-farm production processes. Since this is a national programme covering about 1.2 million poor families, the government of Sri Lanka provides the required funds to implement its strategies and activities in view of achieving its key objectives.

Figure 1: Programmes and Main components of the SDP



Source: Salih (2000).

This paper summarises the findings of a study conducted to estimate the relationship between transition of income poverty and development of asset base of a household using data on the Samurdhi Development Programme (SDP) currently in operation. The main components of SDP are summarised in Figure 1.

BACKGROUND AND CONCEPTS

The dimensions of poverty are wide and complex, and the face of poverty and its impacts vary between regions, countries, communities and individuals (Cahn, 2002). Though it seems very difficult to provide an exact definition for poverty, the definition made in Hengsdijk et al., (2005, p 9) that "poverty is the extent to which households or individuals have sufficient resources or abilities to meet their needs" was used for the purposes of this study. The main reasons for the use of this definition were (a) the close relationship existing between stock of assets (i.e. human, physical, natural, social and financial) and an individual's ability to meet his or her needs, and (b) the framework it provides to measure poverty, including its complex web of interconnections between socio-economic, cultural, political and environmental factors.

A number of studies pertaining to rural poverty and relevant to the present exercise could be found in literature, among which those conducted by Deshingkar, et al. (2008), Ellis (2001) and Ellis and Bahiigwa (2001) and Akter, et al., (2008), are worth special reference.

Deshingkar, et al. (2008) investigated the role of livestock in rural livelihoods and its potential to assist people in escaping poverty in the Indian States of Andhra Pradesh (AP) and Madhya Pradesh (MP), using a combination of quantitative and qualitative methods. They used stratified random sampling method to select 720 households from both States. Basic information pertaining to occupation structures, caste, annual income, and asset ownership of sampled households was obtained from a census survey in 2002. In addition to this, they used focus group discussions and participant observation method to collect information on qualitative aspects of the data. The quantitative techniques included 'tabular analysis' and the use of an ordinary least squares (OLS) regression model. The objective of the use of OLS was to identify how livestock, land, education, assets and livelihood diversification would determine household incomes. The livelihood diversification was represented by an index whose value ranged from 1 to 6 livelihood activities. According to the results of their OLS regression, the assets, land, education and diversification were identified as important determinants of household income. The results of the qualitative study confirmed that the households sold their livestock in order to meet expenses on emergencies and agricultural needs. Thus, Deshingkar, et al. (2008, p.22) identified "livestock as an important liquid asset

which could be used to mobilise cash in emergency situations", and found that money-lenders accept livestock as an important assets in providing loans for poor households.

Ellis (2001) and Ellis and Bahiigwa (2001) investigated rural livelihoods, governance and rural poverty reduction in three rural districts in Uganda. Employing both quantitative and qualitative methods, the study found that the lack of land and livestock, as well as the un-sustainability of non-farm alternatives to reduce farm-based activities were the root causes of their rural poverty.

Akter, et al., (2008) investigated poverty dynamics in relation to livelihood pathways and the role of livestock in alleviating poverty in a panel data study (a cross section of 320 households for 2001/02 and 2006/07) in the Indian State of Andhra Pradesh. They defined different poverty levels according to a subjective range of income differences relative to the poverty line of rural Andhra Pradesh. Poverty levels included the extreme poor, vulnerable, viable and sustainable households. The poverty dynamics of those four groups were compared according to a selected set of livelihood pathways (i.e. agriculture, livestock, non-farm, commuting, migration and diversification) for 2001/02 and 2006/07. They employed a multinomial logistic model and found that poverty was proportionately higher among the scheduled tribes (an indigenous people officially regarded as socially disadvantaged) and backward castes and among those who were landless and marginal farmers. Further, the results indicated that there appeared to be a negative association between land ownership and the probability of becoming unsuccessful or struggling.

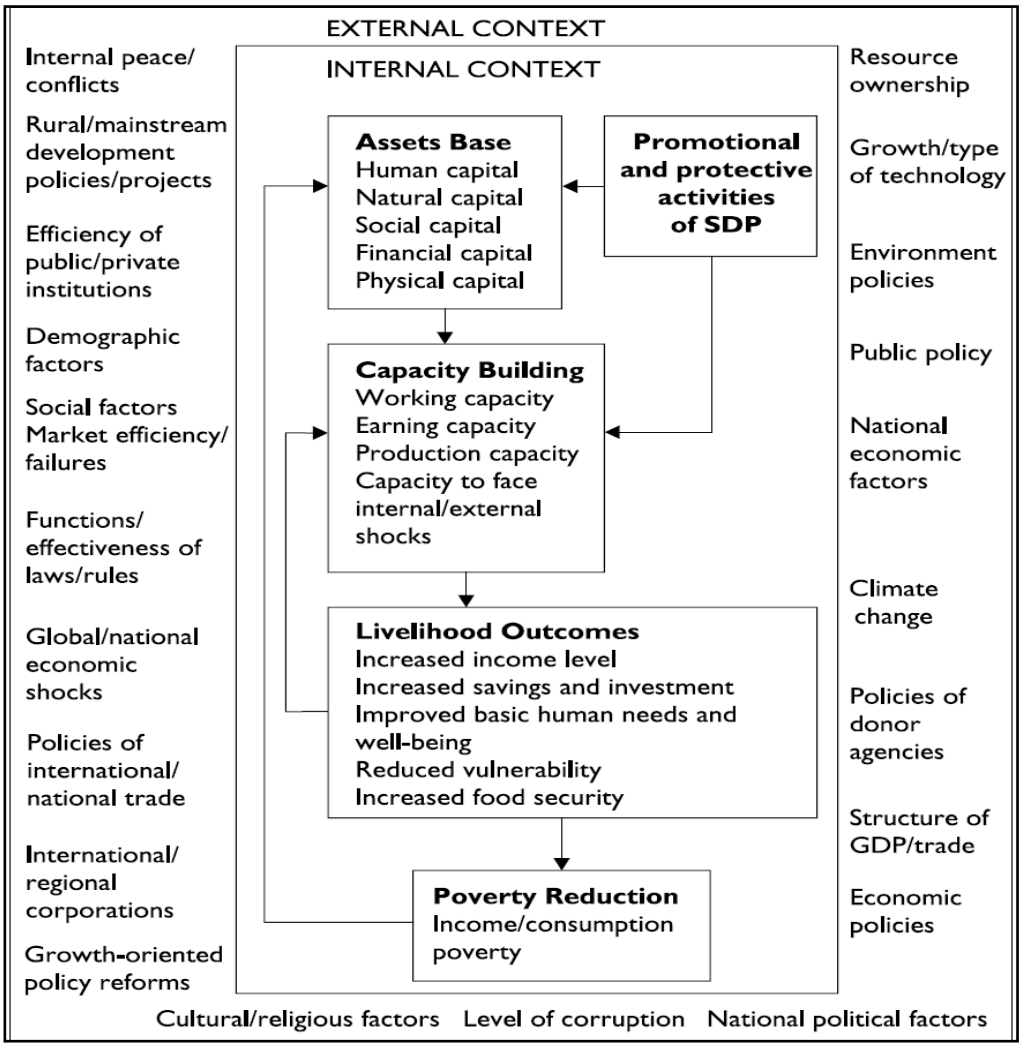
The present study adopted this basic methodology developed by Akter et al.(2008), but with several new techniques added on to it such as (i) the use of dummy variables to identify whether a household was able to develop its asset base or not, and (ii) the assessment of the probabilities of each household falling within each of the four household poverty groups, categorised based on the direction of the transition of income poverty positions.

THEORETICAL FRAMEWORK AND HYPOTHESIS

The theoretical framework used in the study (Figure 2) assumed that the livelihoods of the beneficiaries of the SDP were mainly affected from the on-going activities of the project within the internal context. This carried an implicit assumption that the development of livelihoods of the beneficiaries of the SDP is mainly affected by activities of the SDP, even though there could be various other factors in the external environment directly or indirectly affecting the livelihoods of people. Also, the study hypothesised that promotional and protective activities of the SDP could directly and indirectly affect the livelihoods of its beneficiaries through two channels, namely (a) the "asset base" consisting of human, natural, social, financial and physical capital assets,

and (b) the direct influence the protective activities of the SDP had on the capacity building, and then on the level of poverty.

Figure 2: Links between the external environment, asset base, activities of the SDP, and Poverty



Source: Developed by the author

In this theoretical framework, there exists a cyclical impact between livelihood outcomes and poverty. On the one hand, positive livelihood outcomes could strengthen the capacity of poor people. For example, a continuous increase in the income level of poor people could help educate their children, get more inputs for production, and diversify their sources of income in order to reduce the risk of loss of income. A high

poverty level, on the other hand, could cause deterioration in the asset base of the poor as they tend to overuse the existing assets in order to maintain their lives, bearing a negative impact on capacity building and livelihood outcomes, thus further exacerbating the level of poverty. Breaking this "poverty circle" therefore requires an external influence. As noted earlier, this could be achieved through the promotional and protective activities of the SDP, which directly or indirectly intervenes in improving the asset base of households and their capacity building, respectively.

The hypothesis derived from the foregoing theoretical framework was based on two assumptions. First, livelihoods of the beneficiaries of the SDP were purely determined within the internal context of the theoretical framework. Hence, it was assumed that the impact of the external context on the livelihoods of the beneficiaries would be negligible. Second, only one direction of the bi-directional transmission impact cycle (or two-way causation) in the theoretical framework, namely the impact of the development of capital assets on the level of poverty of households of the SDP and not the reverse flow, was subject to analysis in this study.

Among the activities mainly focusing on eradicating poverty in beneficiary populations of the SDP, those which increase the asset base could actually reduce the poverty level of households. This implies that an increase in the asset base of a beneficiary household during the period 1995–2009 should lead to a reduction in the level of poverty (income) of that household. Thus, the hypothesis tested in this study was that the SDP has been successful in its poverty alleviation process through the development of the asset base of its beneficiaries during the period from 1995 to 2009.

METHODOLOGY

The study focused on the Ratnapura District of Sri Lanka, and considered the period from 1995 to 2009. Though the initial plan was to obtain baseline data on randomly selected beneficiaries of the SDP from the Chief Secretary's Office in the Ratnapura (CSOR) district, the so called 'memory recall' method used in the social science research, as discussed by Phillimore and Goodson (2004), was deployed in this analysis to obtain the baseline information as such data had not been maintained by the CSOR. In this methodology, the respondents themselves were requested to recall from their memories about their past living conditions (that is, about housing status, income, livelihood assets, etc.) when they were admitted to the SDP in 1995. The fallibility of human memory and the resultant possibility of the error of recall with respect to the history the respondents are needed to remember, one of the main criticisms against this method, was addressed in this study by structuring the questionnaire in a specific rather than in a general way in order to prompt accurate memories, and concentrated questions

only on self-evaluation, meaning the history of a household's living conditions (Phillimore and Goodson 2004: 249).[1]

The issues considered in the study (that is, development of social or human capital) were qualitative in nature. Therefore, most of the data obtained were non-measurable (that is, skills and talents developed, development of social networks, improving confidence, etc) rather than measurable. Since the application of quantitative methods requires numeric data, the current study used a set of subjective-based criteria to convert non-measurable data into measurable data.

The sample and data

The study employed a random sampling method to collect data from a cross section of 170 households living in all 17 Divisional Secretariats (DS) divisions in the Ratnapura district, Sri Lanka. The main criterion in selecting the households was that they had to have been beneficiaries of the SDP since 1995. The use of random sampling implied that each beneficiary of the SDP would have an equal probability of being selected in the sample. The standard method of random sampling technique was difficult to apply in the current study as the distribution of the sample units was very large. Thus, a list of all DS divisions in the Ratnapura district was obtained in the first place, and one village from each such DS Division was randomly selected for the survey. Ten beneficiaries were thereafter randomly selected from a list of names of beneficiaries of the SDP in each village.

Accordingly, data were collected from 170 beneficiaries from 17 such villages in the Ratnapura district.

[1]Phillimore and Goodson (2004: 249) indicate that the memory recall method can be used to collect both quantitative and qualitative data of a household's past behaviour. The memory recall method (or life story method) is used as a research tool in the social sciences due to its 'strengths and qualities' (Phillimore and Goodson 2004: 240). Phillimore and Goodson (2004: 240) further highlight that 'by exploring the past, life story analysis provides valuable information about the present'. However, memory recall method has some criticisms such as 'the bias, the credibility of the data and the doubts of scientific validity' (Phillimore and Goodson 2004: 243). One of the main criticisms is the methodology applied in the collection of data as human memory is fallible. The error of recall can be larger depending on the history the respondent is needed to remember (Phillimore and Goodson 2004: 243). However, in order to reduce the possible errors of the memory recall method, we used the following strategies. We structured questions in the questionnaire in a specific rather than in a general way in order to prompt accurate memories and concentrated questions only on the history of a household's living conditions (self-evaluation) (Phillimore and Goodson 2004: 249).

THE MODEL

Dependent variable

Following the method used by Akter et al (2008: p 3), the beneficiaries of the SDP were categorised into extreme poor, vulnerable, viable and sustainable households for both 1995 and 2009. This was done based on a "subjective range of income difference relative to poverty line" of the Ratnapura district. Akter et al (2008: p 3) justified their method by indicating that, "conceptually, the extremely poor are likely to stay poor in the longer term, vulnerable households are likely to move ups and downs around the poverty line, viable households are likely to stay non-poor, sustainable households may never be vulnerable and non-poor".

The Department of Census and Statistics of Government of Sri Lanka (2004) defined the official poverty line as the per-capita expenditure of a person able to meet the minimum living standards, reflecting the ability of a person to buy a consumption bundle including both food and non-food items which would satisfy both minimum nutritional requirements (nutritional anchor of 2030 kilocalories) and other basic needs.

Therefore, using poverty line data for the Ratnapura district for 1995 and 2009, it was possible to categorise the respondent households into the following four groups:

Category 01: Extreme poor = those who have per capita monthly income (PCMI) half or less than half the official poverty line

Category 02: Vulnerable households = those who have PCMI above the PCMI level of extreme poor up to double the official poverty line

Category 03: Viable households = those who have PCMI above the PCMI level of vulnerable households up to triple the official poverty line

Category 04: Sustainable households = those who have PCMI above the PCMI level of viable households

Table 1: Categorisation of income poverty groups for 1995 and 2009

Household Category	Official poverty line for Ratnapura district in 1995 = 833 LKR	Official poverty line for Ratnapura district in 2009 = 2907 LKR
	Formula	Formula
Extreme poor	PCMI $\leq$ 416 LKR	PCMI $\leq$ 1453 LKR
Vulnerable	416 LKR $\leq$ PCMI $\leq$ 1666 LKR	1453 LKR $\leq$ PCMI $\leq$ 5814 LKR
Viable	1666 LKR $\leq$ PCMI $\leq$ 2499 LKR	5814 LKR $\leq$ PCMI $\leq$ 8720 LKR
Sustainable	PCMI $\geq$ 2499 LKR	PCMI $\geq$ 8720 LKR

Source: Department of Census and Statistics of Sri Lanka (2004)

Table 1 shows how these four groups were categorised based on the two official poverty lines for 1995 and 2009. Average official poverty line for 1995 was 833 Sri Lankan rupees (LKR) per month while it was 2907 LKR per month in 2009.

Upon calculations obtained for Table 1, the beneficiaries of the SDP were again categorised into unsuccessful, struggling, successful and most successful groups (Table 2) based on the direction of the transition ("economic mobility") of poverty groups from 1995 to 2009 between extreme poverty, vulnerability, viability and .

Table 2: Categorisation of households groups based on the direction of the transition between income poverty categories, 1995-2009, Ratnapura district, Sri Lanka

Households Group	Direction of the transition
Unsuccessful	**From** viable/sustainable **To** Vulnerable **From** vulnerable/viable **To** extreme poor **Or, remained** in extreme poverty
Struggling	**Remained** in vulnerable
Successful	**From** extreme poverty **To** vulnerable/viable **Or, from** vulnerable **To** viable
Most successful	**From** extreme/vulnerable/viable **To** sustainable **Or, remained** in viable/sustainable

Source: Akter, et al., (2008: p 4)

The objective of such categorisation was to capture the 'dynamic form' of the poverty level and to examine how and to what extent these poverty positions were related to the development of the five capital assets, where the dynamic form of the poverty level reflected how living conditions of households changed from 1995 to 2009.

Independent variables

As the data obtained for the development of capital assets (financial, natural, physical, human and social capital) of households were qualitative, we used dummy (categorical) variables to capture the development of each capital asset, subject to criterion that had to be fulfilled by each household in order to identify that household as being able to develop its respective capital assets. The following section explains how each of the five dummy variables was operationalised.

The dummy variable to capture the development of natural capital:

D_{NC} = 1 (*Those who had been able to develop natural capital assets*)
0 (*Those who had not been able to develop natural capital assets*)

Criterion (subjective judgments)**:**

The following criteria, or a combination of criteria, were to be satisfied by a beneficiary of the SDP in order to fall into $D_{NC} = 1$: **A or B or C or D or** any other combinations including **A B C D**.

A: "The SDP helped me to purchase a land for farming activities (i.e. tea cultivation)/ business activities (i.e. opening a retail shop)"

B: "The SDP helped me to acquire new livestock (i.e. poultry farming, purchasing a cow for drinking milk/selling milk/making dairy products etc) or to expand the existing livestock in numbers and/or in quality"

C: "The SDP helped me to continue/expand the activities on existing land (i.e. tea cultivation, vegetable and fruits cultivation etc)"

D: "The SDP assured me the security of and the sustainable use of water sources for both survival and livelihood needs"

Accordingly, the same method with appropriate criteria was applied to develop four dummy variables for physical, human, financial and social capital assets (Gunasinghe 2010, p 262-265). The dummy variable for the development of financial capital was excluded from the model due to high correlation between this variable and the dummy variable used to capture the development of physical capital.

The meaning of the development of capital assets is explained below (Gunasinghe 2009: p 20-35):

The development of natural capital:

The development of natural capital assets of a household means an increase of that household's earning capacity due to (i) a household having land (purchased, hired or its own land) where there is at least one kind of cultivation (i.e. tea) done with the assistance of a loan from the SDP or from the free services rendered under the SDP (ii) a household having a livestock farm (i.e. cows, goats, pigs, poultry etc) with the help of the SDP to improve earning capacity, (iii) a household being assured of the sustainability of water sources for survival needs and for the sustainability of water based livelihood activities.

The development of physical capital:

The development of physical capital assets of a household means the increase of that household's earning capacity by developing the infrastructure (rural road network, telephone facility and electricity) of a village; a household can benefit by reducing production costs and improving the efficiency of productions, i.e. a household can reduce the cost associated with daily travels to the nearest city, transportation of crops (i.e. tea) and products (i.e. prepared vegetable) and transportation of inputs needed for such production. This then would help that household to save some money that could be used to develop its existing livelihood activity to generate income or could be used for new livelihood activities. If the SDP were helpful in the development of infrastructure of a village by rendering free services or deploying indigenous knowledge, it could have direct and indirect positive impacts on the increase in income capacity of households. Furthermore, a household could build up earning capacity through acquisition of moveable and immoveable physical capital assets through loan facilities provided by the SDP. Examples for movable capital assets could be the acquisition of sewing machines, equipment to prepare spices, a refrigerator to make ice packets or preserve prepared vegetables etc. An example for an immovable capital asset would be an acquisition of a building (temporary/permanent) to open a retail shop or clothes shop.

The development of human capital:

The development of human capital assets of a household means an increase of that household's earning capacity by maintaining working capacity through reducing hunger from the welfare component of the SDP; by developing talents and skills on how to run (or initiate) a business (livelihood activity) effectively through training programmes of the SDP; by improving 'confidence' in working hard in the current livelihood activity; or by reducing financial burdens through supporting the education of children in a household.

The development of financial capital:

The development of financial capital of a household means the increase of its earning capacity due to the SDP motivating a household to change from a culture of consumption to one of saving where there would be more opportunities to initiate new livelihood activities or to expand the existing livelihood activity through increased access for loans and higher financial discipline. Even if a household does not have a good saving culture, it could obtain a loan from the SDP to initiate a livelihood activity or expand (or diversify) the existing activity in order to earn a stable monthly income. By maintaining a good repayment capacity, a household could have the chance to access higher loans to develop the livelihood activity further and avoid financial shocks that disturb its earning capacity.

The development of social capital:

The development of social capital in a household means an increase of earning capacity due to being able to secure benefits through social networks by receiving prompt assistance in face of adverse shocks and by sharing expertise in the formation of other capital assets. Such social networks could help a household to build up its capacity to participate in economically rewarding activities and maintain its well-being in the face of socio-economic shocks. Furthermore, having a developed social network could help build infrastructure of the village with higher tendency for rendering free services and that in turn would help a household with its living conditions. The reduction of the gap between the community and the local government authority could also help motivate a household to function well in the livelihood activity it engages in. This could happen, on one hand, due to the continuous supervision by the government officials at the village (as village households have much respect for government officials, they would not like to report negative results of the progress of the livelihood activity and therefore would try their best to have positive outcomes), and on the other, due to increased ability to have access to correct information at the right time.

Multinomial Logistic Regression

To estimate the models, the current study employed the Multinomial Logistic Regression (MNLR), which is an extension to the binomial logistic regression when the dependent variable has more than two (unordered) categories (Asgary et el 2007: Chan 2005: Cramer 2003: p 113). Unlike the binomial logistic regression, MNLR uses one category of the dependent variable as the reference category in order to simultaneously estimate binomial logistic regressions for each outcome category in the dependent variable. In MNLR, independent variables could take numerical, categorical or both forms. If the dependent variable of a model has ***m*** outcome categories, ***m-1*** MNL regressions are estimated for each outcome category in the dependent variable using one outcome category (or a level) as the reference category (Asgary at el :2007, Chan : 2005, Cramer : 2003 p 113).

Assuming that the log odds of each outcome category in the model were linearly related to its independent variables, a multinomial logistic regression with logit link could be expressed as follows:

$$Log\left(\frac{P(Y_i = m)}{P(Y_i = 4)}\right) = f(D_{NC_i}, D_{PC_i}, D_{HC_i}, D_{SC_i}, Edu_i, Age_i, Ndepend_i, D_{Gender_i}, \varepsilon_i) \quad (1)$$

The equation (1) above shows the log of the ratio of the probability for the ***ith*** household being in the outcome category ***(Yi = m)*** over the probability of being in the reference category ***(Yi = 4).*** The equation (1) is a function of capital assets developed by the

relevant household, education level of chief of the relevant household, age level, number of dependents in the household, gender and an error term. The error term (ε_i) reflects unexplained variations of each outcome category of the dependent variable. As noted earlier, three (4-1)multinomial equations would be estimated with the same independent variables, one for each category relative to the reference category. This means that a MNLR would not be estimated for the reference category. Parameters (β) in equation 1 would be estimated using the maximum likelihood estimation method. The other method of explaining the effect of independent variables on the probability for the ***ith*** household being in the outcome category ***m*** compared to the reference category would be to use predicted probabilities (Gunasinghe 2009: p 35).

The second equation would be constructed only for the significant variables identified in the first equation.

$$Log\left(\frac{P(Y_i = m)}{P(Y_i = 4)}\right) = f(D_{NC_i}, D_{PC_i}, D_{HC_i}, Edu_i, \varepsilon_i) \quad (2)$$

Therefore, the dependent variable of the above two equations has four categories.

Category 01: Unsuccessful households, Category 02: Struggling households

Category 03: Successful households, Category 04: Most successful households

Reference category: Most successful households (Category 04)

Independent variables of the model:

D_i = 1 (*Those who had been able to develop the respective capital asset*)

0 (*Those who had not been able to develop the respective capital asset*)

where i= NC (natural capital), i= PC (physical capital),

i= HC (human capital), and i= SC (Social capital).

Edu = Years of education (this variable was not included in HC as it would not be affected by the promotional or protective activities of the SDP)

Age = Age level

Ndepend = number of dependents in the family

D_{gender} = 0 Female household head

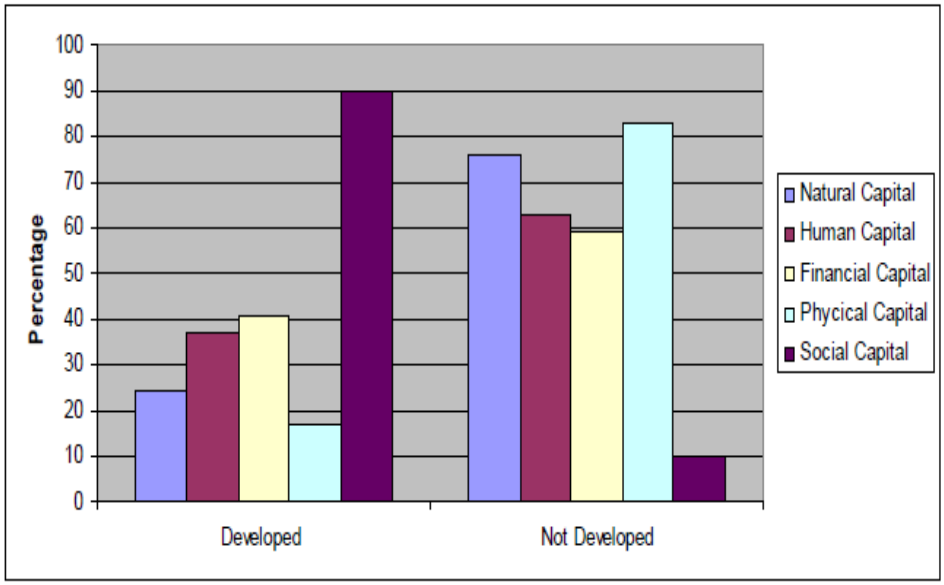
1 Male household head

ε_i = *Error term*

RESULTS AND ANALYSIS

Figure 3 shows the percentage of beneficiaries who were able to develop their capital assets during the period 1995 to 2009. Around 90 percent of households in the sample have been able to develop social capital while around 24 percent, 37 percent and 41 percent of households have been able to develop natural, human and financial capital assets respectively. 17 percent were able to develop physical capital.

Figure 3: Development of asset base of beneficiaries of the SDP as at 2009



Source: Field survey on the beneficiaries of the SDP in the Ratnapura district, Sri Lanka (09.02.2009 -20.03.2009)

With the exception of the social capital component, around 30 percent of households in the sample were able to develop their capital assets during the period of study. On the other hand, it also would mean that approximately 70 percent of households within the sample were unable to accumulate natural, human, financial and physical capital assets, implying that the SDP has failed to implement appropriate programmes directed towards the development of natural, human, financial and physical capital assets over the period from 1995 to 2009.

As per the categorisation of households into four groups as discussed before and summarised in the Table 3, 68 percent of households were still struggling to get out of poverty while 8 percent of households have been 'unsuccessful' in their attempts to achieve higher living standards. However, around 20 percent and 4 percent of households have been 'most successful' and 'successful' respectively, in their poverty alleviation attempts. As the sum of the percentages of successful (4) and most

successful households (24) exceeds the percentage of unsuccessful households (8) in the study, there is a possibility of claiming that the SDP has managed to achieve positive progress in its poverty alleviation efforts over the 14 year period from 1995 to 2009. However, the large percentage of households (68) still 'struggling' to become 'successful' or 'most successful' would make it difficult to confidently argue that, on the whole, the SDP has been successful in implementing its strategies/policies to alleviate poverty in the Ratnapura district during its implementation period.

Table 3: Household groups by direction of movements of poverty status (1995-2009)

Households Group	Direction of the Transition	Households in 2009	
		Number	Percentage
Unsuccessful	**From** viable/sustainable **to** vulnerable **or** **from** vulnerable/viable **to** extreme poor **or** remained in extreme poverty	14	8
Struggling	Remained in vulnerable	116	68
Successful	**From** extreme poverty **to** vulnerable/viable **or** **from** vulnerable **to** viable	6	4
Most successful	**From** extreme/vulnerable/viable **to** sustainable **or** remained in viable/sustainable	34	24
	Total	170	100

Source: Field survey on the beneficiaries of the SDP in the Ratnapura District, Sri Lanka (09.02.2009-20.03.2009).

It is also important to discuss how the transition of poverty status appears to differ according to the type of employment of households. Table 4 provides data on the relationship between the type of employment and poverty transition. Accordingly, 93 households out of 116 vulnerable households were labourers, while others were employed as tea farmers, sellers, etc. As revealed from the survey, the main reasons for those households being in vulnerable poverty could be (i) their not having land other than that available for their housing for cultivation purposes; (ii) being heavily dependent on one livelihood option; and (iii) the poor productivity of existing livelihood activities as households do not aim at getting out of the SDP.

Table 4: The type of employment and the transition of poverty

Type of employment	Transition of poverty[a]										Total
	1	2	3	4	5	6	7	8	9	10	
Conducting a beauty salon	0	1	0	0	0	0	0	0	0	0	1
Broom making	0	1	0	0	0	0	0	0	0	0	1
Businessmen	0	1	0	0	0	0	0	0	0	0	1
Carpenter	0	0	0	1	0	1	0	1	0	0	3
Electrician	0	0	0	0	0	0	0	1	0	0	1
Selling embellishments	0	0	0	0	1	0	0	0	0	0	1
Making flower pots	0	1	0	0	0	0	0	0	0	0	1
Hair cutting	0	1	0	0	0	0	0	0	0	0	1
Iron works	0	0	0	0	0	0	0	1	0	0	1
Iron moulding	0	0	0	0	0	0	0	0	0	1	1
Jiggery selling	0	0	0	0	0	0	1	0	0	0	1
Labour	0	93	1	0	1	1	0	0	1	1	98
Masonry	0	1	0	0	0	0	0	0	0	0	1
Owner of a poultry farm	0	1	0	0	0	0	0	0	0	0	1
Selling prepared vegetables	0	0	0	0	0	0	0	1	0	0	1
Owner of a retail shop	0	1	0	0	0	0	1	0	0	0	2
Sawyer	0	0	0	0	0	0	1	0	0	0	1
Spices making and selling	0	1	0	0	1	0	0	0	0	0	2
Selling string hopers	0	0	0	0	0	0	0	1	0	0	1
Sweets making and selling	0	1	2	0	0	0	0	0	0	0	3
Tailoring	0	0	0	0	0	0	0	0	0	1	1
Tea farming	0	8	1	2	2	6	0	8	0	0	27
Owner of a tea shop	0	1	0	0	0	0	0	0	0	0	1
Owner of a textile shop	0	1	0	5	0	0	0	0	0	0	6
Vegetable farming	0	1	2	0	0	0	0	0	0	1	4
Vegetable selling	0	2	0	0	1	0	0	0	0	0	3
Not a job	1	0	0	0	1	1	0	1	0	1	5
Total	1	116	6	8	7	9	3	14	1	5	170

Source: Field survey on the beneficiaries of the SDP in the Ratnapura District, Sri Lanka (09.02.2009-20.03.2009).

a. 1 from vulnerable to extreme poverty: 2 remains in vulnerable poverty:
3 from vulnerable to viable: 4 from vulnerable to sustainable:
5 from viable to vulnerable: 6 remains in viable:
7 from viable to sustainable: 8 remains in sustainable:
9 from sustainable to vulnerable, 10 from sustainable to viable

Table 4 indicates that there were 14 households who continued to remain in sustainable poverty. Out of these, 8 households were tea farmers while others were employed as carpenters, electrician, and salesmen, etc. The reason for eight tea farmers being in vulnerable poverty and another eight tea farmers being in sustainable category could be differences in average land holding (ALH) among these two groups, with the ALH for tea cultivation of the latter group being higher (1.36 acres) than the former (0.42 acres).

The other very interesting point revealed in the survey was that those households who have had a supplementary livelihood activity (i.e. tea cultivation) other than their main employment (i.e. selling vegetable), were in the "sustainable" category, likely because their capacity to earn an additional income was high compared to those who had one activity. ALH of those who had additional livelihood activities was around 0.37 in acres, which is a considerable value compared to those who held one livelihood activity (of whom ALH was around 0.20in acres) (Gunasinghe 2009: p 51).

Table 5 given below shows the results of the second equation of the model. This equation was estimated using only the significant variables identified in the first equation. The main objective of estimating this equation was to examine the different probabilities of a household falling into each of the four household poverty groups according to their capital developments. Though the predictive power of this equation has declined somewhat from 52% to 46% (based on the Pseudo R-squared), it is clear that the significance of those variables for the 'struggling' position has improved with the exclusion of the non-significant variables from the first equation.

The results in Table 5 also indicate that only the coefficient attached to the development of human capital in the regression for 'unsuccessful' household group is statistically significant. The odds ratio for those who were unable to develop human capital is 5.46. This implies that the probability of falling into the unsuccessful poverty position is five times the probability of being most successful in improving their poverty position in those households who have been unable to develop human capital asset compared to those who managed to do it. On the other hand, the odds ratio for those who had developed human capital is 0.18, meaning that the probability of being unsuccessful is one sixth the probability of being successful in moving out of poverty for those households who had developed human capital assets. Once again this indicates the importance of developing human capital in eradicating poverty. However, the coefficients attached to other capital assets in the regression for the 'unsuccessful' household group bear theoretically expected signs although they appear to not be statistically significant at any levels.

Moreover, the results in Table 5 indicate that the parameter estimates pertaining to the development of natural, physical and human capital assets are strongly significant in explaining variations in the 'struggling' poverty position. All significant coefficients

attached to capital assets for the regression of the 'struggling' group bear theoretically expected signs. However, the coefficients attached to natural capital, physical capital and social capital in the regression for 'successful' poverty position appear neither to be significant, nor to bear the expected signs.

Table 5: Parameters estimated for the second equation.

Poverty Status(a)	Explanatory variable	Estimates $(\hat{\beta}_{mk})$	Significance of estimates (Prob. value)	Odds ratio $\text{Exp}(\hat{\beta}_{mk})$
Unsuccessful	Intercept	-3.726	.057	
	[DNC=.00] [DNC=1.00]	1.291	0.122	3.635
	[DPC=.00] [DPC=1.00]	0.642	0.467	1.900
	[DHC=.00] [DHC=1.00]	**1.697**	**0.065**	**5.459**
	Edu	0.153	0.374	1.165
Struggling	*Intercept*	-0.833	0.494	
	[D_{NC}=.00] [D_{NC}=1.00]	**1.928**	**0.004**	**6.876**
	[D_{PC}=.00] [D_{PC}=1.00]	**1.668**	**0.024**	**5.302**
	[D_{HC}=.00] [D_{HC}=1.00]	**2.631**	**0.000**	**13.892**
	Edu	**-0.213**	**0.047**	**0.808**
Successful	Intercept	0.653	0.711	
	[D_{NC}=.00] [D_{NC}=1.00]	-1.661	0.200	0.190
	[D_{PC}=.00] [D_{PC}=1.00]	-0.475	0.653	0.622
	[D_{HC}=.00] [D_{HC}=1.00]	1.176	0.376	3.240
	Edu	-0.223	0.200	0.800

a The reference category is " Most successful". Average Pseudo R-Square is 0.46

The odds ratio attached to the development of natural capital for the 'struggling' poverty group is 6.87, meaning that the probability of falling in the struggling poverty position is more than six times larger than the probability of being in the 'most successful' poverty position for a household which could not develop its natural capital

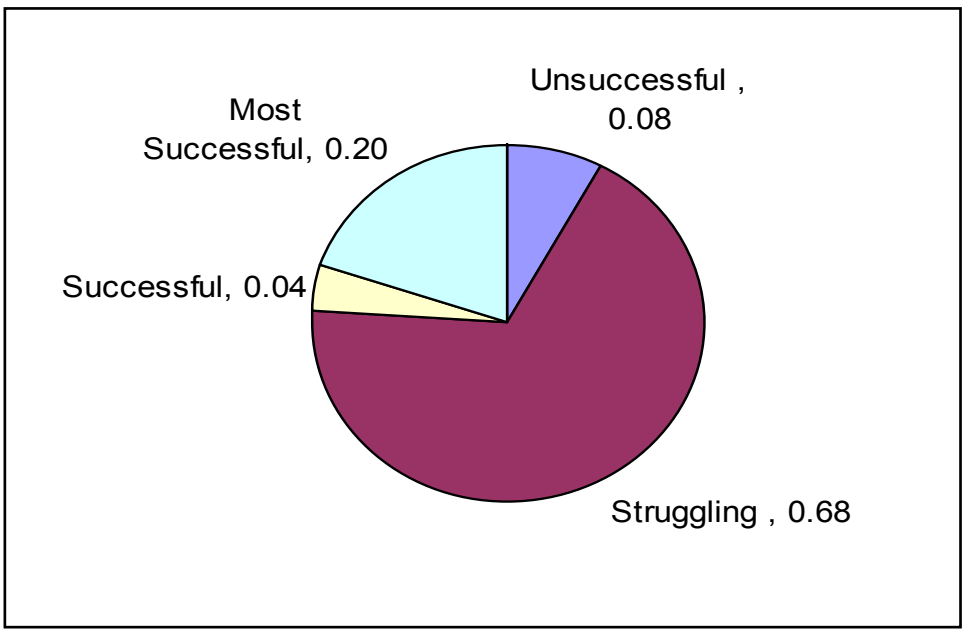
asset compared to one which did. The odds ratio attached to the development of human capital is 13.89, meaning that the probability of falling in the 'struggling' poverty position is thirteen times larger than the probability of being in the 'most successful' poverty position for a household failing to develop its human capital asset. This, once again, confirms that the development of human capital in the form of building confidence of households is important in the SDP's poverty reduction process.

However, this also shows how the human capital asset factor would have made households stay in the 'struggling poverty position' and in the 'unsuccessful poverty position'. The acquired human development appears insufficient for households to move out of poverty (i.e. to become at least successful households).

This interpretation holds valid for households who developed natural and physical capital assets as well. The estimator attached to the development of social capital (Table 5) is insignificant in the three poverty positions concerned.

The coefficient attached to the level of education for the 'struggling' poverty group is significant, meaning that a household having an additional year of schooling would have a lesser probability of being in this poverty category than being in the most successful poverty group.

Figure 4: The mean probability of households falling into certain poverty positions

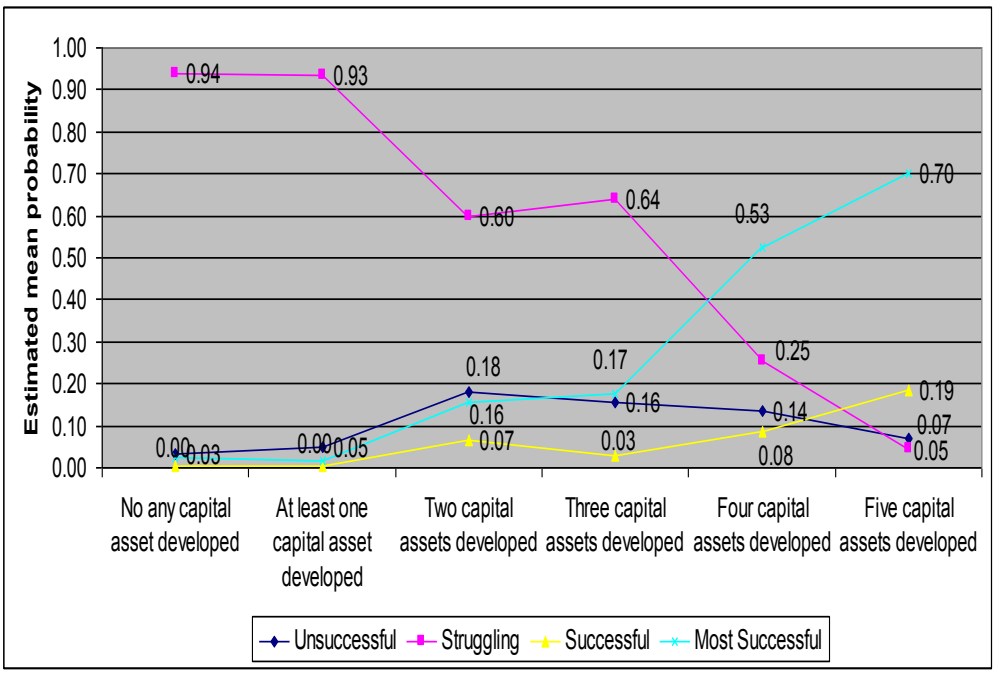


Source: Author's calculations based on the 'estimated response probabilities' of the second MNLR equation

The Figure 4 shows the mean probability of each household falling into one of the four poverty household groups, where it is clear that the probability of a household falling into the 'struggling' poverty position is very high (0.68). Furthermore, the mean probability of a household falling into the successful or most successful poverty positions is 0.04 and 0.20 respectively. This means that there is a chance that 68 out of each 100 households fall in to the "struggling" position.

Figure 5 depicts the relationship between the developments of a household's capital assets and the mean probability of falling into a poverty group. Accordingly, the more the households' ability to develop additional capital assets, lesser the probability of those households regressing in terms of achieving higher living conditions. On the other hand, the households who developed more than three capital assets have reported a speedy positive progress to become most successful households.

Figure 5: The relationship between the development of capital assets and the mean probability of a household falling into a poverty household group



Source: Author's calculations based on the 'estimated response probabilities' of the second MNLR equation

CONCLUDING REMARKS AND LIMITATIONS OF THE STUDY

Having appraised the impact of the Samurdhi Development Programme on poverty alleviation by estimating the relationship between the transition of income poverty and development of asset base of households using the data obtained from a randomly selected sample of 170 beneficiaries of the Samurdhi development programme in the Ratnapura District of Sri Lanka, the study produced evidence to confirm that the development of natural, physical and human capital assets have significantly influenced the poverty standing of beneficiaries. Those who were unable to develop these capital assets were more likely to fall into 'struggling poverty position' (being in vulnerable poverty for a long period). The mean probability of falling into this category being 0.68, it is evidenced that the probability of any household in the SDP in Ratnapura district remaining in vulnerable poverty for a long time is very high.

Also, the study found that around 28 percent of households who had developed up to four capital assets through the SDP are likely to be 'most successful', and nearly three-fourths fail to get into that category. Further, approximately two-thirds of the households who had developed up to three capital assets or less through the SDP were at high risk (over 0.64 probability) to 'stay in vulnerable poverty' (struggling position) over a long period, while only few could be expected to become 'successful' (3%) or 'most successful' (17%).

Based on these findings, it could be concluded that the SDP has not been effective wherever it has developed four capital assets or below in the beneficiary households. However, as the percentage of households below this level of achievement appear nearly three times more than the percentage of households above it, the study prompts to recommend that the SDP should reassess and reformulate its policies and strategies to further strengthen the asset base of its beneficiaries in order to effectively alleviate poverty.

However, the study is not without its constraints and limitations. The sample size of the study was small (170 households in the quantitative study and 17 respondents in the qualitative study) compared to the beneficiary population of the SDP in the Ratnapura district, and therefore the accuracy of findings could be limited vis-à-vis their generalisation. The study assumed that the external environment did not affect the poverty level of households and that their poverty levels were purely determined within the internal context of the theoretical framework. This is an oversimplification of the poverty dynamics of a household which could well be influenced by various external factors such as inflation, economic growth, droughts, etc. Furthermore, the study took into consideration only one direction of the bi-directional causation between poverty and livelihood developments. The study built five dummy (categorical) variables to capture the development of natural, physical, human, financial and social capital assets.

As most of the data obtained were qualitative, a set of criterions had to be introduced for each capital asset in order to convert the qualitative information into measurable data, which also could not fully and perfectly capture real development of these assets of households. In the structured interview, households were asked about their income levels in 1995 and 2009. The responses could not be depended upon as sources of accurate data regarding their income levels as they would fear exclusion from the SDP. However, notwithstanding these limitations, the present study constitutes an important step in future research aimed at investigating poverty alleviation strategies in Sri Lanka.

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STATUS WITH CONSPICUOUS GOODS: THE ROLE OF MODERN HOUSING

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Abstract

People care about their standing in society and what others think about them. One of the foremost reasons for this is the status consideration. Today, most people invest in luxury housing, which are noticeable to the public for the purpose of demonstrating their status. Yet, nearly all applied work in consumer demand assumes the absence of conspicuous consumption. In the light of this, the purpose of this study was to explore various aspects related to the phenomenon of conspicuous consumption and to examine how people use their houses to exhibit their status to the public. This paper reports the outcomes of an exploratory baseline study conducted on 120 modern house owners (MHOs) within the Kurunegala Municipal Council Limits, to examine the use of modern houses to demonstrate the status of their owners. A series of discussions with MHOs, personal interviews with renowned architects and extensive site visits were undertaken to gather first-hand information on the significance of housing in projecting social status. The data gathered were analysed using SPSS (Version 17), along with other exploratory data analysis methods. The results highlighted that the behaviour of MHOs was highly influenced by their social status. Not surprisingly, the findings confirmed that a consumer would perceive both the utilitarian function ($\beta=0.654$, $p<0.001$) and the expressive or status function ($\beta=0.831$, $p<0.001$) of modern housing. The results also produced evidence to suggest that females were more likely than males to purchase or construct status-congruent houses and that higher investment on such houses were generally associated with higher incomes.

***Key Words**: Consumer behaviour, Housing industry, Luxury goods, Status consumption*

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INTRODUCTION

The term 'conspicuousness,' is generally referred as the social and public visibility surrounding the consumption of a certain product or service. Conspicuousness, therefore, relates to consumer behaviour of seeking to purchase goods and services for the status such consumption may confer, regardless of that consumer's objective income or social class (Eastman *et al.*, 1999). When merging the notions of "status" or "conspicuousness" and "consumption" together, consumers often think of expensive brands, conspicuous luxury and spectacular extravagance. Accordingly, scholars recognise conspicuous consumption as "*obtaining luxury goods at higher prices to demonstrate their wealth*". A very similar but more colloquial term is "*keeping up with the Joneses*". Bagwell and Douglas (1996) said: *"…these goods, though not intrinsically superior, are sold at higher prices to consumers seeking to advertise wealth" (p. 349).* Therefore, purchasing expensive and socially visible goods and services is simply labelled '*Conspicuous Consumption*'.

There is much discussion in literature as to which type of goods could be identified as 'conspicuous goods'. Present-day scholars often quote new, large, ostentatious houses as conspicuous products which signal qualities of consumption (Frank, 1999; Jessie and John, 2002; Lloyd, 2005). Lloyd (2005) said that "in the U.S., a trend in 1950s towards large houses began, with the average size of a home about doubling over a period of 50 years….this trend is a symbol of conspicuous consumption". According to Frank (1999), one's evaluation of the 'adequacy' of one's own living space involves comparing it with 'mental images' of the living spaces of others.

Although the role of modern houses in exhibiting the status of their owner has been studied by a number of scholars elsewhere in the world, such studies on conspicuous motivations of modern house owners (MHOs) in Sri Lanka are relatively scarce. Nevertheless, post-modern developments, fuelled by increasing purchasing power and expanding social interactions, appear significant in promoting conspicuous consumption tendencies in developing countries including Sri Lanka.

In light of this, the purpose of this study was to examine how MHOs exhibit their status by living in modern, large, and ostentatious houses. It was also intended to examine other relevant aspects pertaining to conspicuous consumption among the MHOs in the Kurunegala district of Sri Lanka.

BEHAVIOURAL ASPECTS OF CONSPICUOUS CONSUMPTION

The American economist and sociologist Thorstein Veblen (1899) was the first to discuss the concept of 'conspicuous consumption'. He used the term 'conspicuous consumption' to depict the behavioural characteristics of the new class that emerged in

the 19th century capitalist society as a result of accumulation of wealth. According to him, this generation used their enormous wealth to manifest their social power. Therefore, he defined conspicuous consumption as lavish spending on goods and services acquired mainly for the purpose of displaying income or wealth, which behaviour is labelled as "Veblen Effect". As Veblen argued, *"in order to gain and hold the esteem of men, it is not sufficient merely to possess wealth or power. The wealth or power must be put in evidence, for esteem is only rewarded on evidence (p.3)."*He suggested that one possible way to provide evidence of wealth was through conspicuous consumption (the other, according to him, being through extensive leisure activities), implying that conspicuous consumption was a form of socio-economic behaviour in which self-presentational concerns override desires to obtain showy goods at bargain prices. Showy spending may be a social signal directed at other members of the society.

Following Veblen, some researchers referred to conspicuous consumption as the expenditure of money or other resources for the sake of displaying a higher status. For example, Sundieet al (2010) defined conspicuous consumption as *"a lavish spending on goods and services acquired mainly for the purpose of displaying income or wealth…. People purchase expensive goods and services to impress upon others that one possesses wealth or status" (p.22).*In his prominent article on "*The Economic Theory of Conspicuous Consumption"*, Mason (1983) argued that "*people purchase expensive branded apparels, when one could have purchased cheaper apparels that work just as well.*" In the minds of these people, such display serves as a means of attaining or maintaining social status, which would increase 'fashionable' consumption. Consequently, Mason defined conspicuous consumption as *"a form of consumption which is inspired by the social rather than by the economic or physiological utility of products" (p.03).*

According to Leibenstein (1950), people engage in conspicuous consumption for the desire to please their peers, and for that the consumers purchase the latest fashions. For the satisfaction derived from being awarded high regard, they acquire a piece of fine art or an expensive watch (Frank, 1989). Therefore, conspicuous consumption requires social opportunities for displaying the consumption, and needs social interaction for others to observe it according to Charoenrook and Thankor (2008) who thus defined the term conspicuous consumption as *"purchasing goods by which creates social opportunities / social interaction for displaying the consumption to others" (p.02).*

Though different scholars have defined the concept of conspicuous consumption in their own different ways, it has commonly and frequently been defined in relation to consumers' behaviour of seeking to purchase goods and services for the status such consumption would confer, regardless of those consumers' objective income or

social class. For the purposes of this paper, conspicuous consumption is therefore defined as:

> *"…. an ostentatious display of wealth through a lavish spending on goods and services under pressures of social norms and the expectations of social reference groups for the purpose of acquiring or maintaining status or prestige, merely for the sake of being different from other consumers"*

Dussenburry (1949), building upon Veblen's work, discussed the dichotomy of absolute versus relative income and/or consumption, and argued that consumption and saving behaviour would be affected by concerns of social standing. He claimed that human well-being would be a function of both the amount and the types of goods affordable to an individual in comparison to others. Accordingly, Duesenberry developed his own concept, labelled the "Demonstration Effect" or "Bandwagon Effect", which also is referred to by researchers as the "*Relative Income Hypothesis*".

Leibenstein (1950) extended the general category of "conspicuous consumption" into specific sub-classifications depending on the consumer's signalling intent and identified three principal external effects, namely "Veblen effect", "Snob effect", and "Bandwagon effect". The product price itself is used as means of openly displaying wealth in order to gain social status in the case of the "Veblen effect", where the satisfaction of consumption derives not from utilitarian attributes but from reactions by peers to wealth displayed through the purchase. The "snob effect", on the other hand, motivates individuals to buy an item because of its high quality and scarcity value, and the people preoccupied with social status would reject products that were perceived to be possessed by the common people. Thus, the 'snob' consumers would seek to purchase products of limited availability, and this type of exclusive consumption would guarantee a measure of social prestige. It is interesting to observe that both the Veblen Effect and Snob Effect are associated with high prices, and the former is a function of price itself while the latter is decided primarily by the consumption of others. The "Bandwagon effect" encourages people to purchase goods and services in order to be identified with a particular social group by adopting identical or similar patterns of consumption. It reflects the desire of people to be seen as capable of "matching" and, in this respect, contrast most sharply with "Snob Effect" (Mason, 1992).

The desire for status motivates consumer behaviour and the extent to which consumer desires for status could influence consumption of certain products. Several recent scholarly studies have systematically investigated what such products may be, and most concluded that "*fashion goods would be associated with conspicuous consumption*". Such studies appear to recognise that what qualifies as a conspicuous good would depend on the level of benefits to be gained from such consumption relative to the "reference group" with which a consumer identifies himself.

Conspicuous goods are valued not only for functional qualities but also because they confer status on their users (*what Veblen termed as "serviceable" aspect and "ceremonial" aspect*). Moreover, these goods would exert both "snob" and "bandwagon" effects[1]. Considering these arguments, Charoenrook and Thakor (2008) defined conspicuous goods[2] as those "*with higher variability of innate consumption utility in the cross-section of consumers at higher prices*". Such products are often supported by high levels of producer advertising that promote them as "status symbols" for wealthy people. This leads to the acceptance of goods with higher cross-sectional variability in consumer utility as conspicuous goods at higher prices than those with lower variability, when both goods have the same cross-sectional mean utility and distribution function.

The Economist (1993) emphasised that "*retailers could damage a glamorous good's image by selling it too cheaply*". Therefore, conspicuous consumption would involve consumption of expensive luxury products which are not used by most consumers on a regular basis products. In this spirit, Schor, (1998) defined conspicuous goods as:

> *".. goods which are simply noticeable to the public and the higher consumption of these goods are generally associated with higher income. These goods in most cases are readily visible or if invisible, the owner must be able to convey the ownership and any status associated with it (p.2)"*

Fan (2000) used an economic definition of luxury goods as a proxy for conspicuous consumption. He defined conspicuous goods as "*those commodities and services with income elasticity greater than unity*". This definition proposed that conspicuous goods had high expected income elasticity.

Thorstein Veblen's focus was mainly on affluent products when defining conspicuous goods. He claimed that people would consume highly visible and extravagant goods in order to prove their wealth and to gain prestige. Besides classic Veblen goods, more sophisticated culturally conspicuous consumption goods are now available in present day consumer-markets. Therefore, marketers deem that conspicuous consumption is not only about high-priced ornaments and lavish cars. Possessing expensive paintings, using branded mobile phones, or even wearing fashionable dresses would also be acts of signalling and status-seeking.

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[1] According to Leibenstein (1950), Snob effect arises when a conspicuous good confers more status benefits if the number of users is perceived to be limited as a result of high price, constrained output or other factors. Bandwagon effect is deemed to arise when the conspicuous good confers more status benefits if the number of users is perceived to be growing.

[2] Ben Coope, *et al.,* (2001) attempt to differentiate 'conspicuous goods' from "normal goods.' They emphasize that 'normal goods' confer direct utility, while 'conspicuous goods' confer utility only at the expense of others.

As explained in the literature above, the demand for conspicuous consumption goods is hard to explain. Yet, the market for conspicuous goods has experienced a tremendous growth over the last few decades. Moreover, products categorised as 'conspicuous' also have changed. Jessie and John (2002), for example, identified clothing and taking a small vacation as conspicuous products for those who earn little extra money; lap top computers, taking a moderate vacation and purchasing furniture as conspicuous products for moderate extra money earners; and new, larger homes and luxury cars, cell phones, car-related commodities, furniture, hardwood flooring and swimming pools as conspicuous products for those who earn substantial extra monies; in the USA.

Recognising the importance of the rapidly emerging market for conspicuous products, both academics and marketers continuously attempt to explore the characteristics of goods which could be chosen as conspicuous. For instance, researchers have identified designer clothing and luxury automobiles as popular conspicuous goods, followed by wristwatches and bigger houses (Table 1).

Table 1: Most Recognised Conspicuous Goods

Researcher(s)	Conspicuous Good												
	DC	JW	LA	CW	FT	LP	BH	CP	WC	SE	AA	SH	CD
Charles *et al*., (2007)	**X**	**X**	**X**										
Schor, (1998)	**X**		**X**	**X**	**X**	**X**							
Jessie and John, (2002)	**X**		**X**				**X**	**X**					
Frank, (1999)	**X**		**X**										
Charles *et al*., (2007)	**X**		**X**										
Charoenrook and Thankor, (2008)	**X**		**X**	**X**		**X**			**X**			**X**	
Belk, (1986)	**X**												**X**
Andler, (1984)			**X**	**X**				**X**			**X**		
Frank, 1999		**X**			**X**		**X**		**X**	**X**			
Heffetz Ori, 2004							**X**						

DC : Designer clothing JW : Jewellery LA : Luxury cars/automobiles
CW: Wrist watches FT : Furniture & Equipment LP : Lipstick & Perfumes
BH: Bigger home CP : Cell Phone WC : Wine & Champagne
SE : Sports Equipment SH : Shoes CD : CD Players

METHODOLOGY AND DATA

On the basis of the above examined conceptual framework, the present research aimed at investigating the motives of constructing modern luxury houses in Sri Lanka, and the role of modern houses in conspicuous consumption. For this purpose, an exploratory baseline study on120 Modern House Owners [MHOs] (N= 120, 78 men and 42 women; age range 35 – 51 years) was undertaken within the Kurunegala Municipal Council Limits. People living in luxury lakeside houses were selected as the population relevant to this study, and sampled using non-probabilistic sampling technique. The modern houses built at investments of over Rs.10 million within 2006-2012 were entitled to be included in the sample. Voluntary assistance of few renowned architects was also obtained in order to ensure accurate selection, and the relatively small size of the sample enabled researchers to concentrate on the quality of information gathered (Tai, 2007).

One of the main aspects of the research being identification of needs of the MHOs, both implicit and explicit, a number of face-to-face interviews were held at the outset between ten selected architects and the research team. A semi-structured interview guide was used: the questions were open-ended and designed to obtain the views of participants with only minimal influence from the moderating researchers.

The interactions were transcribed by the researchers and voice-recording was done when and where necessary. Respondents' views under each theme were analysed intensively at the end of each interview. This helped researchers to conceptualise the behaviour of modern house owners, and accordingly, to develop the research tool.

First-hand information on housing symbolism was gathered through a series of subsequent discussions with MHOs, supported by extensive site visits. A pre-tested semi-structured questionnaire was used for collecting data. The questionnaire contained three sections. The first section gathered personal information of the MHOs, while the second section focused on collecting the relevant information pertaining to the modern houses (such its investment, number of rooms, roofing style, etc). The last section was designed to identify the motives of constructing luxury houses.

The respondents' signalling motive was examined through the three principal external effects identified by Leibenstein (1950), namely the Snob effect (*other's demand reduces own demand*), the Bandwagon effect (*other's demand increases own demand*), and the Veblen effect (*where quantity demanded for a good may increase with price*).

Eleven questions, four each for Veblen and Snob effects and three for Bandwagon effect, were used to investigate the motives of the MHOs. All these motives/effects were measured on a five-Point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). These questions are summarised in Table 2.

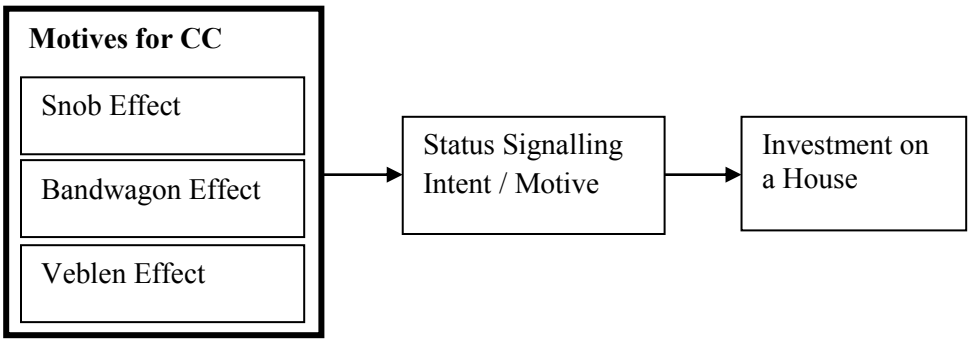
Table 2: Statements used on Likert Scale to measure the external effects influencing MHOs

	VEBLEN EFFECTS
1	You prefer to purchase high-priced products
2	Product price is openly displaying wealth
3	You can gain social status by displaying wealth
4	Satisfaction derives not from the utilitarian attributes but mainly from peer reaction to the wealth displayed by the purchaser
	SNOB EFFECTS
1	You decrease you consumption as others increase their consumption
2	You are attracted to rare things
3	You enjoy shopping at stores that carry merchandise that is unusual
4	You are more likely to buy a conspicuous product if it is unique
	BANDWAGON EFFECTS
1	You prefer to purchase goods in order to be identified with a particular social group
2	You can conform to them by adopting similar patterns of consumption
3	The social influences on consumer behaviour affect demand

The researchers also assigned a "conspicuousness rating", based on the status consideration of MHOs, from 1 to 5 (1 = '*not at all conspicuous consumption'* to 5 = '*definitely conspicuous consumption'*).

Along with other exploratory data analysis methods, the Statistical Package for Social Sciences (SPSS) [version 17] was utilised to facilitate an objective assessment of data gathered. The research model adopted in this study is summarised in the Figure 1.

Figure 1: The Research Model



RESULTS AND DISCUSSION

The results revealed that the MHOs would be more inclined to increase the demand for modern luxury houses as a conspicuous good if their prices were increasing (Veblen Effect: $\bar{x}$ = 4.41, SD = 0.915), and the majority stated that they would reduce their own demand for a particular type of modern luxury house if others also would demand the same type (Snob Effect: $\bar{x}$ = 4.28, SD = 0.901). This implies also that modern house owners, who are conspicuously motivated, refuse to purchase or construct houses which are common. They prefer unique architectural designs (Bandwagon Effect: $\bar{x}$ = 2.06, SD = 0.843).

The sample used in this study comprised of the three main ethnicities living in Sri Lanka; Sinhalese (N = 85), Tamils (N=23), and Muslims (N=12). An analysis of variance (ANOVA) was conducted to compare the means of the relevant samples to compare the variability among the group means against the variability within groups, upon confirming the normality of the distribution of respondents' views.

The outcomes of ANOVA indicated that the difference of means pertaining to different respondent groups were statistically significant (p = <.001, MSE = 0.205). Therefore, the average perceptions towards modern-luxury houses as the conspicuous product amongst these three ethnic groups were found to be considerably different, where Muslims ($\bar{x}$ = 4.42, SD = 0.761) and Tamils ($\bar{x}$ = 4.30, SD = 0.566) were found to be highly attracted by the Veblen effect, while Sinhalese appeared more influenced by the Snob effect ($\bar{x}$ = 4.24, SD = 0.525).

Moreover, the results highlighted that the MHOs were highly influenced by their social status. Not surprisingly, the findings confirmed that a consumer would perceive both

utilitarian function (β=0.654, $p<0.001$) and the expressive or status function (β=0.831, $p<0.001$) of housing. Further, the results confirmed that females were more likely than males to purchase or construct status-congruent houses, and that high investments on such status-congruent houses would be associated with respondents' profession (r= 0.876, $p<0.001$) and place of living (r = 0.821, $p<0.001$).

As expected, conspicuousness ratings were found higher for outer-appearance of house (M = 4.7), its size (M = 4.2), interior decorations (M = 4.1), but lower for number of rooms (M = 2.9) and for a modern-equipped pantry (M = 2.7). Most of the respondents accepted that they would have invested in modern, large and ostentatious houses to display higher status than others (M = 4.85), which motive was followed by the respondents' intentions to secure social opportunities and social interaction (M = 4.64) to distinguish them from others (M = 4.21), and to impress upon others that they possess wealth (M = 3.87).

CONCLUSIONS

According to the findings, both status and utilitarian functions of housing appear important determinants of investment decisions by MHOs in Kurunegala district. Yet, most of them would pay more attention on status functions than the utilitarian function of shelter. Moreover, MHOs struggle to create social opportunities and to distinguish themselves from others by having a modern and ostentatious house. Impressing upon others that MHOs possess wealth also appears an important motivation. Place of living, profession, and gender also are likely to influence the investment decisions of the MHOs.

While the outer-appearance, size and the interior decorations appear extremely important for MHOs, some MHOs would increase their demand for a luxury house with its value, while some others would increase demand in response to a general increase in demand by their peers.

The results of the research could be considered useful for the marketing of luxury houses in Sri Lanka. For instance, when designing a new house, the potential values that could be added through the status function could be taken into account by the architects. They should possibly look for different avenues to make the outer-appearance of houses more attractive. Taking the support of interior decorators in designing a house also could be helpful as MHOs appear highly concerned with the interior designing aspects. This could possibly be useful information for relevant professional groups such as curators, layout planners, interior designers, carpenters, etc.

Finally, the outcome of this analysis indicates that the status signalling of the MHOs is encouraged by all three status effects: Veblen, Snob, and Bandwagon. While the Veblen

and Snob effects in general appear more influential than the Bandwagon effect, the level of influence is likely to differ based on the ethnicity of MHOs. The Muslim and Tamil modern house owners are highly motivated by the Veblen effect, while Sinhalese MHO's appeared to be more attracted to the Snob effect. Furthermore, the findings indicate that the Veblen effect would be highly correlated with income, education and profession of the respondents, whereas the Snob effect would be significantly associated with the place of living, particularly among the urban residents. A significant correlation also was found between the respondents' gender and the Snob effect.

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THE TEMPORAL CONFIGURATION OF BANDARANAIKE INTERNATIONAL AIRPORT AS AN AVIATION HUB OF THE FUTURE

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Abstract

The temporal configuration of Bandaranaike International Airport (BIA), Sri Lanka is reviewed through this paper with the view of assessing the current performance of the airport which envisions its development into an aviation hub in South Asian region. Connectivity is evaluated by assessing the coordination of the published time-table of flights at the airport for the first week of July 2012. Two major concepts utilised in the study are: (1) Wave-System-Structure: which examined the arrival and departure flight patterns at BIA to identify whether there is a coordinated wave system created by banks of arrival and departure flights and (2) Hub Connectivity Indicator: which measured the quality of the connections created by the Wave-System-Structure as equivalent to a direct flight. The airport has a Wave-System-Structure mainly driven by the operations of the home carrier. On absolute terms quality of the temporal connectivity of the flight schedule at BIA is judged as low based on the fact that only 38% of the total viable connections made are equal to the quality of a direct connection. To assess the relative performance of the airport, it should be judged against the performance of nearby hub airports in the South Asian region.

Keywords: *Hub Airports, Connectivity, Temporal Configuration, Wave-System-Structure, Hub Connectivity Indicator*

JEL Codes: R4,L930, L980, L52, O250, O530

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INTRODUCTION

Sri Lanka envisions developing herself into a strategically important economic centre in the South Asian Region by taking advantage, among other things, of the country's strategic geographic location. Transforming the country into an "Aviation Hub" represents one important element of this development vision spelt out in the "Mahinda Chinthana" policy document [1] and in subsequent strategic action plans of the Government of Sri Lanka (Ten Year Development Plan, Ministry of Finance and Planning, 2011).

An aviation hub is a special node in a network, which facilitates connectivity for flights arriving within a short period of time from several origins, allowing time for connections, and departing to several destinations for airlines, passenger and cargo, (O'Kelly, 1998; Jayalath and Bandara, 2000). Advantages of such hub and spoke (HS) systems are multifaceted. For passengers, this offers a wide choice of destinations together with more transfer options by facilitating indirect connections[2] among nodes established via the central node, when no or only a very few direct connections[3] exist between nodes. Hub airports are also preferred by airlines due to the benefits of cost economies. Airlines can exploit economies of scale of flying larger aircraft with sufficiently high load factors enabled through "connectivity" driven passenger demand at the hub airport. HS network structure also provides economies of scope for an airline by enabling it to offer more services to different locations by establishing itself at the centre. Hence, the cost of production is less than that of different airlines operating similar services. This happens with more spokes being connected to the hub which allows for creating multiple connections without additional effort. Increased traffic at the hub, eventually increases the traffic between two Origin-Destination nodes (OD) allowing average unit cost of production to decline which is termed as economics of traffic density (Button, 2002; Kahn, 1993). In addition, a hub airport confers benefits on the community of the geographical area it serves. It stimulates the agglomeration of local industries around the catchment area of the airport, and further more new business ventures; since the airport opens up local industries: as buyers and sellers to international markets (Button, 2002; Yu Jian et al, 2011). Thus, developing BIA as a hub in the South Asian region is deemed to be an important part of the post-war economic development plans of Sri Lanka. It would support the national economy by linking the country to more destinations which will open up opportunities for the local economy to integrate with international markets.

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[1] Mahinda Chinthana Idiri Dekma – Election manifesto of the United People's Freedom Alliance at the Presidential Election – 2010.

[2] A connection made between an origin and a destination via a third stopover/transfer point.

[3] A connection made between an origin and destination without any stopovers /transfers.

Qualifying criteria to become a good air transport hub include having a unique geographical location that has spatial qualities of centrality (central point for locations) and intermediary (in between locations) (Fleming and Hayuth, 1994) with respect to the other connecting destinations; having an established hub carrier or two; adopting cost effective pricing solutions for passengers flying via the airport (Jayalath and Bandara, 2001); having a strong and stable Origin-Destination market; possessing necessary infrastructure facilities at the airport including access modes to the airport and ensuring operational efficiency of the airport (Yu Jian et al., 2011). Among these however 'connectivity' offered by an airport is the key factor for it to qualify as a hub in the global network.

Connectivity looks at two key aspects of the network associated with an airport: Spatial Connectivity, that is to say how well the airport is connected with other airports through the flights offered, and Temporal Configuration which relates to how well the scheduled arrival and departure flights from-and-to the different destinations are coordinated to optimise the number of viable connections available to passengers to choose from. In an era where 'time' is assigned increasing economic value by society, passengers look for ways and means of arriving at their destinations in the shortest possible time with the greatest possible convenience and value for money. In this respect choosing an indirect connection facilitated via a hub is based upon the generalised cost of the flights of indirect connections against available direct connections between two airports. Apart from the monetary value associated with the ticket price passengers, tend to compare costs in terms of flying time and connecting time between the options available to them. Passengers will neither prefer longer waiting times because of it being unproductive time; nor will they like very short connection times due to the risk of missing the connection when transferring from one flight to another. Hence, hub operators need to optimise the schedules to offer acceptable waiting times to arrival passengers to connect with their onwards journey (Veldhuis, 1997). Therefore, the operational efficiency of a given aviation HS System needs to be evaluated in terms of the quantity (number of viable indirect connections) and quality (travel times against the available direct connections) of scheduled flights.

The airport should take immediate steps to try and meet the above criteria in order to achieve its long term plan of converting itself into a hub airport. The objective of this paper is to appraise the temporal coordination of the schedules at BIA in terms of the quantity and quality of connections offered with a view to assessing the degree of its qualification to be admitted as an Aviation Hub. Thus, the paper looks at ways to measure this feature in terms of the hub-wave-system at BIA and by developing an index, namely a Hub Connectivity Indicator (HCI), to measure the quality of the indirect connections facilitated via BIA against the direct connections available between those origins and destinations. These indicators can be used as comparative measures to

assess BIA's performance as a hub against other regional airports, if such calculations are carried out to include those airports as well.

LITERATURE REVIEW

Temporal configuration suggests that the connections offered via a hub should offer a well-coordinated set of arrival and departure flights for passengers. Since flying via a hub often replaces direct connections, attractiveness of such a network to an alternative will depend on the frequencies offered, coordination of flights and other through services, travel times and waiting times, ticket prices and many other features (Veldhuis, 1997; Jayalath and Bandara, 2001; Burghouwt and Veldhuis, 2006; Burghouwt and Wit, 2005). These will be the choice factors for passengers to select an indirect flight against a direct flight (Doganis and Dennis, 1989; Veldhuis, 1997; Burghouwt and Veldhuis, 2006; Burghouwt and Wit, 2005; Danesi, 2007;Li et al., 2012). Temporal coordination, which is the focus of this study; is measured using both quantity and quality of connections offered by airlines operating at the hub (Veldhuis, 1997; Burghouwt and Wit, 2005; Li, et al., 2012).

A temporally coordinated schedule will affect the operation of a wave-system-structure at the hub. In an 'ideal wave', the arrival wave would be followed by a transfer period and a corresponding departure wave of flights (Danesi, 2006). Hence, a wave-system-structure will have a number of continuous flight waves throughout the day. The time interval between the same points of two consecutive waves (e.g. start of arrivals of first wave to the start of arrivals of the second wave) would indicate the hub-repeat-cycle of a particular wave system structure. Opposed to the sophisticated methods used to assess hub wave systems (Bootsma, 1997 as cited in Danesi (2006) and Burghouwt and Wit, (2005)), this provides a simple measure to evaluate the organisation of a wave-system-structure at a hub airport (Danesi, 2006). Danesi (2006), in evaluating the performance of few European hubs, used the method of counting arrival and departure flights within each hour and plotting the counts against time intervals to pictorially describe the hub waves.

More advanced measures of temporal connectivity looks beyond a simple wave-system-structure by evaluating quantity and quality of schedule coordination[4]. 'Quantity' of connections is the number of connection options a passenger is given by coordinating

[4] (a) Connectivity ratio (Doganis and Dennis, 1989)
(b) NETSCAN model (Veldhuis, 1997; Veldhuis and Burghouwt, 2006)
(c) Weighted Indirect connection index (WI) (Burghouwt and Wit, 2005)
(d) Weighted connectivity ratio (Danesi, 2006)
(e) Hub Connectivity Indicator (HCI)(Li et al., 2012)

the arrival bank of flights to be followed by a time period which allows passengers to make convenient transfers to the departing bank of flights. This convenient time period is called a 'Viable Connection Threshold' (VCT) (Li et al., 2012). A VCT is associated with the concepts of Minimum Connecting Time (MCT); the lower boundary and Maximum Acceptable Connecting time (MACT); the upper boundary. As first introduced by Doganis and Dennis (1989) in evaluating the European context, the standard thresholds lie between, MCT= 45 minutes and MACT= 90 minutes in order to minimise disutility related to waiting times experienced by passengers in making connections at airports. This threshold has been varied in other studies based on author assumptions and the standards used at respective airports. Burghouwt and Wit (2005) uses 40-90 minutes in assessing the European context. Improving on previous methods Dennis (2006) uses three different thresholds for combinations of continental and intercontinental flights, again for European airports. Li et al., (2012) uses the assumption that MACT is three times the MCT (45 minutes) in their Hub Connectivity Indicator developed to evaluate All Nippon Airways (ANA) hubbing practices at Tokyo Haneda and Narita International Airports. Hence a viable connection is the connection between any two arrival and a departing flights falling within the defined VCT. At a hub airport, the sum of all such connections within the VCT is identified as the Quantity of Viable Connections (QVC) (Li et al., 2012). Therefore, a larger QVC signals more connecting opportunities.

The second parameter, 'Quality' of the connections falling within the VCT is related to the economic concepts of disutility associated with travel time. As explained previously, Veldhuis (1997) and Veldhuis and Burghouwt (2006) in their NETSCAN model, argue that passengers' choice among alternative routes would depend on attractiveness of the available alternatives. They explain that this attractiveness is often expressed in '*utility functions'* related to frequencies, travel time against direct connections, ticket prices, comfort and loyalty to airlines. While the latter two dimensions are hard to measure, the former three should have accurate figures which can be used for evaluation of quality of the viable connections. The higher the frequencies, the more viable connections it would create. However, fare variations are often hidden in advanced revenue management systems. They suggest that total travel time is a near proxy to both travel times and associated fares. This is anchored on the market based notion that direct flights are usually more expensive than indirect flights. Danesi (2006) and the later developments by Li et al. (2012) use the same assumptions in assessing quality of QVC.

In measuring the quality of a connection, to accommodate the disutility associated with travel time of an indirect connection, the concept of 'Perceived-Travel-Time' (PTT) (Veldhuis, 1997; Burghouwt, 2005; Veldhuis and Burghouwt, 2006; Danesi, 2006; Li et al., 2012) is used. PTT is the time a passenger would perceive an indirect flight may take. This includes the travel time (TT) and the transfer times (TrT). In general

passengers perceive TrT as more inconvenient than flying time. This is associated with the psychological stress related to risks of missing connections and losing baggage during transfers and the extra hassle of moving between aircrafts and terminals and waiting in a third airport (Veldhuis, 1997). Therefore passengers tend to perceive this time as longer than the actual TrT. This is accounted for by introducing penalties (Veldhuis, 1997; Burghouwt and Wit, 2005; Veldhuis and Burghouwt, 2006; Li et al., 2012) for the TrTs by multiplying it by a penalty factor (PF)[5]. Comparison is made between the Nonstop-Flight-Time (NFT) which is the estimated direct flight time between two connecting points (incoming flight's origin and outgoing flight's destination) and the PTT of the indirect flight facilitated via the hub airport. PTT includes actual flying time of two connecting segments plus the TrT after applying a penalty factor (Veldhuis, 1997; Burghouwt and Wit, 2005; Veldhuis and Burghouwt, 2006; Li et al., 2012).

In addition to the above analysis of Time Factor (TF), Burghouwt and Wit (2005), Danesi (2006) and Li et al. (2012) have introduced a Routing Factor (RF) as an indicator of how efficient the hub is, in terms of routing passengers between two points. A De-Routing Factor Index (DRF) is arrived at by dividing the indirect distance by direct distance of two connecting flight segments (Danesi, 2006, Li, et al., 2012), which gives a ratio between one to positive infinity. An index equal to one indicates that the transferring hub is geographically located between the two points. The bigger the DRF, the less efficient the transfer option is. However, given that routing of flights are of less concern to passengers compared to a time or schedule factor, a less stringent approach is adopted by assigning dummy values for the RF based on the value ranges of the DRF (Danesi, 2006;Li et al., 2012).

Li et al. (2012) derive the Quality of Connectivity Index (QCI) for the QVC by using the product of the TF and RF that is measured in percentage terms and ranges from zero to positive 100%. Positive 100% is the direct flight's service quality, and acts as a benchmark, which decreases to zero with increasing transfer time and if there is additional backtracking involved in the routing. Connections with a QCI equal to zero are considered as non-viable connections and are excluded in the determination of QVC and overall hub performance. The Hub Connectivity Indicator (HCI) combines both quantity and quality dimensions.

[5] (a) Factor of 3 (Veldhuis, 1997;Veldhuis and Burghouwt, 2006) :TrT x 3

(b) Factor of 2.4 (Burghouwt and Wit, 2005) :TrT x 2.4

(c) Factor of θ which takes into account the availability of an alternative direct connection and also multi-hub transfers in the case ANN at Tokyo Haneda and Narita Airports (Li et al : 2012, pp 13)

$$HCI = \sum (QVC_i \times QCI_i)$$

One unit of HCI is equal to one direct connection (Li et al., 2012). For example, 100 units of the HCI mean that the number of qualifying connections at the hub is equal to 100 direct flight services (Li et al., 2012).

The studies and indexes on measuring temporal coordination of schedules at airports have been mostly carried out in the European region (Veldhuis, 1997; Burghouwt and Wit, 2005; Veldhuis and Burghouwt, 2006; Danesi, 2006). The only study in the Asian context by Li et al. (2012) also looks at a single airline's hubbing practices. It does not provide an indication on the hub operation of an entire airport.

Evaluation of temporal coordination of South Asian airports, which are more relevant in the context of the proposed study, are not found in the body of extant literature on the subject.

METHODOLOGY

In order to appraise the BIA's status as an Aviation Hub, temporal connectivity was used as an indicator among the other necessary features already explained. The methods adopted were twofold. First, arriving and departing flight patterns at BIA were examined to assess whether there was a coordinated set of arrival and corresponding departure waves (a wave-system-structure), which is a primary qualifier for a hub airport. Second, a Hub Connectivity Indicator (HCI) was derived to measure the 'connectivity' offered by BIA through the operation of the above identified wave-system-structure.

The data set consisted of the published flight schedule of BIA for the month of July 2012. This contained the information on origins, destinations, OD flight times and elapsed time, weekly frequency, operating carrier, type of aircraft, and number of seats. Further the information on the coordinated flights by ways of interlining and code-share agreements between different operating carriers were gathered from the Civil Aviation Authority of Sri Lanka (CAASL), Srilankan Airlines (ALK/UL) Amadeus schedules database and individual airlines. Alternative flights and their respective details were gathered from Amadeus schedules database. Distances between origins and destinations were gathered from flight time and distance calculator by Rockwell Collins Ascend Flight Information Solutions.

The flight count was plotted against time in a bar chart using the flight schedule data applicable for the selected month in order to identify the arrival and departure waves. Observations were made to gather how many hub waves were there and time interval

after which the cycle was repeated in the same manner and throughout seven days of the week, following the method used by Danesi (2006).

The HCI was developed following methods similar to that of Li et al., (2012), but with slight variations to accommodate the context of BIA. The differences were that the index was calculated for the hub operations of all the carriers operating at the airport with the marketing feasibility of making connections (intra-connections of Srilankan Airlines flights and connections made possible through marketing agreements of interlining and code sharing in the case of connections between different carriers). Secondly, the index only looked at a single hub operation.

Following the standards used by many of the previous studies (Doganis and Dennis, 1989; Veldhuis, 1997, Danesi, 2006; Veldhuis and Burghouwt, 2006; Li et al., 2012), which was also the standard used by the home carrier ALK; 45 minutes was used as the MCT for BIA as well. In previous studies also, different upper limits had been used based on the respective airports under consideration. It is evident that higher the MACT, higher would the number of viable connections. But this should not be over extended, since it would increase the disutility experienced by passengers and the index would not represent the true quality of the connections.

Taking into consideration the specific operational and landside infrastructure limitations at BIA, the MACT was set at 180 minutes (four times the MCT). BIA runway had certain operational limitations (due to capacity limitations of terminal and apron facilities) which only allowed it to handle 22 aircrafts within a given hour, though the ideal operations should handle 45 movements per hour (CAASL, 2013).

On the other hand this was also justified by the findings of Ranatunga (2013) on the causes of departure flight delays at BIA which reported that 26% of departure delays happen due to bottlenecks in airport related operations and ramp handling. Home carrier ALK also considers 180 minutes or less as an acceptable level. As presented in the results, close observation of flight waves showed that the gap between the first arrival and last departure flight of a flight wave was on average 4.75 hours which was an approximation to the intervals allowed. Thus, 45 – 180 was considered as an acceptable VCT for BIA under the circumstances.

By taking into account the sum of all the connections within the above identified viable connection threshold of 45 – 180 minutes, the QVC for BIA was established. Only the intra ALK flights and other flights between different airlines having a marketing agreement as explained earlier were accounted for in calculating the QVC. The connections established between low cost carriers and full service carriers were also eliminated as low cost carriers do not have such marketing agreements.

QCI of the viable connections were established following Li et al. (2012). Deviation from the Li et al (2012) method was the introduction of the penalty factor. The Penalty Factor for transfer time was applied as 1 if there were no alternative direct connections available and 2 if there was an alternative direct connection available, which would reduce the attractiveness of the transfer option.

A summary of the analytical process is outlined below.

HCI = $\sum (QVC_i x QCI_i)$

QVC = Count of viable connections within 45-180 minutes VCT

QCI = TF x RF

TF = NST/PTT

PTT = TT+ (TrT x PF)

PF = 1 if No and 2 if Yes on the availability of a direct connection

RF = Based on values of DRF

RF = 1, if DRF≤ 1.2

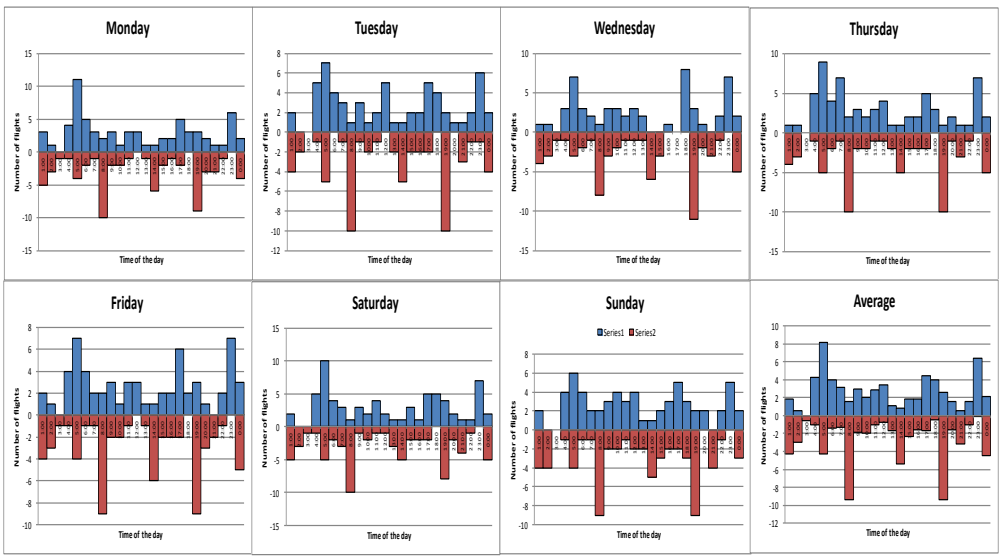
RF = 0.5 if 1.2< DRF ≤ 1.5

RF = 0 if 1.5< DRF

RESULTS

The results obtained are graphically depicted in Figure 1.

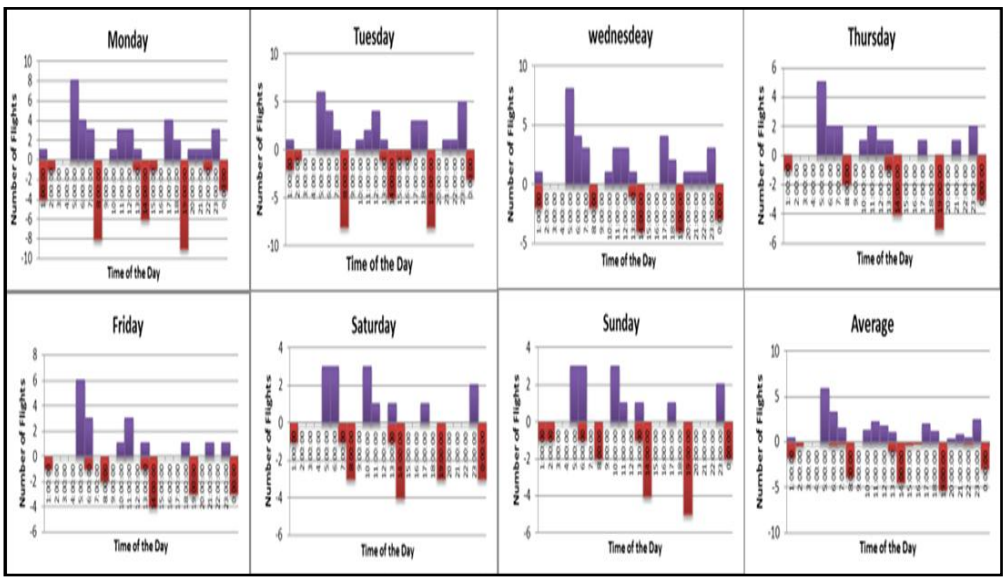
Figure 1: Weekly Hub Wave System at BIA: Number of Flight Arrivals & Departures per Hour



Though the arrival and departure flight patterns at the BIA do not reveal a structure of an ideal wave system, there appear to be four (4) waves from 0400–0900hrs, 1000-1400hrs and 1500–2100hrs and 2200-0200hrs in general, with an average hub repeat cycle of 4 hours and 45 minutes, on each day of the week.

This wave system structure is particularly influenced by the operations of the home/national carrier, ALK; with four flight waves aligned to the above mentioned time periods (Figure 2).

Figure 2: Weekly Hub Wave System of ALK/UL at BIA – Number of Flight Arrivals and Departures per Hour



As per Figure 2, the operations seem to peak during early mornings and late nights with the contribution of other foreign airlines operating to BIA. During mid-day, however, only the ALK flights appear to provide a significant contribution to create a wave. The full operational capacity of BIA runway is only utilised during 0500-0600, 0800-0900and 1900-2000hrs.

Table 1details the results of the Quantity of Viable Connections (QVC), Quality of Connectivity Index (QCI) and Hub Connectivity Indicator (HCI) calculations for BIA. There are 894 arrivals and departures handled by BIA per week. These arrivals and departures create 1961 QVCs within the VCT identified for BIA as 45-180 minutes. It gives a HCI of 749.38 that is equal to approximately 750 direct connections in terms of quality and quantity. This is only 38% from the total connections made (HCI/QVC). Within this QVC, ALK as the home base carrier accounts for 94% of the viable

connections which is equal to a HCI of 709.12 equivalent direct connections. Therefore, as evident from the comparison drawn in Table 1, the majority of connections at BIA are offered by the national carrier ALK.

Table 1: Quantity of Viable Connections (QVC) and Hub Connectivity Indicator (HCI)

	All Airlines	Srilankan Airlines (ALK/UL) contribution
Total Arrivals and Departures	894	481
Quantity of Viable Connection (QVC): *Number of connections made by all airlines [within Viable Connection Threshold (VCT)]*	1961	1847
Quality of Connectivity Index (QCI): *Quality of the QVC*	304.5	300.3
Hub Connectivity Indicator (HCI): $HCI = \sum (QVC_i \times QCI_i)$	749.38	709.12

In order to further analyse the connectivity offered by the national carrier, the contribution of its code-share partners and interline partners towards the above estimated HCI were analysed, as shown in Tables 2 and 3 below. This indicates that 537 out of the total connections made by ALK, are attributable to the interline partners of Srilankan Airlines and 102 connections provided through its code-share partners.

Table 2: Contribution from Interline Partners

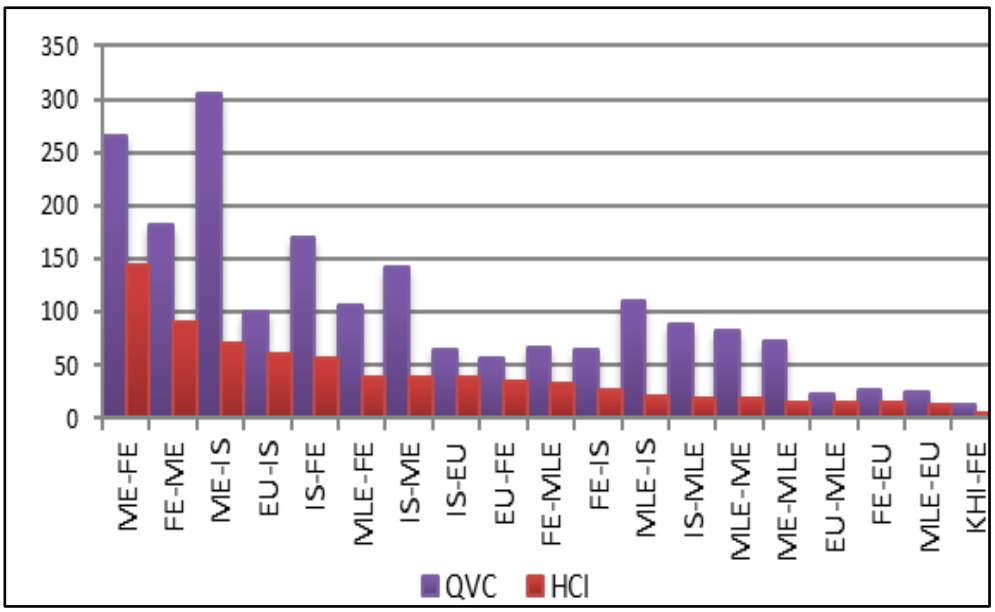
	Interline Partners
Quantity of Viable Connection (QVC) : *Number of connections made by all airlines [within Viable Connection Threshold (VCT)]*	1454
Quality of Connectivity Index(QCI): *Quality of the QVC*	226.8
Hub Connectivity Indicator (HCI): $HCI = \sum (QVC_i \times QCI_i)$	537.0

Table 3: Contribution from Code-share Partners

	Code-share Partners
Quantity of Viable Connection (QVC) : *Number of connections made by all airlines [within Viable Connection Threshold (VCT)]*	249
Quality of Connectivity Index (QCI): *Quality of the QVC*	38.5
Hub Connectivity Indicator (HCI): $HCI = \sum (QVC_i \times QCI_i)$	102.2

As illustrated in figure 3, the highest number of viable connections is made between the Middle East (ME) region and the Indian Sub-Continent (IS) region. But their quality is considerably low. Second highest is between the Middle East (ME) and Far East (FE) and vice versa. Examined closely, it can be perceived that the quality of the flight schedule to the Indian subcontinent and Male (MLE) is low, which in turn negatively impacts the HCI.

Figure 3: Regional Distribution of QVC and HCI



CONCLUSION AND POLICY RECOMMENDATIONS

From a policy perspective, as explained at the beginning of the discussion, hubs also serve as windows and bridges to open up a country or a region, and lay the foundation for the local or regional economy to participate in international cooperation and competition. In this context, the optimisation of temporal connectivity at BIA gains significant importance in the policy directions aimed at developing Sri Lanka as an aviation hub in the South Asian Region.

The results of the research reveal that, even though it is not an ideal system, BIA has a certain wave-system structure which is driven by the operations of the home carrier ALK. In absolute terms quality of the temporal connectivity of the flight schedule at BIA can be judged as low based on the figure that the HCI only accounts for 38% of the QVC, which in other words mean that only 38% of the total viable connections made are equal to the quality of a direct connection. To assess the relative performance of BIA as a hub in the South Asian Region, it should be compared with indexes calculated for other nearby hub airports such as Dubai and Singapore which are giving strong competition in the North West (NW)-South East (SE) markets, which have been identified previously as a desirable route direction for BIA to operate as a hub (Jayalath and Bandara, 2000). It is also important to consider the three main hub operations in the Indian aviation market; Delhi, Mumbai and Chennai in comparison with BIA operations. A main drawback of this study is the lack of comparative measures to assess the relative postion. Only in absolute terms, BIA can be advised to look into ways of improving the HCI of the current flight schedule.

In looking at ways to imporve temporal connectivity, policy makers can pursue two options in relation to BIA. One is to optimise the utilisation of exisiting infrstructure by encouraging operators to introduce more flights and frequencies, which would improve the quantity of connections falling within the VCT. In doing this, certain limitations highlighted previously on the operations at BIA should be addressed. Therefore, it is important to improve the handling capacity and ground services to utilise the existing runway capacity in order to accommodate more aircrafts. However these would incur costs to airport operators. Simultaneously increased frequencies will also put an additional burden on the operating cost of airlines. If required load factors are not achieved these additional frequencies may not be economically viable for the airline. Hence proper cost benefit analysis should be carried out prior to introducing such services. Furthermore, the quality of the connections provided may be hindered by the negative records on punctuality at BIA by the handling agent (on average 75%) (Ranatunga, 2013). Hence,the lower margin of VCT of 45 minutes may not be practical in such a context due to the delays caused by the ground handlers.

ALK provides a major portion of the connections established. However, out of the total viable connections made by ALK, only 38% of flights are of accepted quality from a transfer passenger point of view in saving time. Also these connections fall closer to the upper boundary of the VCT. Apparently the quality of the connections offered via BIA have been hampered eventhough a higher quantity of connections are offered. Hence, the national carrier has enough room to improve the quality of their connections by careful schedule planning of their own arrival and departure flights. For example the arrival ALK flight from London Heathrow (LHR) from NW at 0155hrs on Monday in the first week of July 2012 at BIA, does not have any corresponding flights which falls within the VCT (upper limit 0455 hrs) directed towards SE, which may have created an ideal connection options. Instead all the departing flights which fall within the VCT were directed to the ME region.

Therefore, BIA should work along with the national airline and other airlines operating at the airport to deliver a much more coordinated service. Code sharing and interlining arrangements between the airlines serving at BIA have a pivotal role to play in improving quality, without which the connection may not be a saleable option for passengers. This would enable improving the productivity of the performance of ALK as a hub carrier, which in turn would strengthen BIA's hub positioin. It is also interesting to note that, though the BIA was recognised to have the potential to be a hub on the cross roads between NW-SE and NE–SW air routes (Jayalath and Bandara, 2000) that even after twelve years, the potential of NE-SW routes have not been explored. Except for Male the rest of the connections are between the NW-SE and the IS regions(Figure 3).

In addition to overcoming the limitation of having no comparative indicators, future attempts to improve this evaluation should also look at the addition of Hambantota Mahinda Rajapaksha International Airport (MRIA) to the airport network in Sri Lanka as this would create a multi-airport scenario having further implications on BIA's operations. Future studies should be aimed at evaluating the scenario from a dual-hub perspective.

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PERSPECTIVES

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සංවර්ධනයේ තිරසාරත්වය සහ බෞද්ධ ආර්ථික දර්ශනය

Sustainability of Development and Buddhist Economics

පූජ්‍ය අගලකඩ සිරිසුමන හිමි
සිංහල අධ්‍යයනාංශ ප්‍රධානී, කොළඹ විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව

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Abstract

සෑම පුද්ගලයකුම අර්ථ ශාස්ත්‍රයේ විග්‍රහ කෙරෙන අයුරින් "තාර්කික" විය යුතු ද? අසීමාන්තික පරිභෝජන පෙළඹීමෙන් මිදීමට මිනිසාට නො හැකි ද? සියලු මිනිසුන් තම අවශ්‍යතා සපුරාගැනීමට නැඹුරු වන නමුත් අසීමාන්තික පරිභෝජන පෙළඹීමට නතු නො වී සිටිය හැකි ය. බෞද්ධ අර්ථ ශාස්ත්‍රයෙන් ඉදිරිපත් කෙරෙන්නේ එවැනි සුසමාදර්ශයකි. බෞද්ධ ආර්ථික දර්ශනය තුළ තිරසාරත්වය වෙත පවත්නා යොමුව ආශ්‍රිතව මෙම සටහන ගොඩනැඟෙයි. මෙහි දී ධන නිෂ්පාදනය හා පරිහරණය, ශ්‍රම සබඳතා, අරපිරිමැස්ම, පරිසර සංරක්ෂණය, භෞතික සම්පත් හිමිකාරත්වය ආදී මාතෘකා කිහිපයක් සැලකිල්ලට ගැනෙයි. ඒ තුළින් තිරසාරත්වය පිළිබඳ වැදගත් බෞද්ධ ඉගැන්වීම් ඉස්මතු කර දක්වනු ලැබෙයි.

Are all economic actors 'rational'? Is boundless acquisitiveness an incurable attribute of homo economicus? Buddhist Economics contends that, while the desire to fulfil one's needs is inherent to the human condition, the excessive and insatiable pursuit of profit and acquisitions is not. Hence, it seeks economic growth through sustainable means: an effort that is particularly relevant in a world of economic extremes. 'Sustainable Development and Buddhist Economic Philosophy' examines the relevance of Buddhist Economics to labour relations, the achievement of productive and allocative efficiency, the promotion of environmental conservation, and the common ownership of resources, and its enduring contributions to sustainable development.

සංලක්ෂ්‍ය / Remark :

මෙම ලිපිය සැකැසීමේ දී කොළඹ විශ්ව විද්‍යාලයේ ආර්ථික විද්‍යා අධ්‍යයනාංශයේ ආචාර්ය ලලිතසිරි ගුණරුවන් මහතාගෙන් සහ තිළිණි සමරසේකර මෙනෙවියගෙන් ලද දායකත්වයට කර්තෘ ගේ කෘතඥතාව හිමි වේ.

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සම්පත් සීමිත ය, විකල්ප ප්‍රයෝජන සහිත ය. එහෙත් මිනිස් වුවමනා අසීමිතව වැඩෙන සුළු ය. එ සේ අසීමිත වූ වුවමනා සපුරා ගැනීමේ දී විකල්ප ප්‍රයෝජන සහිත සීමිත සම්පත් වඩා කාර්යක්ෂමව හා ඵලදායීව උපයෝජනය කර ගැනීම අර්ථ ශාස්ත්‍රයේ කේන්ද්‍රීය විෂය වෙයි. ඒ අනුව බිහි වන තේරීම හා හිඟතාව මත ජනනය වන ප්‍රශස්තකරණ ගැටලුව ඔස්සේ මිනිස් පරිභෝජන ආශා තෘප්ත කර ගැනීමට මෙන්ම ඊට උවමනා වන භාණ්ඩ හා සේවා නිෂ්පාදනය හා බෙදා හැරීම කෙරෙහි ආර්ථික විශ්ලේෂණයේ මූලික අවධානය යොමු කෙරෙයි. එම ආර්ථික ක්‍රියාකාරකම් සහ ඊට අවශ්‍ය යෙදවුම්වල කාර්යක්ෂම හා ඵලදායී කළමනාකරණය අදාළ ව්‍යවසායකත්වය තුළින් සිදු වේ. නිදහස් වෙළෙඳපොළ ක්‍රමය තුළින් මෙම කටයුතු සිදු කෙරෙන අයුරු සහ ශ්‍රම විභජනය තුළින් කාර්යක්ෂමතාව ඉහළ දමා ගැනීමට හා ඵලදායීතාව වර්ධනය කර ගැනීමට මෙන්ම ලාභ උපරිම කරගැනීමට හැකි වන අයුරු සම්භාව්‍ය අර්ථ ශාස්ත්‍රයේ පියා ලෙස සැලකෙන ඇඩම් ස්මිත් තම *"ජාතීන්ගේ ධනය" [Wealth of Nation]* කෘතියෙන් පුළුල් ලෙස සාකච්ඡා කරයි.

ප්‍රංශ ජාතික ආර්ථික විද්‍යාඥයෙකු වූ ෂෝන් බැප්ටිස්ට් සේ (Jean Baptiste Say) විසින් ඉදිරිපත් කරන ලද සැපයුම් න්‍යාය තුළ කියවෙන්නේ ද නිෂ්පාදනය හෙවත් සැපයුම මඟින් ඉල්ලුම ඉදිරියට මෙහෙයවෙන බැවින් ආර්ථික වෘද්ධිය ළඟා කර ගැනීම සඳහා කළ යුතු වන්නේ නිමැවුම ඉහළ දැමීම බවයි. තව ද, කේම්බ්‍රිජ් ගුරු කුලයේ ප්‍රබල පුරුකක් වූ නිකොලස් කැල්ඩෝර් (1957) තම *"ආර්ථික වෘද්ධි ආකෘතිය" [A Model of Economic Growth]* නම් ලිපිය තුළින් ජනගහන වර්ධනය, එම ජනගහනයේ ඉතුරුම් නැමියාව සහ නව නිපැයුම් හා සොයා ගැනීම් තුළින් සිදු කෙරෙන ඵලදායිතාවයේ වර්ධනය රටක ආර්ථික වර්ධනය කෙරෙහි බලපාන මුඛ්‍ය සාධක තුන ලෙස හඳුනාගනු ලැබ ඇත. මේ සියලු කරුණු මත පැහැදිලිවම එළැඹිය හැකි නිගමනය වනුයේ ආර්ථික විද්‍යාව තුළ සිදු කෙරෙනුයේ අසීමිත මිනිස් වුවමනා සපුරාලීමට අවශ්‍ය භාණ්ඩ හා සේවා නිෂ්පාදන උදෙසා මිනිසා සතු සීමිත සම්පත් ගැලපීමේ නව මාර්ග සොයා ගැනීමට උත්සාහ දැරීම බවයි.

අසීමිත බවට නිර්ණය කෙරෙන මිනිස් වුවමනා සන්තර්පනය කිරීමේ මෙම අත්තිවාරම මත අර්ථ ශාස්ත්‍රය විසින් බොහෝ ආකෘති ගොඩනඟනු ලැබ ඇත. හැකි උපරිම මට්ටමින් යෙදවුම් තමන් සතු කර ගැනීමේ අභිලාෂය මෙන්ම අවම යෙදවුමක් තුළ ඉහළම නිමැවුමක් හඹා යෑමේ ප්‍රයත්නය ද එම ආකෘතිවල ආවේණික ලක්ෂණ වේ. සම්පත්වල අයිතිය සහ භාවිතයේ ඵලදායිතාව (හෝ කාර්යක්ෂමතාව) නැමැති සංකල්ප මෙම ආකෘතිවල ප්‍රතිඵලයන් ය. ශ්‍රම සම්පත සූරා කෑම සහ යටත්විජිතකරණය මෙම ආකෘති විසින් සුජාතකරණය කරන ලද බව පැහැදිලි වේ. මෙ වැනි සමාජ, ආර්ථික ප්‍රතිවිපාක නිරීක්ෂණය කෙරෙන විට ඊට පිළියම් ලෙස තව ද සංකල්ප හා ආකෘතීන් ගොඩනැඟීමට අපි පෙළඹෙමු. සමාජවාදය, කොමියුනිස්ට්වාදය, මූල්‍යවාදය පමණක් නොව වෙළඳපොළ අසාර්ථකතා සහ තිරසාරත්වය ද ඊට උදාහරණ ලෙස ගෙන හැර දැක්විය හැකි ය. වෙළඳපොළ තරගයෙන් දිනීම උදෙසා විවිධ උපායයන් යෙදීමට ද, අලෙවිකරණය ඉහළ නැංවීමේ අපේක්ෂාවෙන් පාරිභෝගිකයා තුළ පවත්නා ආශා සන්තර්පනය කර ගැනීමේ ගිජුකම මෝදු කරවන ප්‍රචාරණ ක්‍රමවේදයන් දියත් කිරීමට ද මෙම රාමුවෙන් දිරි ලැබෙන්නේ නිතැතිනි. මිනිසාගේ මූලික අවශ්‍යතාවන් ඉක්මවා, වුවමනාවන් මැවීම මෑතකාලීනව නිෂ්පාදකයන්ගේ ඉලක්ක බවට පත්ව තිබීමෙන් මේ බව පිළිබිඹු වෙයි. තව

ද, දිරි ගැන්වෙන පාරිභෝගිකයා සතුව ප්‍රමාණවත් ක්‍රය ශක්තියක් නොමැති නම් ඔවුන් ගේ සඵල ඉල්ලුම උද්දීපනය කිරීමේ කේන්සියානු නිර්දේශයන් ද ඉදිරිපත් කරනු ලැබෙයි, ඉදිරි ආදායම් උගසට තැබෙන පරිදි ණය බැරපත් ලබා දීම වැනි මූල්‍ය උපායමාර්ග ද දැඩි ලෙස මූල්‍යකරණයට ලක් වී ඇති[1] වර්තමාන ආර්ථිකයන් හි භාවිත කෙරෙයි. ඉන් පරිභෝජනය දිරි ගැන්වී ඒ හරහා ආර්ථික වෘද්ධියට පිටුබලයක් ලැබිය හැකි නමුත් දිගුකාලීන ණයගැති බව ද ඒ සමඟම නිතැතින්ම වර්ධනය වෙයි. ප්‍රශ්නයට ඉදිරිපත් කෙරෙන පිළිතුරම නැවත ප්‍රශ්නයක් වන්නේ ඒ අයුරිනි. මෙය, ප්‍රස්තුත ගැටලුවට හේතු පාදක වන රාමුවක් තුළින්ම අදාළ ගැටලුවට පිළිතුරු සෙවීමේ විශම චක්‍රයට නූතන ආර්ථික විශ්ලේෂණ ක්‍රමවේදයන් ගොදුරු වීමේ ප්‍රතිඵලයකි. එහෙත්, අසීමිත මිනිස් වුවමනා තෘප්ත කිරීමේ සන්දර්භය තුළම විසඳුම් සෙවීමට උත්සාහ කිරීම විනා එම සන්දර්භය අභියෝගයට ලක් කිරීමක් නූතන ආර්ථික විද්‍යා විග්‍රහය තුළ නිරීක්ෂණය කෙරෙන්නේ නම් ඒ අල්ප වශයෙනි.

අනෙක් අතට, නූතන ආර්ථික දැක්ම විසින් ගොඩනඟනු ලැබ ඇති ලෝකය පිළිබඳව කිසි අයකුට සතුටු විය හැකි ද? ගෝලීය මිනිස් ප්‍රජාවගෙන් අඩකටත් වඩා අන්ත දිළිඳුකමින් පෙළෙද්දී අතළොස්සකට අධි පරිභෝජන අවස්ථා උදා කර දී ඇති අර්ථ රටාවක් පිළිබඳව තෘප්තිමත් විය හැකි ද? රටවල් විශාල සංඛ්‍යාවක් ඌන සංවර්ධනයේ ගිලෙද්දී ලෝක ජනගහනයෙන් ඉතා සුළු ප්‍රතිශතයක් ජීවත් වන සංවර්ධිත රටවල් ගෝලීය සම්පත්වලින් අතිමහත් බහුතරයක් පරිභෝජනය කිරීමට යොමු කළ ආර්ථික සන්දර්භයක් වෙත මානව සුබසාධනයේ අනාගතය භාර දිය හැකි ද? පවත්නා පාරිසරික හා සම්පත් පීඩන තත්වයන් හමුවේ ඇමෙරිකා එක්සත් ජනපදයේ හෝ යුරෝපයේ පුරවැසියන් ගේ ඒක පුද්ගල සම්පත් ප්‍රමාණය භුක්ති විඳින මට්ටමට[2] ආසියාවේ, අප්‍රිකාවේ හෝ ලතින් අමෙරිකාවේ ආර්ථික වෘද්ධියක ඇති වුවහොත් එය දරා ගැනීමට මිහිතලයට හා ජෛව ගෝලයට හැකි වනු ඇති ද? නො එසේ ව, එවන් වූ පරිභෝජන මට්ටමක් දැනට ඌන සංවර්ධිත කලාපයන් අනාගතයේ දී අත්පත් කර නො ගත යුතු බව පවත්නා මූල ප්‍රවාහ ආර්ථික රාමුවේ පිළිගැනීම ද? පිළිතුර මින් කවරක් වුවත් ඉන් ගම්‍ය කෙරෙන ලෝකයේ පැවැත්ම සාධාරණ ද? යථාර්ථවාදී ද? ධරණීය ද?

මෙම සන්දර්භයට සැබෑ ලෙසම විකල්පයක් නොමැති දැයි විමසනු ලැබීම ඒ අනුව ඉතා තාර්කික හා කාලීන අවශ්‍යතාවකි. මෙහි දී පළමු කොට ඉස්මතු වන්නේ සෑම පුද්ගලයකුම තම අසීමිත උවමනාවන් සහ ආශාවන් තෘප්ත කිරීම සහ තම උපයෝජනය උපරිම කර ගැනීම පසුපස හඹායන සම්භාව්‍ය ආර්ථික රාමුවේ අර්ථ දැක්වෙන "තාර්කික මිනිසකු" විය යුතු ද යන ප්‍රශ්නයයි. මිනිසා ද සත්වයකු වුවත්, අසීමිත ලෙස පංචේන්ද්‍රියයන් පිනවීමට තිරිසනුන් තුළ පවත්නා කෑදරකමේ සත්ව සංඥාවෙන් මෙහෙයවනු ලැබීමෙන් බැහැරවීමට මිනිසාට නො හැකි ද? සෑම ආර්ථික නියෝජිතයකුම සූක්ෂම ආර්ථික විද්‍යා න්‍යායට

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[1] මූල්‍ය පද්ධතිය අවශ්‍ය වන්නේ ආර්ථික කටයුතුවල පහසුවට නමුත් මේ වන විට මූල්‍ය සේවා අනෙකුත් ආර්ථික ක්ෂෙත්‍ර අභිබවා යමින් හුදෙක් මූල්‍ය කටයුතු සඳහාම ප්‍රමාණාතික්‍රම ලෙස වර්ධනය වෙමින් තිබෙන බව මහාචාර්ය ලක්ෂ්මන් පවසයි. Lakshman W D (2012).

[2] මෙම සියවසේ මුල් දශකය තුළ ලෝකයේ ධනවාදී රටවල විශාල ආර්ථික අර්බුදයන් හටගත් බවත් ඉන් පසු මේ වනවිට යුරෝපාකරයේ ණය අර්බුදයක් මතු වී ඇති බවත් ඊට හේතුව මිනිසුන් තුළ ඇති දැඩි කෑදරකම හා අනවශ්‍ය ලෙස මුදල් වියදම් කිරීම බවත් සමහරුන් දක්වන බව සදාචාර ආර්ථික විද්‍යාව නැමැති තම කෘතිය තුළින් සෝමසුන්දර ගෙනහැර දක්වයි. ඇමරිකානුවන් බොහෝ දෙනෙක් අනවශ්‍ය ප්‍රමාණයට පරිභෝජනය කරන බවත් ධනයත් සමඟ මිනිසුන් අනවශ්‍ය ලෙස මුදල් වැය කිරීමේ සංස්කෘතියකට හුරු වී ඇති බවත් ඔහු පවසයි (සෝමසුන්දර ජේ ඩබ්ලිව් ඩී; 2013)

අනුව උපයෝගිතාව උපරිම කර ගැනීමට උත්සාහ දරන සහ කිසිවිටෙක තමා ලද සම්පත් ප්‍රමාණයෙන් සෑහීමකට පත් නොවන අතර අසීමිත වුවමනාවන් සන්තර්පණය කර ගැනීමට තරගකාරීව වෙහෙසෙන ස්වයං-අභිමතාර්ථ මුදුන් පමුණුවා ගැනීමේ ආත්මාර්ථකාමී අභිලාෂ සහිත වූවකු බවට සම්භාව්‍ය ආර්ථික විද්‍යා රාමුවේ එන එජ්වර්ත් ගේ (Edgeworth; 1881) මතය ඉන්දීය ආර්ථික විද්‍යාඥයෙකු වන අමාර්ත්‍යා සෙන් (1977) ප්‍රතික්ෂේප කරයි. ඔහු සඳහන් කරන පරිදි ආර්ථික තාර්කික මිනිසකු ලෙස "අන්තවාදී වීමට" මිනිසාට නො හැක. තම මූලික අවශ්‍යතා සපුරා ගැනීමට මිනිසා පෙළඹීම ස්වභාවික නමුත් අසීමාන්තික ලෙස ලාභ අපේක්ෂණය හෝ පරිභෝජනයෙන් තෘප්තිමත් වීමට නො හැකි වීමේ ගිජුකම සෑම මිනිසකු තුළම තිබීම අවශ්‍ය නො වේ. එසේ නම්. ඒ හරහා අභියෝගයට ලක් වන්නේ නූතන අර්ථශාස්ත්‍රයේ මූලික පදනමකි. එය දෙදරන්නේ නම් ඒ මත ගොඩනඟනු ලැබ ඇති විශ්ලේෂණ විධික්‍රමයන්හි වලංගු බව ප්‍රශ්න කරනු ලැබීම අරුමයක් නො වේ. ඒ තුළ ආමන්ත්‍රණය කෙරෙනුයේ ආර්ථික දැක්මක් පිළිබඳව වන නව්‍ය වූ විග්‍රහ රාමුවකටය; නැතහොත් විකල්ප සුසමාදර්ශයකට ය.

බෞද්ධ ආර්ථික දැක්ම

බෞද්ධ ආර්ථික දැක්මක් පිළිබඳව අර්ථ ශාස්ත්‍රඥයන්ගේ අවධානය යොමු වන්නේ මෙම සන්දර්භය තුළ ය. බටහිර ආර්ථික විද්‍යාඥයකු වන ෂුමාකර් (1967) දෘෂ්ටිකෝණ ගණනාවකින් බෞද්ධ අර්ථශාස්ත්‍රය සාධාරණීකරණය කරයි. ඔහු ප්‍රකාශ කරන්නේ ඕනෑම ආධ්‍යාත්මික හෝ ආගමික වටිනාකමකට වඩා ආර්ථික වර්ධනය වැදගත් යැයි පිළිගන්නා පුද්ගලයකුට පවා බෞද්ධ ආර්ථික විද්‍යාව වැදගත් වනු ඇති බවයි. එසේ වනුයේ, එ මඟින් නූතන වර්ධනය හා සාම්ප්‍රදායික එකතැන පල්වීම අතර තෝරා ගැනීමක් ඉදිරිපත් කරන නිසා පමණක් නොව, සංවර්ධනය වීමේ නිවැරදි මාර්ගය හෙවත් මධ්‍යම ප්‍රතිපදාවට මඟ පෙන්වන බැවිනි.

අසීමාන්තික කෑදරකම තුළින් ලබා ගන්නා කෙටිකාලීන ආර්ථික වර්ධන ප්‍රතිඵල නොව වර්තමානයේ මෙන්ම දිගුකාලීනව ද සමාජ ආර්ථිකමය යහපැවැත්ම තහවුරු කෙරෙන තිරසාර ආර්ථික දැක්මක් බෞද්ධ දර්ශනය තුළ ගැබ් වී ඇත. ආරියරත්න (1999) සිය *ෂුමාකර් දේශන* තුළින් ඉස්මතු කර පෙන්වා දෙන පරිදි ලෞකික ජීවිතය තෘප්තිමත්ව ගත කිරීම බුදුදහමට කිසිසේත් පටහැනි නො වේ. මූලික අවශ්‍යතා සපුරා ගැනීමට අසමත් වන්නේ නම් ජීවිතය තෘප්තිමත්ව ගත කළ නො හැකි අතර එය අගතියට ද හේතු වෙයි. ආර්ථික සුරක්ෂිතතාව නැති පුද්ගලයකු නිතර අසහනයෙන් පෙළෙන අතර යහපත් ක්‍රියාවන් පිළිබඳ සිතක් පහළ වීමට හෝ ඉඩක් නොමැත. එබැවින් ආර්ථික දියුණුව ළඟා කරගත යුතු වෙයි. ධනයේ සහ ධනය රැස් කිරීම් නියමාර්ථය පිළිබඳ කෙරෙන පැහැදිලි කිරීම් අනුව ධනය නිෂ්ඨාවන් සාධනය කිරීමේ මාධ්‍යයක් බව ද පෙන්වා දෙනු ලැබෙයි.[3] ලෞකික සුභසිද්ධියට ගමන් කිරීමේ සාධක ලෙස උත්සාහය, ආරක්ෂාව, යහපත් සමාජ ආශය හා අය-වැය සමව පවත්වා ගැනීම[4] බුදු දහම තුළ පැහැදිලිව පෙන්වා දී ඇති බව මහතන්ත්‍රිගේ (2003) පවසයි.

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[3] අංගුත්තර නිකායෙහි ව්‍යග්ඝපජ්ජ සූත්‍රය

[4] උට්ඨාන සම්පදාව හෙවත් කාර්යයෙහි දක්වන උද්යෝගය, ආරක්ඛ සම්පදාව හෙවත් විනාශ දොරටු වසා ගැනීම, කල්‍යාණ මිත්තතා හෙවත් විශ්වාසවන්ත පිරිසක් ආශ්‍රය කිරීම, සමජීවිකතා හෙවත් බුද්ධිමත්ව ධනය පරිහරණය කිරීම" සිගාලෝවාද සූත්‍රය

නිෂ්පාදනය

ධනය නිෂ්පාදනය සම්බන්ධයෙන් ඉදිරිපත් කළ දර්ශනය කවර ආර්ථික දැක්මකට වුව උචිත වෙයි. ආර්ථික ක්‍රියාවලියක් සඳහා තත් විෂය සම්බන්ධයෙන් ව්‍යවසායකයා සතුව පැවතිය යුතු දක්ෂතාව, විශේෂඥතාව හෝ නිපුණත්වය; එම දක්ෂතාව ඔප් නැංවෙන පරිදි ව්‍යවසායකයා තුළ ගොඩනඟා ගත යුතු කාර්යශූරත්වය හා උදාසීන-අලස-කම්මැලි-නිද්‍රාශීලි ගති පැවතුමෙන් බැහැර වීම; තමාගේ නිෂ්පාදනයෙහි උපයෝගිතාව හා ඊට යෝග්‍යභාවය පිළිබඳ අවබෝධය සහ නොනිසි දේවලින් බැහැර වෙමින් නිසි නිෂ්පාදනයන් කලට වේලාවට, නිපැයීම හා සැපයීම; මනා සංවිධාන සැලසුමකින් යුතුව කටයුතු කිරීම[5]; ඉස්මතු කර දක්වනු ලැබ තිබේ. නිෂ්පාදන ක්‍රියාවලියේදී අත්‍යවශ්‍යම කළමනාකරණ සංකල්පයක් ලෙස ද මෙය ඉදිරිපත් කළ හැකි ය.

බුදු දහම "පාර ලෞකික" බවට ද ඒ අනුව සමාජ බලවේග හෝ සමාජ ව්‍යාපාර පිළිබඳ දැක්මක් බෞද්ධ දර්ශනයට නොමැති බවට ද හයින්ස් බෙෂර්ට්[6] කරන ප්‍රකාශය සමඟ ධර්මසේන හෙට්ටිආරච්චි (2002) එකඟ නො වේ. ලෞකික සැප අමතක කර ලෝකෝත්තර සැපයක් සොයා යන ලෙස බුදු දහමෙහි කිසිවිටෙක නො පැවසේ. බුද්ධ දර්ශනය පුද්ගල තෘප්තිය හෝ සමාජ ආර්ථික සමෘද්ධිය ප්‍රතික්ෂේප නො කරයි.[7] ඉන් ඔබ්බට ගොස් ධනය ඉපැයීම සහ හිමිකර ගැනීම ආර්ථික සුරක්ෂණයට සහ ආත්ම අභිමානයට හේතු වන බවත්, එම ධනය තමන් ගේ, තම පවුලේ, ඥාති හිතවතුන් ගේ, සේවකයන් ගේ අවශ්‍යතා වෙනුවෙන් උපයෝජනයට මෙන්ම අන්‍යන්ට උදව් කිරීම සඳහා යොදා ගැනීමට හැකි වීම තුළින් තෘප්තියට පත් විය හැකි බවත් පෙන්වා දෙයි. මින් පෙනී යන්නේ ධනය සහ සම්පත් උපයා-සපයා ගැනීමේ වැදගත්කම බෞද්ධ දර්ශනයේ ප්‍රකාශිතවම ගැබ් වී ඇති බවයි.

පරිභෝජනය

ධාර්මිකව වස්තු ඉපයීම පිළිබඳව පමණක් නොව උපයා ගත් ධනය පරිහරණය කළ යුතු ආකාර පිළිබඳව බුදු දහමේ අන්තර්ගතය ද අර්ථ ශාස්ත්‍රමය මඟ පෙන්වීමකි. සමජීවිකතාව තුළින් තුලිත අය-වැයක් පවත්වා ගනිමින් මූල්‍යමය ස්ථාවරතාව ඇති කර ගත යුතු ය. නූතන මූල්‍ය කළමනාකරණයේ එන ආදායම් විශ්ලේෂණය, අවදානම් කළමනාකරණය ආයෝජන සැලසුම්කරණය ආදී සංකල්ප ද බෞද්ධ ආර්ථික දර්ශනයෙන් පිළිබිඹු වෙයි. ණය නොමැති වීම තුළ නිවහල් බවේ සතුට අන්තර්ගත වේ.[8] ආධ්‍යාත්මික විමුක්තිය සෙවීමට ද මෙම පදනම උපකාරී වෙයි. තම ආදායම කොටස් සතරකට බෙදා මනාව පරිහරණය කළ යුතු ආකාරය පිළිබඳව උපදෙස් දෙනු ලැබෙයි. ඉපැයීම්වලින් සියයට විසි පහක ඉතුරුම් නිර්දේශයක් ද එම දැක්ම තුළ අන්තර්ගත වේ. ආර්ථික ස්ථාවරත්වය හා අවදානම කෙරෙහි පූර්ව සූදානම ඉතා වැදගත් බව ඉන් නිරූපණය වෙයි. සාර්ථක

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[5] "දක්ඛො - අනලසො - තත්‍රූපාය වීමංසාය සමන්නාගතො - අලංකාතුං - අලංසංවිධාතුං" ව්‍යග්ඝපජ්ජ සූත්‍රය

[6] Bechert Heinz, in his article on Buddhism as a Factor of Political Modernisation: The Case of Sri Lanka, in *Religion and Development in Asian Societies*, published by Marga Publication, Colombo, Sri Lanka, 1974, as quoted by Dharmasena Hettiarachchi (p 33)

[7] ධම්මික සූත්‍රය (Ven. Yatagama Dhammapala, H.M. Moratuwagama, 1996)

[8] අණන සුබය

පුද්ගලයෙකු වීම සඳහා කළ යුතු - නො කළ යුතු දේ පිළිබඳ මඟ පෙන්වීමක් ද කෙරෙයි. වීර්යයෙන් තොර වීම, අලස වීම, සැප සම්පත් තනිව භුක්ති විඳීම ආදිය පරාභවයට හේතු වන බවත් ; ශිල්ප දන්නා බව, නිවැරදි කර්මාන්ත කිරීම, ලද දෙයින් සතුටු වීම යනාදිය මංගල කරුණු බවත් බුදු දහමෙහි උපුටා දැක්වෙයි.[9] එම අර්ථ රටාවට අනුකූල වූ දිවි පෙවෙතක් අනුගමනය කිරීම තුළින් තෘප්තිමත් ජීවිතයක් ගත කිරීමේ හැකියාව ලැබේ.[10] මෙහිදී "තෘප්තිමත්" යන වචනය නිවැරදිව නිර්වචනය විය යුතු අතර ලෞකික තෘප්තිය පිළිබඳ අසීමාන්තික ගිජුකම සහ දිළිඳුකමින් පෙළෙමින් මූලික අවශ්‍යතා තෘප්ත කර ගැනීමට පවා නොහැකි වීම යන **අන්ත දෙක** බැහැර කරමින් මධ්‍යම ප්‍රතිපදාවෙන් ගත කරන උපේක්ෂා සහගත සරල ගෘහ ජීවිතයක් බෞද්ධ දර්ශනයෙන් නිර්දේශ කෙරෙයි.[11]

සුසමාදර්ශීය වෙනස

බෞද්ධ ආර්ථික දර්ශනය වර්තමාන ලෝකය විශේෂිව හඳුනා ගන්නා විෂය පථයක් නොවේ. එය ජාතික ආදායම, නිෂ්පාදන සහ මිලදී ගැනීමේ හැකියා වර්ධනය, කාර්යක්ෂමතා වර්ධනය හෝ පූර්ණ සේවා නියුක්තිය වැනි "උද්යෝග පාඨයන්ට" කොටු වූ සීමිත හැකියාවන් සහිත ආකෘතියක් ද නොවේ. එය මිනිස් ජීවිතයේ සතුට සහ සැනසුම කරා වූ පූර්ණ, සමස්ත සහ ඒකාබද්ධ ප්‍රවේශයකි. ඒ උදෙසා අවශ්‍ය විප්ලවීය වූ නමුත් හිංසනයෙන් වියුක්ත වූ සමාජමය වෙනස වෙත ආමන්ත්‍රණය කරන්නකි. ගැටලු නිරාකරණයේ බෞද්ධ ප්‍රවේශය ආනුභවික, ප්‍රායෝගික හා සමස්ත වූවකි. ඒ තුළ ද්‍රව්‍යමය මෙන්ම ආධ්‍යාත්මික සංවර්ධනය ද අතිනත් ගෙන යා යුතුය. ස්වාර්ථය වෙනුවෙන්ම සම්පත් රැස් කිරීම හඹායන නූතන ආර්ථික දැක්මෙන් කැපී පෙනෙන වෙනසක් බෞද්ධ ආර්ථික ප්‍රවේශයේ ඇති වන්නේ මෙම අතිනත් ගැනීම තුළ දී ය. ආරියරත්න[12] විසින් උපුටා දැක්වෙන පරිදි ෂූමාකර් පවසන්නේ වෙනත් විශේෂඥයන් මෙන්ම අර්ථ ශාස්ත්‍රඥයන් ද ඔවුන්ගේ ශාස්ත්‍රය පූර්ව කල්පිතයන්ගෙන් තොර වූ පරිපූර්ණ හා ස්ථාවර සත්‍යයක් බව විශ්වාස කරන යම් ආකාරයක *පාරභෞතික අන්ධභාවයකින්* පෙළෙන්නන් බවයි. ඔවුන් අතරින් සමහරුන් සිතන්නේ ආර්ථික විද්‍යා න්‍යායන් ගුරුත්වාකර්ෂණ නියාමයන් මෙන් පාරභෞතික විද්‍යාවන්ගෙන් හෝ අගයයන්ගෙන් වියුක්ත වූවක් ලෙසිනි. ෂූමාකර් පවසන්නේ කිසියම් ආධ්‍යාත්මික හෝ ආගමික අගයකට වඩා ආර්ථික වෘද්ධිය වැදගත් කොට සලකන්නවුන් පවා බෞද්ධ අර්ථශාස්ත්‍රය හැදෑරීම වර්තමාන අත්දැකීම් සඳහා මෙන්ම දිගුකාලීන අවස්ථා උදෙසා වැදගත්වන බවයි. "එය නූතන වෘද්ධිය සහ ගතානුගතික *එක තැන පල්වීම* අතර තෝරා ගැනීම පිළිබඳ ප්‍රශ්නයක් නොවේ. එය *ද්‍රව්‍යවාදී උමතුව* සහ *ගතානුගතිකවාදී අබිබගාතබව* යන දෙ අන්තය අතරින් සංවර්ධනය කරා විහිදුනු නිවැරදි මැද මාවත සොයා යාමකි. කෙටියෙන් කිවතොත් නිවැරදි ජීවන මාර්ගයයි" (ආරියරත්න, 9 වැනි පිටුව). බටහිර ආර්ථික දෘක්ම තුළ සදාචාරවත් බවට ස්ථානයක් නොමැත. බෞද්ධ ආර්ථික දෘක්ම හා බටහිර ආර්ථික දෘක්ම අතර ඇති ප්‍රධාන බෙදීම මෙයයි.

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[9] මහා මංගල සූත්‍රය හා පරාභව සූත්‍රය (Chandima Wijebandara, H.M.Moratuwagama, 1999)

[10] ව්‍යග්ගපජ්ජ සූත්‍රය

[11] Ariyaratne, ibid (p 5)

[12] Ariyaratne, ibid (p 5)

ලෝක ආර්ථිකයේ පරිණාමය තුළ අවශ්‍යතා-පාදක අර්ථ රටාවෙන් ක්‍රමානුකූලව උවමනා-පාදක රටාවක් කරා ගමන් කළ ආර්ථිකයන් විශේෂ වශයෙන් කර්මාන්ත විප්ලවය සහ යටත්විජිතකරණය මෙන්ම විද්‍යා හා තාක්ෂණ දියුණුව කරණ කොට ගෙන වඩ වඩාත් ගිජුකම-පාදක වූ ආර්ථිකයන් දක්වා පරිවර්තනය වූ අයුරු නිරීක්ෂණය කළ හැකිය. මේ තුළින් මිනිස් සමාජයට හා ජෛවගෝල පරිසරයට සිදු වූ විනාශකාරී බලපෑම සුළුපටු නොවේ. තාක්ෂණික පුනරුදයත් හේතු කොටගෙන ඇති වූ මහා පරිමාණ නවෝත්පාදන හා නව සොයා ගැනීම් කෙටි කාලීනව මිනිසා ගේ කෑදරකම යම් තරමකට තෘප්ත කිරීමට ප්‍රමාණවත් වුව ද බොහෝ විද්‍යාඥයන් ගේ සහ දාර්ශනිකයන්ගේ මතය වනුයේ නුදුරු අනාගතයේදීම එම අසාමාන්‍ය දියුණුවෙහි අනිටු විපාක විඳිමින් මිහිමතින් අතුරුදහන් වීමට පවා මිනිසාට සිදුවිය හැකි බවයි. ක්‍රිස්තු වර්ෂයෙන් තෙවන සහශ්‍රකයට ප්‍රවිෂ්ට වී සිටින අපි මේ වන විට එම අනුවර්තනයේ පූර්ණ ව්‍යසනය දක්වා වූ ප්‍රමාණාතික්‍රම ඉදිරි පිම්මකට මුහුණ දී සිටිමු.[13]

මිනිස් ශ්‍රමය

නූතන ලිබරල් ආර්ථික විද්‍යාවේ සහ මාක්ස්වාදී ආර්ථික න්‍යායේ මෙන්ම බෞද්ධ ආර්ථික දර්ශනයේ ද මිනිස් ශ්‍රමයට හිමිවන්නේ වැදගත් ස්ථානයකි. එහෙත් බෞද්ධ ආර්ථිකයේ මිනිස් ශ්‍රමය යනු ස්වභාවික සම්පත් මත මූල්‍යමය අගය එකතු කරන හුදු ආර්ථික සාධකයකට ඔබ්බෙන් වූ මානව සම්පතකි. එය සේව්‍ය-සේවක සම්බන්ධතා, ශ්‍රමික සුබසාධනය, සේවා නියුක්තියේ සතුට හා තෘප්තිමත් බව ද ආවරණය කෙරෙන පරිදි පුළුල් වූවකි. නිෂ්පාදන කාර්යයේ දී ශ්‍රමය කෙරෙහි අභිමානයක් ඇති කිරීම බුදු දසුනෙන් අවධාරණය කෙරෙයි. සේවකයා ගේ අභිමානය රැකීම සඳහා සේව්‍යයා විසින් කළ යුතු කාර්යභාරය [14] මෙන්ම ඒවා ඉටු කෙරෙන විට සේවකයා විසින් ඉටු විය යුතු කාර්යභාරයන් [15] පිළිබඳව ද අවධාරණය කෙරෙයි. ශ්‍රම විභජනය සහ විශේෂීකරණය බෞද්ධ ආර්ථික දර්ශනය තුළ ප්‍රතික්ෂේප නො කෙරේ. එහෙත්, එ වන් වූ විභජනයක් හෝ විශේෂිකරණයක් මත ශ්‍රමිකයා තරාකරණයට ඒ තුළ ඉඩක් නොමැත. ශ්‍රමිකයා ගේ මිනිස් අවශ්‍යතා තෘප්ත විය යුතු ය. ඊට සරිලන චේතන ඔහුට ගෙවනු ලැබිය යුතු ය. ඒ තුළ ශ්‍රම සූරාකෑමකට හෝ ශ්‍රම ඒකාධිකාරයන් තුළින් අධිචේතන කේවල් කිරීමට හෝ අවශ්‍ය නො වේ. ශ්‍රමිකයා ගේ පුහුණුව, ශාරීරික-මානසික යෝග්‍යතාව, සේවක උද්යෝගය, සුබසාධනය, නිවාඩු, සෞඛ්‍ය ආරක්ෂණය සහ දිරිගැන්වීම ද සාධාරණ වැටුප් ගෙවීමට අමතරව සිදු කෙරන අර්ථක්‍රමයක් තුළ එවැනි සූරාකෑම් හෝ කේවල් කිරීම් අදාළ නො වේ.

රජයේ කාර්ය භාරය

සාර්ව දේශපාලන-ආර්ථික රාමුව තුළ සාමය හා සමෘද්ධිය උදෙසා බෞද්ධ ආර්ථික දර්ශනයේ ඉගැන්වීම් ඉතා කාලීන වේ.[16] නිෂ්පාදනයේ අවප්‍රමාණ වීමක් හෝ භාණ්ඩ හා සම්පත් බෙදාහැරීමේ අකර්මන්‍යතා නිසා සමස්ත ආර්ථික ව්‍යුහයම බිඳ වැටීමට හා ඒ තුළින් ව්‍යාකූලත්වයට හා විනාශයට තුඩු දිය හැකි අයුරු පෙන්වා දෙනු ලැබ ඇත. රජය

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[13] "We witness that we are now ready to make a quantum jump into total oblivion", Ariyaratne (ibid) p9.

[14] සිගාලෝවාද සූත්‍රය

[15] කුසීතාරමහ සූත්‍රය

[16] චක්කවත්ති සීහනාද සූත්‍රය, කූටදන්ත සූත්‍රය සහ අග්ගඤ්ඤ සූත්‍රය

මැදිහත් වී එවැනි තත්වයන් වළක්වාලිය යුතු ය. රටක සම්පත් අතලොස්සක් විසින් මෙහෙයවනු ලැබීමට ඉඩ නො තැබිය යුතු ය. මහජනතාව සතු එම සම්පත් උත්සව සහ සංදර්ශනය වෙනුවෙන් නාස්ති නො කළ යුතු අතර ග්‍රාමීය සම්පත් එවැනි සංදර්ශන සඳහා නගරය වෙත උකහා නො ගත යුතු ය. "විවේක පංතියේ න්‍යාය" නැමැති තම කෘතියෙන් තෝර්ස්ටයින් වෙබ්ලන් (1899) විසින් *සන්දර්ශනාත්මක පරිභෝජන* නැඹුරුව ලෙස හඳුන්වා දෙන ලද "අන්‍යයන් ඉදිරියේ කැපී පෙනීම සඳහා තමන්ට අත්‍යවශ්‍ය නොවන භාණ්ඩ පරිභෝජනය" කරා යොමු වීමෙන් සම්පත් නාස්තියක් උද්ගත වෙයි. එය ඉතා හානිකර ය.

අරපිරිමැස්ම සහ නාස්තිය පිටු දැකීම

සම්පත් නාස්තිය සම්බන්ධයෙන් බෞද්ධ ආර්ථික දර්ශනය දක්වන්නේ සුවිශේෂී අවධානයකි. සම්පත් හානි වීමේ ඉඩකඩ හා ඉන් වලක්වාලීමේ මාර්ග ද බෞද්ධ ආර්ථික දර්ශනය තුළ ප්‍රකාශිතව සඳහන් වී ඇත. අල්පේච්ඡ ජීවන රටාව හා ඉතුරුම් ආර්ථිකය ඉතා වැදගත් වෙයි. යුරෝපීය රටවල් තමන් වර්තමානයේ මුහුණ පා සිටින ණය අර්බුදයට විසඳුම් වශයෙන් ඉදිරිපත් කර ඇත්තේ ද දැඩි පිරිමැස්ම බවත්, අපිස් ජීවිතයකට තම රටවැසියන් හුරු කරවීම සඳහා දෘඪශීලී ප්‍රතිපත්ති රැසක් බවත්, රජයේ වියදම් කපා හැරීම, වැටුප් සීමා කිරීම, ණය සීමා කිරීම ඉන් සමහරක් බවත්, මේ බෞද්ධ දර්ශනයේ එන සරල දිවිපැවැත්ම පිළිබඳ සංකල්පයට ප්‍රවේශ වීමක් බවත්, සෝමසුන්දර (2013) ගේ මතයයි. ණය නො වී ජීවත් වීම ගෘහස්ථයාට ලද හැකි සැපතක් බව සඳහන් වුව ද,[17] ඵලදායී ආයෝජන අවශ්‍යතා සඳහා ණය ගැනීම වරදක් නො වේ. ණය ගැනීම නූතන ආර්ථිකයෙහි ප්‍රාග්ධනය සපයා ගැනීමේ ප්‍රධානම අංගයක් ලෙස සැලකේ. කාමයෝගී දිළින්දාට ණය ගැනීම දුකක් වුව ද[18] ගෙවීමේ සැලසුමක් ඇති පුද්ගලයා තම ව්‍යාපාර දියුණු කර ගැනීම සඳහා ණය ගැනීම වරදක් බව බුදුසමය අවධාරණය නො කරයි.

ආර්ථික භාණ්ඩ ප්‍රශස්ත ලෙස උපයෝජනය නාස්තිය පිටු දැකීමට මෙන්ම පරිසර සංරක්ෂණයට ද ඉවහල් වෙයි. වර්තමානයේ දී ඉසුරුමත් පන්තියේ පමණක් නොව සාමාන්‍ය ජනතාව අතරින් පවා "නැවත නැවතත් භාවිතය" (re-use) ගිළිහෙමින් පැවතීම සම්පත් නාස්තියට සොරොව් දොරටු විවර කිරීමකි. බෞද්ධ දර්ශනය තුළ ආර්ථික භාණ්ඩ අවම ලෙස ඉවත දැමෙන පරිදි යළි-යළිත් භාවිතයට ගැනීම පිළිබඳ ඉතාම සාරවත් දැක්මක් ඉගැන්වෙයි. භික්ෂූන් තම සිවුරු පෙරවීමට නො හැකි තරමට පරණ වූ විට ඒවා ඇඳ ඇතිරිලි බවට පත් කරගන්නා බවත්, තව ද පරණ වන විට පාපිස්නා සකසා ගන්නා බවත්, ඊටත් පරණ වන විට ජලයෙහි තෙමා බිත්ති පිරිසිදු කර ගන්නා බවත්, තව දුරටත් දිරාපත් වන විට සිහින්ව කපා මැටි සමඟ අනා කුටි තනා ගන්නා බවත්, බෞද්ධ සාහිත්‍යයේ ඇගැයීමට පාත්‍ර වෙයි.[19] නූතනයේ මෙම සංකල්පය "ප්‍රතිචක්‍රීකරණය" ලෙසින් අපට ඉගැන්වේ. බෞද්ධ සාංස්කෘතික පදනමක් සහිත ලාංකීය සමාජයේ මීට අනුකූල ආර්ථික පිළිවෙත් මෑතක් වන තුරු ම පැවැතිණි. අධ්‍යාපනික විෂය මාලාවට නියමිත පරණ පොත්, ඇඳුම් පැළඳුම් නැවත නැවත භාවිතයට ගන්නා ක්‍රමවේද පැවැතිණි. එහෙත්, නූතනයේ ප්‍රදර්ශනාත්මක පරිභෝජන රටාව තුළ ඇතැම් වාහන, යන්ත්‍ර-සූත්‍ර, දෑව

17 අංගුත්තර නිකායේ අණන සුත්‍රය

18 අංගුත්තර නිකායේ ඉණ සුත්‍රයේ

19 චුල්ලවග්ග පාලි

උපකරණ, පරිගණක හා තාක්ෂණික මෙවලම් පවා ඉතා සුළු අඩු-පාඩුවක් මත ඉවතලනු දැකිය හැකි ය. එය බෞද්ධ අර්ථ රටාවට පටහැනි නැඹුරුවකි.

පොදු අයිතිය

පොදු අයිතිය පිළිබඳව මූලධර්මයට ද ඉහළ ප්‍රමුඛතාවක් බෞද්ධ දර්ශනය තුළ ලබා දී ඇත. දේපොළ පොදු වශයෙන් පරිභෝජනය කිරීම බෞද්ධ ආර්ථික දර්ශනයට අනුව ඉතාම උසස් ධන විභජන ක්‍රමය වන බව ගුණපාල ධර්මසිරි (1986) සඳහන් කරයි. මේ බව ප්‍රතික්ෂේප නො කරන ධර්මසේන හෙට්ටිආරච්චි සඳහන් කරන්නේ භෞතික සම්පත්වල හිමිකාරත්වය වඩ වඩාත් කෑදරකමට මිනිසා පෙළඹවීමට ඉඩ ඇති නමුත් කෑදරකමට එකම සාධකය නිෂ්පාදන සාධකයන්ගේ පෞද්ගලික අයිතිය ලෙස බෞද්ධ දර්ශනයේ දී නොසැලකෙන බවයි. පාරිභෝගිකයා විසින් සම්පත් හඹා යෑමේ අසීමාන්තික පෙළඹීම පාලනය කර ගත් විට සම්පත් තිබූ පමණින් එම අගතිගාමීත්වය උද්ගත නො වේ. මෙම දාර්ශනික පදනම මත පිහිටන බෞද්ධ ආර්ථික දැක්ම තුළ පොදු අයිතියට ඉහළ ප්‍රමුඛතාවක් හිමි වුව ද, පෞද්ගලික දේපළ ක්‍රමය සම්පූර්ණයෙන් ප්‍රතික්ෂේප කිරීමක් ගැබ් නො වන බව ඔහු ගේ මතය යි.[20]

තිරසාරත්වයේ සංකල්පය

නූතන අර්ථ ශාස්ත්‍රයේ විග්‍රහ කෙරෙන පරිදි වර්තමාන ආර්ථික ඒජන්තයන් තම උපයෝජනය උපරිම කිරීමට ආත්මාර්ථකාමීව ගනු ලබන පියවර වෙනුවට, වර්තමාන ජන සමාජය පමණක් නොව අනාගත පරපුරේ උපයෝජන අවශ්‍යතා ද තෘප්ත කරනු ලැබිය හැකි අයුරු ජාතික සම්පත් කළමනාකරණය රජයේ වගකීම වේ. ස්වභාවික සම්පත් සහ ජාතික ධනය සුරැකිය යුතු ය. ඒ සම්පත් ධරණීයව වර්ධනය වන පරිදි මනාව සැලසුම් කරන ලද සංවර්ධනාත්මක ආයෝජන ව්‍යාපාරයන් ක්‍රියාත්මක කළ යුතු ය.

ඒ නයින් බලන කල වර්තමානයේ ප්‍රමුඛත්වයෙහි ලා සැළකෙන තිරසාර සංවර්ධනය පිළිබඳ සංකල්පය ප්‍රථමයෙන් අපට හමු වන්නේ බෞද්ධ ආර්ථික දර්ශනය තුළ බව ද,[21] ක්‍රිස්තු පූර්ව හතරවන ශත වර්ෂයේ දී, මිහිඳු හිමියන් විසින් දෙවන පෑතිස් රජු වෙත කරන ලදැයි පිළිගැනෙන ප්‍රකාශනයෙන් බෞද්ධ ආර්ථික දර්ශනයේ අන්තර්ගත එම දැක්ම සෘජුවම පිළිබිඹු කෙරෙන බව ද, නිරීක්ෂණය වෙයි :

> *"මහරජ, ඔබ මේ රටේ, මේ පොළොවේ, මේ සම්පත්වල අයිතිකරු නො වේ. භාරකරු පමණි. ඔබගේ වගකීම වන්නේ ඒවායේ සැබෑ අයිතිකරුවන් වන මේ රටේ මහජනතාව ගේ පමණක් නොව සතා සිව්පාවා ගේ සහ ගහ-කොළ වල වර්තමාන පරපුරේ මෙන්ම අනාගත පරපුරුවල ද සුබසාධනය තහවුරු කෙරෙන පරිදි එම සම්පත් කළමනාකරණය කිරීමයි".*

[20] හෙට්ටිආරච්චි ධර්මසේන, ibid (පිටුව 332)

[21] මිහිඳු හිමියන් සිංහලද්වීපයට බුදු දහම හඳුන්වා දුන්නේ රතු ඉන්දියානු නායක *සියැටල් ජීවත් වූ යුගයට ශතවර්ෂ විස්සකටත්* පෙර දී ය.

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MODELLING WITH DATA DEFICIENCIES

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Abstract

The availability of numerically measured data without measurement errors is a requirement for any statistical analysis. However, this requirement is not met in many cases, especially in statistical applications in social sciences. In the context of social science applications, two broader types of measurement errors can be identified. Error due to data collection inefficiencies is the first type. The second type is the presence of numerically immeasurable variables. Conceptual Variables, Multi-dimensional Variables and Hidden (latent) Variables are examples of numerically immeasurable variables.

Measurement errors of first type would be minimized if the survey design is done with extra care. Use of proxies is one of the popular methods to overcome problems associated with second type. However, use of proxies is also criticized because it can create another form of measurement error.

Statisticians and econometricians have proposed various statistical methods to overcome the problem of measurement errors. This paper classified them into two as theoretical and technical. Theoretical solutions derive equations with measurable variables to represent conceptual variables. Several technical solutions are reviewed in this paper. Instrumental variable method and orthogonal distance regressions are generally accepted solutions for most forms of measurement error. Discrete choice models with measurable indicator variables and canonical regression methods are used by applied statisticians and econometricians to overcome the problems of latent dependent variable and multi-dimensional variables.

Key Words: *Measurement error problem, Latent Variables, Multi-dimensional variables, Canonical Correlation (Regression), Instrumental Variable Method, Orthogonal Regression*

INTRODUCTION

Economists suffer from more data problems than any other scientists. Therefore, a significant amount of theoretical and technical contributions in econometrics literature are directly or indirectly associated with attempts to solve data and data related problems. Griliches (1986) has identified three inter-related causes of data problems in economic analysis: incorrect or incomplete theories, inappropriate levels of data aggregations and incorrect data (relative to what it purports to measure). Griliches (1986) has also identified one more reason in his article, but it is not listed as one of the "main causes" of data difficulties. The "fourth cause" that Griliches (1986) identified but did not list as a main cause is the gradually increasing complication of economic theories. There are many theories in economics relating to conceptual [Friedman (1957) permanent income] or hidden [McFadden (1980) utility] or multi-dimensional [Vinod (1968) joint-products] variables as dependent or independent variables. Some theories are too complicated for statistical estimation [all productions beyond Cobb-Douglas for example]. Griliches (1986) further elaborated the fact that they (economists) use data collected by others for different purposes and that the data collection itself is done by "non-professional" enumerators. Therefore, data inaccuracy is more likely in economics than any other fields.

First paragraph of Griliches (1986) states;

> *"...Econometricians have an ambivalent attitude about economic data. ..., 'data' are the world they want to explain… At the other level, they are the source of all troubles. Their imperfections make our job more difficult and often impossible… If the data were perfect, ... there would be hardly room for a separate field of econometrics.... it is the "badness" of the data that provides us with our living..."*
>
> [Griliches, Z. (1986), p. 1466]

Econometricians have spent more time and effort to developing methods to rectify the data problem.

This paper is an incomplete review of selected theoretical and empirical literature on measurement error problem and presence of immeasurable variables. It is declared as incomplete because it is practically impossible to review all major works relevant to the review. This calls for more comprehensive and more updated reviews on the same subject.

The paper is organised into four sections including the Introduction. In its second section, the paper presents the OLS model, satisfying all assumptions. This is limited to a re-production of the textbook version of OLS method. Purpose of reproduction of the OLS method is to clear the platform for the review in this paper. This section is concluded with highlights of the impacts of the two problems identified above. Next, it directly addresses various sources and forms of measurement error problem, immeasurable variables and remedies for them. Final section is devoted for concluding remarks.

THE OLS METHOD

The history of the Ordinary Least Squared (OLS) Method is reported in Merriman (1877). According to the recorded history, the OLS method is first introduced in 1806 by Lagendre. Merriman (1877) briefly reviews that in the 70 years period from 1806 to 1870 there are thirteen different proofs of the OLS method.

From its inception, the technique is strictly recommended for sciences in which controlled experiments are possible. Assumptions therein are justified in that context. However, most of those assumptions were challenged when the same method was used in the social sciences, in which controlled experiments are not possible. As per common academic consensus, the OLS method was first used in the context of social sciences Jan Tinbergen, the first Nobel laureate in Economics (1969)[1].

Suppose the relationship for estimation is

$$(1) \qquad y_i = \beta x_i + u_i$$

Where, y_i is the dependent variable, x_i is the independent variable, u_i is unexplained or the residual term of regression and β is the regression coefficient to be estimated. The OLS estimator of this equation is derived assuming certain behaviours of y_i, x_i and the u_i. For details of those assumptions, a reader can refer to any standard econometric textbook. [See, *inter-alia* Gujarati (2004)]. Among all other assumptions, for the purpose of this paper it is crucial that measurability of y_i and x_i variables without any error is assumed. For the best utilization of the technique, a continuous dependent variable is assumed. However, in the reality those assumptions are seldom satisfied.

[1]In 1969, Jan Tinbergen and Ragnar Frisch won the first Nobel Prize for Economics. The reason given for the award is "...for having developed and applied dynamic models for the analysis of economic processes: [www.nobelprize.org].

Methods of dealing with non-continuous (discrete) independent variables and such dependent variables are widely discussed, used and generally accepted in econometric analysis[2].

Applied econometricians encounter many more complicated problems about data. Some variables are only conceptual. They have no empirical counterparts. For example, *utility, lifetime income, permanent income* and *human capital* are used in many economic analyses. Obviously these are merely concepts. No measurements are possible. When independent variables cannot be numerically measured only two options are available with OLS: one, to estimate the model without the conceptual variable and the other, to use a "proxy variable" in place of conceptual variable. Use of years of schooling in the human capital production function, use of IQ test scores for ability in earnings functions are only few example. These are generally accepted methods but not without criticisms.

For example, the first method (estimate the regression excluding immeasurable variables) will lead to *exclusion of relevant variable bias.* This is quite common in the earnings function where "ability" is identified as a key determinant of earnings but is excluded due to immeasurability. [Card (1994)].

The second method (use of proxies) is generally criticized for the *measurement error* problem. Friedman (1957) is a good example where according to Friedman (1957) regression of total consumption on total income is incorrect because the true relation is between permanent income and permanent consumption. In this model both variables are not empirically available. It is proved in Friedman (1957) that measurement errors in dependent variable will have no effect on unbiasedness. However, measurement error in independent variables makes OLS coefficients biased.

In modern econometric analysis, specially, in cross section applications of it more complicated problems are identified. Two of the most interesting problems encountered specially in cross section analysis are *latent (hidden) dependent variable* and *multi-dimensional variables.*

[2] In OLS context, dummy variables are used to treat discrete independent variables. For example, categorical variables like sex, ethnicity dummies are used. The coefficients attached to dummy variables measure the effect of the category on average behaviour of continues dependent variable (change of intercept). Use of OLS method with dummy dependent variables is proved to be inefficient due to heteroscedasticity of the error term. [See, *inter-alia*, Maddala (1986)].

Latent dependent variable model is the case when dependent variable is purely conceptual and no empirical observations are available. However, every latent dependent variable is associated with an indicator variable which represents the behavioural changes of the respondents under certain conditions of underlying latent dependent variable. A typical example for the latent variable is *optimal length of schooling*. This will be further elaborated in the next section of this paper. For reference on latent variable models see *inter-alia* Maddala (1986).

There are numerous models with multi-dimensional dependent variables. Output from a joint-product production function [Vinod (1968)], multiple outcomes of education (cognitive and attitudes) and education inputs [Chizmar and Zak (1983), Gyiamah-Brempong and Gyapong (1991), Ranasinghe and Kurukulasooriya (2013)] and demand for education quality [Ranasinghe and Hartog (1998), Ranasinghe (1999)] are only few examples for multi-dimensional output variables.

MEASUREMENT ERROR PROBLEM

The Problem

Manifolds of measurement error problems are encountered in econometric analyses. The simplest among them is the problem of *reporting error*. Due to inefficiencies in survey management some data may be collected inaccurately. Reporting error is a prominent case in this context. For example, respondents may have under reported their income and assets, enumerators have not collected all sources of income from the respondents or all sources of income are not listed in the questionnaire.

Reporting error problem is straightforward and it is assumed that with careful survey designs and efficient survey management this problem can be minimized.

In modern econometric analysis more serious problems of measurement errors are identified. Presence of *conceptual independent variables* is one of the earliest versions of it. For example, Friedman (1957) defined relationship between permanent income and permanent consumption. Ando and Modigliani (1967) described relationship between lifetime income and consumption. Permanent income/consumption and lifetime income are purely conceptual variables. No empirical measures for those variables can be obtained from a field surveys.

Latent dependent variable models [Maddala (1986)] are the next of this sort. Origin of latent variable models is found in biometric studies of effectiveness of insecticides and

pesticides. In modelling the effectiveness of insecticides and pesticides it is assumed that each insect (pest) has a *tolerance limit* to insecticides (pesticides). The tolerance limit is a function of various attributes of the insect (pest). Therefore, one can write $d_i = \beta x_i + u_i$ where, d_i is a latent variable measuring the tolerance limit of insect *"i"* and x_i are observable attributes of individual insects.[3] Selected examples for economic applications are optimal length of schooling [Ranasinghe (1999) Ranasinghe and Hartog (2002)], brand loyalty [McFadden (1980)] and product differentiation [Berry (1994)]. Common feature of these models is that the dependent variable is latent or *hidden*[4].

Multi-dimensional dependent variables are the last of this sort. There are numerous economic examples for that. Multi-product production function is the most obvious and earliest example for it. Mutton and Wool are examples quoted in many textbooks. One of the earliest references for joint-product production function is Mundlak (1963). [Mundlak (1963) is referred in Mishra (2008)].

All the remedies proposed in the literature for different types of measurement errors can be classified into two as *theoretical* solutions and *technical* solutions[5].

Theoretical Solutions

Many variables used in econometric analyses are conceptual. There are no direct measures for them. Friedman (1957) proposed his version of consumption theory with permanent consumption and permanent income as dependent and independent variables respectively. In this model both variables are conceptual. No direct measures are available for permanent consumption and permanent income. With further assumptions Friedman (1957) shows that the dependent variable (permanent consumption) can be replaced with total consumption; causing no harm. Friedman showed that the measurement errors in dependent variable add to the error term of the regression. As long as the measurement error is not correlated with independent variables, the regression estimates based on

[3]For a detailed discussion on the history of latent dependent variable models see, Amemiya (1975).

[4]All hidden (latent) variables are conceptual variables too. Difference between the two models is that in the former the conceptual variable is appeared in left-hand side whereas in the latter conceptual variables are appeared in right-hand side of the equation. Therefore, the ways that economists deal with the two are entirely different.

[5]The best solution recommended for measurement error problem, specially for its first variety (reporting error) is to go back to the field and recollect accurate data. All the solutions discussed in this paper are only secondary solutions. However, the first best solution is not applicable always.

dependent variable with measurement error is still unbiased. However, efficiency of the OLS estimate is affected due to the increased variance of the new error term (error term of the regression + measurement error in dependent variable).

Measurement errors in independent variables are serious. This is elaborated in detail in Friedman (1957) in the context of consumption function, Card (1994) in the context of earnings function and Hausman (2001) in general. The downward bias of the slope is also called attenuation bias. In general the idea is that due to the measurement errors of independent variables intercept is overestimated and slope is under-estimated[6].

Friedman's permanent income hypothesis of consumption function is

$$c = ky_p + u \qquad (2)$$

Where, c is total consumption[7] and y_p is permanent income and u is the error term (OLS residual and difference between actual consumption and permanent consumption). Marginal and Average Propensities of Consumption (MPC and APC) are equal to *k* in this equation.

Permanent income is not empirically observable. Therefore, Friedman (1957) used *adaptive expectation* mechanism to define permanent income. According to Friedman (1957) people form expectations about their income and the expectation is formed according to the adaptive expectation mechanism. [For further details of adaptive expectation, see *inter-alia,* Shaw (1984)].

Adaptive expectation hypothesis can be summarized using following equation.

$$y_{pt} - y_{pt-1} = (1-\lambda)[y_t - y_{pt-1}]; \text{ Where, } 0 \le \lambda \le 1. \qquad (3)$$

With small adjustment this can be re-written as $y_{pt} = (1-\lambda)y_t + \lambda y_{pt-1}$. This assumes that present year's expected income (permanent income) is the weighted average of the

[6] Friedman (1957) used this to resolve the empirical controversy over the Keynesian consumption theory. According to Friedman (1957) the true consumption goes through origin (no intercept) and it is steeper than the Keynesian consumption function. According to Friedman (1952) this is due to the measurement error of independent variable in Keynesian consumption function.

[7] In its original form, the left-hand side variable is permanent consumption (c_p), not total consumption (c). Based on the argument presented above on the measurement error of the dependent variable allows Friedman (1975) to replace c_p with c.

actual income in present year and the expected (permanent) income of the previous year. The weight factor is λ. With repeated substitutions of lagged values of permanent income y_p, permanent income can be written as a weighted average of actual income in all previous years.

$$(4) \qquad y_{pt} = (1-\lambda)[y_t + \lambda y_{t-1} + \lambda^2 y_{t-2} + \lambda^3 y_{t-3} + ... + \lambda^T y_{t-T}]$$

Equation (4) can be substituted to equation (2) to find "an estimable consumption function" with observable independent variables.

$$(5) \qquad c_t = k(1-\lambda)[y_t + \lambda y_{t-1} + \lambda^2 y_{t-2} + \lambda^3 y_{t-3} + ... + \lambda^T y_{t-T}]$$

Writing equation (5) for previous year (C_{t-1}), multiplying it by λ and taking the difference between it and equation (5);

$$(6) \qquad c_t = k(1-\lambda)y_t + \lambda c_{t-1}.$$

This is the equation that Friedman (1957) estimated using US data.

Seater (1982) empirically estimated permanent income hypothesis with slightly different mathematical specification. In Seater (1982) total consumption (one with durables and other without it) is regressed on both permanent and transitory income. Permanent income is calculated using adaptive expectation formulae given above. Seater (1982) also added intercept and transitory income to the model because of the possible measurement errors in this method. In both regressions Seater (1982) found that intercepts and coefficients of transitory income are statistically significant. One may interpret this as the effect of measurement error[8].

Campbell and Mankiw (1990) tested the permanent income hypothesis using instrumental variable technique.

Six years later, Ando and Modigliani (1963) brought similar argument in deriving *lifecycle hypothesis* of consumption. In their version, Ando and Modigliani (1963) defined current consumption as a fraction of the present value of lifetime income (PV_t).

[8]This is important. The problem still remains unsolved. This can be a general criticism against any "economic theoretical solutions". It derives an "estimable equation". However, the estimable version is not necessarily free from measurement error problem.

Modigliani's consumption function is then,

$$(7) \qquad c_t = k(PV_t)$$

Empirical estimation of this equation is difficult because PV_t is not empirically observable. In order to derive an estimable version of equation (7) Ando and Modigliani (1963) assume that the present value of lifetime income is approximated by the sum of three elements; current income (y_t), wealth accumulated up to year t (w_t) and present value of expected lifetime non-property income $\left[\sum_{t=T}^{N} \frac{y_t^e}{(1+r)}\right]$. First two components of lifetime income are measurable. Ando and Modigliani (1963) found an "estimable counterpart" for the third component using a very "tricky assumption". They assumed that the average of the present value of lifetime non-property income is proportional to present income.

$$(8) \qquad \bar{y}_t^e = \frac{1}{N-T}\sum_{t=T}^{N} \frac{y_t^e}{(1+r)} = \beta y_t$$

Replacing PV_t with this;

$$(9) \qquad PV_t = w_t + y_t + \beta(N-T)y_t = w_t + \left[1+\beta\left(N-T\right)\right]y_t$$

In equation (9) present value of lifetime wealth can be measured given the values of β, N and T. In this specification N refers to length of working life and T is the current age. Ando and Modigliani (1963) allowed the econometric model to determine the value of β. However, Ando and Modigliani (1963) expected that β is approximately *1*. Substituting equation (9) to equation (7) we find Ando and Modigliani's "estimable version" of lifecycle consumption function. Equation (10) below reports it.

$$(10) \qquad c_t = kw_t + \gamma y_t \text{; where, } \gamma = k\left[1+\beta(N-T)\right].$$

Both the examples show that the estimable versions are derived using very specific assumptions and algebraic manipulations. Therefore, the econometric estimates of these equations must be tested for measurement errors and interpreted carefully. It is further suggested that one can derive entirely different estimable equations using the same initial equations under different assumptions. For example, if *static expectation* ($y_{pt} = y_{t-1}$) is assumed, Friedman's permanent income hypothesis will result $c_t = ky_{t-1}$; current consumption is linearly determined by the income in previous year. If *rational*

expectation is used instead, a totally different specification is obtained. All the models are equally justifiable and also can be subject to same criticisms.

Ando and Modigliani (1967) is also based on same theoretical foundation. But as shown in equations (7) to (10) has resulted entirely different estimable consumption function.

This discussion leads to several inferences. The first is that this is an accepted practice in econometrics literature. Therefore, we can use this method without strong justifications. If the consumption function is estimated, equations (7) or (10) can be used without the requirement of any justification.

Second, it is also obvious that as there can be many estimable versions of the same equation, and that the empirical estimates of the original model are not necessarily consistent. Different versions can result in mutually inconsistent results.

The third issue that concerns an econometrician is that this method does not solve the problem. Instead it changes the problem. The problem is changed from immeasurability to measurement error.

Technical Solutions

This section of the paper describes all the major technical (statistical and econometrics) solutions for all the types of measurement error problems identified above. First the general solutions for measurement error problem are presented and then latent dependent variable models are presented. Problem of multiple dimensional dependent variables is presented thereafter.

General Problem and Solutions

General problem of measurement error refers to a case where, both left-hand and right-hand side variables are measured with some error. Friedman's interpretation to Keynesian consumption theory is a classical example for this. According to Friedman (1957) Keynesian consumption function is with measurement errors in both left-hand side and right-hand side variables. Effect of measurement error problem in left-hand side and right-hand side variables are presented below. First the case with measurement error only in left-hand side is presented. Then the issue of the right-hand side variable is presented.

Equation (11) is reproduction of equation (1) with measurement error problem in dependent variable.

(11) $y_* = \beta x + u$ where, $y_* = y + \varepsilon$ and ε is the measurement error

Equation (11) can be re-written as

(12) $y = \beta x + \lambda$. Where, $\lambda = u + \varepsilon$.

Unbiased estimate for β can be obtained by applying OLS to equation (11) if the measurement error in variable *y* is not related with *x* variable. If we also assume that two error terms are linearly independent, standard error of β from the regression with measurement error is always greater than that of the model without measurement error[9].

Equation (13) reproduces equation (1) when *x* variable is measured with error.

(13) $y = \beta x_* + u$. Where, $x_* = x + \delta$.

When OLS is applied for equation (13) $\hat{\beta} = \frac{\sum x_* y}{\sum x_*^2}$ of which the expected value is $E(\hat{\beta}) = \beta E \frac{\sum x_* x}{\sum x_*^2}$. With some further manipulations $E(\hat{\beta}) = \beta \frac{\sigma_x^2}{\sigma_x^2 + \sigma_\delta^2}$. Therefore, $E(\hat{\beta}) < \beta$.

Two technical solutions are indentified to correct for this bias. The *instrumental variable method* [Hausman (2001)] and the method of *orthogonal distance regression*. [Boggs and Rogers (1990)].

Measurement Error problem and Instrumental Variables

Econometricians have recommended this technique as a remedy for two problems; measurement error problem and endogenity bias. Hausman (2001) is an original and very descriptive assessment of use of *instrumental variables* as a remedy for measurement error problem. Instrumental variable can be any variable which satisfies following conditions. *a.*) It is strongly related with the immeasurable independent variable, *b.*)

[9]Standard error of β without measurement error is $\frac{\sigma_{u'}^2}{\sum x^2}$. W2hereas the standard error of β of the model with measurement error is $\frac{\sigma_{\lambda'}^2}{\sum x^2} = \frac{\sigma_u^2 + \sigma_\varepsilon^2}{\sum x^2}$. Measure error has increased the standard error of regression coefficient and therefore the efficiency of OLS is affected.

Instrumental variable is not linearly related with the error term of the original model and also with the measurement error, and *c.)* The instrument does not have any direct association with the dependent variable. This makes sure that the marginal effect of the immeasurable independent variable can be isolated through instrumental variable using *chain rule, i.e.;* $\frac{\partial y}{\partial x} = \frac{\partial y}{\partial z}\frac{\partial z}{\partial x}$ .Once a proper instrument is selected two stage method is used to estimate the instrumental variable method. Choice of appropriate instrumental variable is heavily dependent on several practical conditions. Availability of suitable instrumental variable in the data set is the key concern here. Always, researchers have to work with available data. Instrumental variables are drawn from available data. Before using any variable as an instrument its statistical suitability should be tested. In econometric literature two tests are recommended for this: *a.)* test for relevancy (high correlation between instrument and immeasurable independent variable) and *b.)*exogenity (linear independency between instrument and error term of the original equation).

Examples for using instrumental variable techniques are abundant in econometric literature. Card (1994) has summarized a selected list of literature. Some of the instruments used are given below to show that the choice of instruments is purely experimental basis and repeated use of the same instrument in different context cannot be guaranteed. Angrist and Krueger (1991a) used Year, Quarter and State of Birth as instrumental variables to correct for the endogenity of schooling in their earnings function. Justification of this instrumental variable is that those born in first quarter of the year start schooling with others born in different quarters of the same year. But they reach school leaving age before the others born in the same year. Therefore, quarter of birth will have an effect on schooling length but not on earnings. Angrist and Krueger (1991b) used lottery number assigned during Viet Nam war era as instrument for schooling. The lottery number is based on month and day of birth. Angrist's and Krueger's (1991b) logic behind this choice is that those individuals with a "high risk" of enlisting in Viet Nam war tended to engage further in fulltime education because fulltime enrolees were not enlisted to the war.

Card (1994) has some more examples quoted. All these examples show that the choice of any instrument must be based on experiments and none of the instruments listed above guarantee that the same instrument will be "relevant" for all circumstances.

Orthogonal Distance Regression (ODR)

Orthogonal distance regression is one of the latest techniques developed to resolve the measurement error problem. The advantage of this method is that it addresses the measurement error in independent and dependent variables simultaneously. Boggs and Rogers (1990) is a clear exposition of the method.

This method is based on the assumption that the error term is normally distributed and the MLE is used to find the solution to the optimization problem. The ODR method proposes to find estimates of relevant regression parameters to *minimize the sum of squared measurement errors in both variables.*

Assume that the true regression is one given in equation (1) which links *y* (dependent) with *x* (independent) through regression parameter β. Both variables are measured with errors. Instead of *y* and *x*, y∗ and x∗ are observed. Let, $y_{*i} = y_i + \varepsilon_i$ and $x_{*i} = x_i + \delta_i$. Where, ε_i and δ_i are measurement errors of *y* and *x* respectively. We also assume that both errors are normally distributed around mean error zero and constant variances $\sigma^2_{\varepsilon_i}$ and $\sigma^2_{\delta_i}$ respectively. Subscripts *i* in two variances indicates that variances of the measurement errors are not constant. Then, the ODR optimization problem is to minimize $\sum_{i=1}^{n}\left(\varepsilon_i^2 + \delta_i^2\right)$subject to the constraint that $y = \beta x$. Note that this is the exact part of the equation (1). In this model it is implicitly assumed that only measurement error contributes to random term. Replacing observable variables (with measurement errors) into the constraint we find $y_{*i} = \beta(x_i + \delta_i) - \varepsilon_i$.

We can use the constraint to eliminate ε_i^2 from the objective function of ODR.

The objective function after substitution is $\sum_{i=1}^{n}\left[\{\beta(x_i + \delta_i) - y_i\}^2 + \delta_i^2\right]$. This is further adjusted with weights where weights are the inverse of standard deviations of two error components. Following Boggs and Roger (1990) the weighted ODR objective function is written as

(14) $\sum_{i=1}^{n} w_i^2\left[\{\beta(x_i + \delta_i) - y_i\}^2 + d_i^2\delta_i^2\right]$. Where, $w_i = \frac{1}{\sigma_{\varepsilon i}}$ and $d_i = \frac{\sigma_{\varepsilon i}}{\sigma_{\delta_i}}$.

There is no numerical solution to this. Therefore appropriate linear algorithm can be used to find the solution to this function. To estimate the parameter of this function Boggs and Rogers (1990) also recommends open source software. The software recommended is ODRPACK.

Latent Dependent Variables

A clear definition for latent variables is given in Skrongal and Rabe-Hesketh (2007). Skrongal and Rabe-Hesketh (2007) has also referred to an earlier literature review on latent variables by Andersen (1982). According to Andersen (1982) the latent variable method was first introduced in 1950 by Paul Lazersfeld.

The very first paragraph of Skrongal and Rabe-Hesketh (2007) is:

> *"Latent variables are random variables whose realized values are hidden. Their properties must thus be inferred indirectly using a statistical model connecting the latent (unobserved) variables to observed variables.---, latent variables are referred to by different names in different parts of statistics, examples including 'random effects', 'common factors', latent classes', 'underlying variables' and 'frailties'....*"
>
> [Skrongal and Rabe-Hesketh (2007), p. 312]

Table 1: Classification of Latent Variable Models

		Indicator Variable	
		Continuous	Discrete
Latent Variable	Continuous	**Latent:** Standard of Living **Indicator**: GDP	**Latent:** Utility of education. **Indicator:** Whether respondent is in fulltime education or not.
	Discrete	**Latent:** level of economic freedom. 1: Mostly free, 2.) Free, 3.) Moderately free, 4.) Mostly unfree 5.) Unfree 6.) Repressed. **Indicator:** Economic freedom index	**Latent:** Preference of certain brand of product **Indicator:** Consumer's Actual Choice of the brand

This definition clearly presents that latent variable models are associated with a latent variable and an indicator variable. The indicator variable is observable and closely associated with the movements of latent variable. Depending on the nature of latent and indicator variables four types of latent variable models can be identified. Table 1 above summarises the four types with appropriate examples.

Similar classification is also found in Table 1 in Skrongal and Rabe-Hesketh (2007). In this classification the first option (top-left) is similar to the situation described in section 3.2 of this paper except that in section 3.2, conceptual variable is appeared in the right-hand side. In Table 1 it is in the left-hand side.

Top-right case where latent variable is continuous but the indicator variable in discrete is very common in discrete choice regression analysis in econometrics. McFadden (1980) random utility theory provides very convenient interpretation to this. This is demonstrated in McFadden (1980) and in many textbooks [See, *inter-alia* Maddala (1984)]. For the convenience of beginners, the same is reproduced in this paper to model the school enrolment decision. The model is also presented in Ranasinghe (1999) and Ranasinghe and Hartog (2000).

The latent variable in this model is the *optimal length of schooling* (d_i). We assume that the optimal length of schooling is a function of X_i, optimal length is linearly dependent on X and random error term ε_i is normally distributed.

The modelling starts with the assumption that the optimal length is a latent variable and the indicator variable is the discrete choice between schooling and dropping out. Following Becker (1967) it is argued that the rational individual continuous fulltime education as long as the optimal length is greater than the reported length of schooling. Individual leaves school once he/she reaches the optimal length of schooling.

This suggests that when a person from the eligible age group is chosen at random, the probability that he/she is still in school (enrolment probability) is equal to the probability that the optimal length is greater than reported length. Algebraically, $d_i = \beta X_i + \varepsilon_i$ be the optimal length equation. Let S_i be the reported length of schooling. Then,

$$\Pr(E = 1) = \Pr(d_i \geq S_i) = \Pr(\beta X_i + \varepsilon_i \geq S_i) \tag{15}$$

Rearranging terms;

$$\Pr(E = 1) = \Pr(\varepsilon_i \geq S_i - \beta X_i) \tag{16}$$

Equation (16) shows that the enrolment probability is the area under the Cumulative Distribution Function (CDF) of ε_i over the range specified in equation (16). Then, PROBIT of LOGIT estimators can be used to estimate the coefficient (β). Choice between PROBIT and LOGIT depends on researcher's assumption on the probability distribution of ε_i.

To estimate values of S_i and X_i should be known and they are available from field surveys. Once β is estimated predicted values of optimal length of schooling (d_i) can be estimated using $\hat{d}_i = \hat{\beta} X_i$.

Advantages of this method is that it allows us to estimate the regression coefficients without knowing the dependent variable and it also predicts the probabilities of being in school (enrolment rate) and probability of school leaving (dropout rate).

Bottom-left cell represents the case with discrete latent with continuous indicator variable. Example given in the relevant cell is economic freedom index. Countries are classified into 6 categories on level of economic freedom. The levels are given in the table. However, those levels are not directly observable (latent). The levels are identified using *economic freedom index.* Economic freedom index is the indicator variable. In this case, analysis is simple, we can use OLS with economic freedom index as the dependent variable.

The bottom-right cell shows the case with discrete latent and discrete indicator variables. Most of the *multi-variate* discrete choice models fall into this category. Example presented in the bottom-right cell is about *brand preference* or brand loyalty of consumers.

Similar to the previous case the preference of brand is a latent variable. Theory of consumer behaviour suggests the determinants of brand loyalty. Although the brand preference is not observable we can see which brand is selected. It is the indicator variable of this model.

The advantage of this method is that it provides a framework to estimate and interpret the coefficients of a regression of which the dependent variable is not observable.

A problem of this method would be that the same estimable version of the equation could be drawn from different latent variable models. For example, the enrolment model we derived above could also be derived using utility approach. For example define U_S be the utility of being in school and U_D the utility from dropping out from schooling as a

function of X. Then, the discrete decision variable (whether the person selected is in school or not) indicates whether U_S is greater or smaller than U_D. In literature, this is not even identified as a problem because all the applications of latent dependent variable models do not intend to predict the latent variable. All the estimates are limited only to predict probabilities and to interpret regression coefficients. Therefore, prediction of latent variable is not an issue.

Multiple Dimensional Variables

More complicated models with latent dependent variables are also available in economic literature. These are the models with "multi-dimensional" dependent variables. The tradition starts with Vinod (1968) controversial article to *Econometrica* on "joint-product production functions". Vinod (1968) differentiates the joint-products from multiple products. It is also a multiple output production process. In joint products, separate inputs and production process cannot be identified for each product in the multiple-product system. Therefore, Vinod (1968) argued that estimation of separate production functions for each output is not acceptable because they are not yielded through different production processes. Inputs going to each production process cannot be identified separately. As an example, Vinod (1968) takes the mutton and wool industry. One cannot identify inputs for mutton and wool separately. Later on various applied econometricians identified many other production processes with similar characteristics. For example, the education production function is identified as a joint-product production process. Outputs of the education process are multitudinous. In its simplest case, education process improves knowledge, skills and attitudes of students. Similar to the mutton-wool example, no one can differentiate inputs or production processes of the three outputs of the education process. See, *inter-alia* Vinod (1968), (1976), Kuylen and Verhallen (1981), Rijken Van Olst (1981) for early economic applications and Chizmar and Zak (1983), (1984), Chizmar and McCarney (1984), Cohn *et.al* (1989) Gyiamah-Brempong and Gyapong (1991) for applications in education production function. Ranasinghe and Hartog (1998), Ranasinghe (1999) used the same technique to estimate production and demand functions of education simultaneously.

Van Olst (1981), Chetty (1969), Dhrymes*et.al* (1969) and Rao (1969) offer a comprehensive discussion on the Vinod (1968) re-interpretation of canonical correlation in the context of regression.

Canonical correlation is defined as the correlation between *two sets of variables*. Let us define two sets of variables, U and V. The former is a linear function of set Y which consists of k number of variables and the latter is a linear function of another set X. Set X

consists of *g* number of variables. We assume that both sets consist of standardized variables. We also assume that *g* is always greater than *k*.

In matrix form $U = \lambda' Y$ and $V = \beta' X$. Where, λ and β are *canonical weights*. The canonical correlation is the Pearson correlation between *U* and *V*. The MLE suggests assigning values for λ and β such that the correlation between *U* and *V* (the canonical correlation) is maximized. This maximization is done subject to two constraints that both *U* and *V* have unit variance[10].

Canonical correlation a facility is readily available in number of statistical software such as STATA and SPSS. Canonical correlation estimate yields three sets of coefficients; canonical weights of *Y*-variables ($\hat{\lambda}$), canonical weights of *X*-variables ($\hat{\beta}$) and canonical correlations ($\hat{r}$). According to Vinod (1968) re-interpretation of canonical correlation suggests $\hat{\lambda}$ and $\hat{r}\hat{\beta}$ are the coefficients of Canonical regression. Interpretation to canonical regression coefficients is similar to that of OLS regression coefficients.

One of the drawbacks of this method is that the canonical regression method cannot be used with discrete data[11].

Three alternative applications of canonical regression method are briefly presented below, especially for beginner' references in their applications. The three cases presented below are Vinod (1968, 1969 and 1976) and critiques of the application and interpretation of the technique in mutton-wool production function - Chizmar and Zak (1983) in the education production function and Ranasinghe and Hartog (1998) and Ranasinghe (1999) - on the use of the technique to estimate demand and production of education in a simultaneous system.

An interpretational limitation of canonical correlation reviewed in this paper is that all tend to interpret only the first canonical correlation whereas the technique itself produces more than one canonical correlation and set of canonical weights for each.

[10]For detailed discussion on the estimation of canonical correlation, see, *inter-alia,* Anderson (1984).

[11]Despite this limitation, Chizmar and Zak (1983) have used several Likert Scale measures in their canonical regression of education production function estimate.

Joint-Product Production Function of Mutton and Wool (Vinod)

Vinod (1968) re-interpreted Hotelling's canonical correlation in a regression context and used US time series data for the period 1951-62 on wool and mutton production process. Inputs of this model are the labour and capital used to produce wool and mutton. Vinod (1968) argued that mutton and wool are joint-products. Labour and capital used for mutton production and wool production cannot be identified separately.

Using the canonical regression estimates Vinod (1968) calculated "ratio elasticity" of the two products with respect to each input; for example, the mutton to wool elasticity of labour. This measures percentage change in the mutton to wool ratio to one percent change in labour. Vinod (1968) further compares canonical results with OLS.

Later, in 1969, several economists criticized Vinod's comparison as incorrect because OLS regression is estimated using original data whereas canonical regression is estimated using standardized variables. [See, Rao (1969), Chetty (1969), Dhrymes and Mitchell (1969)]. Therefore, critiques suggested that canonical regression can be compared with OLS only if the OLS is also estimated using standardized variables in which the regression coefficients are the *beta coefficients*. Vinod (1969) and Vinod (1976) further developed his method considering the criticisms.

Education Production Function (Chizmar and Zak)

Chizmar and Zak (1981) is one of the earliest applications of canonical regression to estimate the education production function. In this study, joint-product education production function is estimated using individual student data from undergraduates of Illinois State University. It is assumed that education produces two outputs, *knowledge* in economic theories (cognitive ability) and *attitude* towards economics. Production of knowledge is measured in terms of end of semester exam scores in economic theory courses. Attitudes are measured using a 14-item Likert-scale instrument. An attitude test was performed twice, one at the beginning of the course and the other at the end of the course. The former was used as an input variable and the latter as one of the output variables.

Ranasinghe and Kurukulasooriya (2013) adopted the same procedure to estimate education production process for first year undergraduates in University of Ruhuna, Sri Lanka. Outputs of this production process were knowledge and attitudes towards economics. It was a replication study of Chizmar and Zak (1981).

Simultaneous Estimate of Demand and Production of Education (Ranasinghe, Hartog and Ranasinghe)

Ranasinghe and Hartog (1998), a discussion paper, and Ranasinghe (1999), an unpublished PhD thesis, report the modelling of education demand and production simultaneously. These two papers use canonical regression method in totally different context. These are attempts to bring education production and demand for education into one specification. Most of the estimates of demand for education use proxy measures for the dependent variable in the demand function. The proxy they choose depends on data availability and purposes of research. Education system produces multi-dimensional output[12]. Ranasinghe and Hartog (1998) and Ranasinghe (1999) assume that whatever the production by schools at equilibrium it is equal to the demand[13].

Researchers cannot measure exactly what is produced by schools. However, they can identify it up to a mathematical equation and known input variables. Similarly demand for education can also be modelled. At the equilibrium, production (production function) is equal to demand (demand function). Then, the canonical regression method is used to estimate both models simultaneously.

SUMMARY

This paper examines the problem of measurement error in econometric analysis. The measurement error problem is defined broadly. Several sources of measurement error are identified.

Incorrect recording of data, presence of conceptual variables, latent dependent variables and multi-dimensional dependent variables are the sources of measurement errors examined in this paper. Applied statisticians and econometricians have identified many solutions to this problem. For the first type, the best solution is to re-collect data with no errors. However, this is not possible always and it is not practical for all types of error. Some economists have invented theoretical solutions to it. This suggests expressing the conceptual variables in terms of known and measurable variables. The instrumental

[12]Various dimensions of education output may be conceptually identified (knowledge, skills and attitudes) but cannot be measured. Ranasinghe and Hartog (1998) and Ranasinghe (1999) do not attempt to measure them.

[13]Kurukulasooriya (on going PhD research) estimates joint-product production function with knowledge and subject related attitude as multi-dimensional output on selected input measures for university education.

variable method is also used quite extensively to correct measurement errors. The idea is to identify an additional variable which is closely related to the variable with measurement error but has no relationship with the dependent variable. Instrumental variable method is used extensively. However, it is difficult to generalize the instrumental variable method, and in many cases, to find suitable instrumental variables.

Orthogonal Distance Regression (ODR) is one of the latest techniques developed for the solution of the measurement error problem. The ODR method is to find regression coefficients to minimize the sum of the squared measurement errors.

Latent dependent variable is the next source of measurement error problem reviewed in this paper. There are plenty of examples in econometric literature with hidden (latent) dependent variables. All discrete choice literature can be identified as the solution to this problem. For that the only requirement is that a discrete indicator variable for the latent variable be identified. This will estimate the regression coefficients on discrete moves of the indicator variable. Any movements within a given range of the latent variable are not captured.

The presence of multi-dimensional variables is identified as the next source of measurement error. Joint-product production function and output of education system are examples cited in literature. Use of Hotelling's Canonical correlation is identified as the solution to that.

Table 2 summarises the contentment of this paper.

Table 2: Summary of Findings

Source	Effect on OLS	Remedy
Inefficiencies in survey management Incorrect definitions	Biased if measurement error is in independent variables. Less efficient.	• Re-collect more accurate data. • Instrumental variables. • Orthogonal Distance Regression.
Conceptual Variables	OLS can be used only with proxy measures of conceptual variables. If proxies are with errors, biased results and less efficient.	• Theoretical solutions. • Instrumental variables • Orthogonal Distance Regression
Latent dependent variables	OLS cannot be used.	Discrete regressions with observable indicator variables.
Multi-dimensional dependent variables	OLS cannot be used.	Canonical Regression

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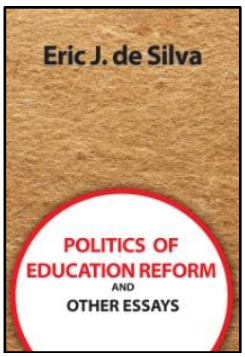

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Introduction

The 1970s were an eventful decade for the education sector in Sri Lanka. The insurrection that took place at the turn of the decade clearly showed the need to change the existing system of education from one catering to the elite to one empowering the masses. The 1972 attempt to cater to this need was unsuccessful and did not appeal to the public who pursued social mobility through education. The new government that came into power in 1977 was eager to please the public that it reversed many of the introduced reforms. But the process of education policy reform continued with the 1981 White Paper. Eric de Silva, becoming the Secretary of the Ministry Education in 1980, clearly had the dual advantage of studying the attempts at education policy reform in the 1970s and the first-hand experience of education policy making in the early 1980s. In his book, Politics of Education Reform and Other Essays, he shares these experiences and knowledge by chronicling education policy making in Sri Lanka. Today's policy makers can learn several lessons from this narrative.

Education policy making in the country has never been easy

Eric de Silva's recount clearly shows the importance of obtaining public feedback before implementing education policies. The examples of education policy making in the 1970s illustrate this well.

In the early 1970s, just following the insurrection spearheaded by the Janatha Vimukthi Peramuna (JVP), the main issue for education policy makers was establishing better linkages between education and employment. Eric de Silva clearly shows that even as far back as early 1970s, there was concern about the "premium on examinations, degrees and diplomas rather than on the development of skills … necessary for economic development" (page 12). Even in the early 1970s there was a realisation that the curricula catered mostly for those intent on an education leading to white collar jobs. As such, it was largely irrelevant for those who failed to enter the academic stream leading to a university education. This resulted in an education and skills mismatch, which contributed to the large scale unemployment and social unrest the country experienced.

The 1972 proposals attempted to find solutions to these issues of the education system. They proposed to radically overhaul the education system in the country. They included many elements that are being reconsidered even today – such as the provision of a school completion certificate, introduction of vocational training, and better linkages between education and the general needs of the country. However, at the time the reforms were introduced, attempts were not made to think through all the aspects of the reforms. For example, although the intention of limiting access to the Higher National Certificate of Education (HNCE) was to limit the quantity of people aiming for higher education, the country was not sufficiently prepared to address the education needs of those who did not enter the HNCE course.

These limitations of the 1972 reforms came under considerable criticism of parents, teachers and the general public who were unsure of what the future offered under the new system of education. Eric De Silva points out several reasons for the unpopularity of these reforms. They were introduced without paying sufficient attention to their social impacts and the availability of resources to implement the reforms. The reforms also did not follow the earlier process of producing a White Paper for discussion prior to implementation. Given this, the reforms became a hot political issue, and resulted in being overhauled soon after the election of a new government.

Stakeholder discussions are necessary but useless without political backing

Learning from 1970s attempts at reforming education, in 1981 the government prepared a White Paper for wider discussion before implementing new policy. But the discussions were more intent on making political mileage before the upcoming elections rather than on finding a real solution to the problems of the education system. The lack of political backing for proposed changes resulted in policy recommendations not being implemented fully.

Independence in policy reforms can only work with political support

The lack of attention to education reform was at least partly responsible for the second insurrection in the country during the 1987 to 1989 period. Following this, education reforms received renewed interest in the 1990s. Learning from past failures of quick attempts to introduce reforms and the difficulties in finding consensus in the face of politicisation of education reforms, the 1990s used a new approach for education policy making in the form of an independent commission. The Presidential Commission (popularly referred to as the Youth Commission) appointed in 1989 to study the causes of youth unrest identified the need to reform education policy as priority action. The Youth Commission recommended the establishment of a National Commission on Education Policy. The main objectives of this education commission was to recommend changes to education policies in the country from time to time, to reflect changing circumstances globally and within the country and to find national consensus for these proposed changes. As a result of this recommendation the National Education Commission (NEC) was established in 1991 under the National Education Commission Act No. 19 of 1991, with the approval of all political parties (page 38).

Unlike in earlier mechanisms for education policy making, the newly appointed Commission had bipartisan support. The Chairman and the members of the National Education Commission were appointed with the concurrence of the Leader of the Opposition. Mr. Lalith Athulathmudali, Minister of Education and Higher Education, who presented the NEC bill in parliament referred to it as " one of the most important bills in the history of education in this country" (page 38).

The NEC prepared an initial report in 1992 detailing the existing education system, the educational goals of the country and the changes needed to realise the stated educational goals of the country. However, these recommendations were not fully implemented. Eric de Silva notes that although the National Education Commission (NEC) was established with the intention of depoliticising education policy making, it was only given powers to make recommendations. Implementing the recommendations was at the hands of the ministry in charge of education. From the author's narrative what is apparent is that there was some confusion over this process.

Part of the problem in the absence of comprehensive education policy formulation was the lack of clear demarcation of authority. The new government elected in 1994 on several occasions reiterated their commitment to establishing a National Education Policy. With that backing in 1995, the National Education Commission submitted a new report: "An Action Oriented Strategy towards a National Education Policy".

But this was not directly implemented. In 1996, the Ministry of Education and Higher Education (MEHE) came out with a document of its own called the 'National Education

Policy – A Framework for Action on General Education (Draft Proposals)'. This led to education proposals being drafted by both the NEC and the MEHE in the 1990s. As a result of this confusion the NEC could not deliver the anticipated change in education policy making.

Political will alone doesn't work without proper research based policy formulation and public consultations

As the process of education policy making was not going forward, in 1996 President Chandrika Bandaranaike Kumaratunge appointed a Presidential Task Force, with the Minister of Education and Higher education as Chairman, to come up with a plan of action for general education reforms to be implemented with immediate effect. The author notes that this Task Force ignored the attempts made at the beginning of the 1990s to depoliticise education policy reforms. The Task Force was able to produce what it referred to as an "Executive Summary of Proposed Actions", a ten paged document, within three months of its appointment. But the proposals failed for several reasons. First, as they were hurriedly put together, they were not backed by a comprehensive study of the issues of the education system in the country. Secondly, they were not given the opportunity to be discussed in order to arrive at a national consensus. Lastly, there was no attempt to obtain the concurrence of the opposition for the proposed reforms.

Not surprisingly, the way the proposals were drafted received mounting criticism. Earlier President Kumaratunga had declared 1997 as the 'year of education'. With this year of education almost coming to an end and the proposed reforms receiving increasing criticism due to lack of transparency, the latter part of 1997 saw several policy documents on education policy reform. The National Education Commission produced a printed document under the title 'Reforms in General Education, 1997'. Although it was supposed to have been prepared on the basis of proposals made by the Technical Committees of the Task Force, it also contained some reforms not included therein.

Adding to the confusion, yet another document was presented in 1998 by the NEC called the 'General Education Reforms, 1997'. However, this too was not tabled in parliament or opened for public discussion.

These activities clearly show the pitfalls of policy formulation without proper research, public discussion and the backing of other political parties.

Policy reforms should be done with clear objectives in mind – the case of School Rationalisation

The education policy reforms introduced since the 1971 insurrection have attempted to revise the school structure on several occasions for different reasons. The reforms introduced in 1972, increased the school going age from five to six with the intention of reducing the number of years of formal education, and saving funds for improving quality of education. However, these reforms were reversed in 1978, and the schooling age was again brought down to five years.

In 1996 the Ministry of Education introduced a school rationalisation system, to close down schools that did not have sufficient number of students after making alternative arrangements for them. The main objective of this exercise also was to improve the financial efficiency of education.

The Presidential Task Force appointed by President Chandrika Kumaratunga backed the proposal for restructuring schools for three different reasons. First, it argued that having an integrated school system from grade 1 to 9 will help to reduce school dropouts. Secondly, it argued that separating grades 1-9 (junior schools with a primary section (grades 1-5) and a junior secondary section (grades 6-9) will help to develop a school culture more appropriate to the different age levels of pupils. Finally it argues that senior schools (grades 10-13) will be able to provide more specialised courses and better facilities for senior secondary education.

However, as the author points out there are numerous counter arguments for these proposals. Also it was not clear whether the envisaged massive overhaul of the education system in the country would result in generating returns that justify the required investments. Further, proposed reforms had not taken into account the availability of funds to carry out the proposed changes to the education system. As a result, the proposed restructuring of the school system did not go ahead as planned.

Medium of instruction – an example of hasty policy implementation that led to confusion

In the face of rapid globalisation, the frequent use of English in the private sector to conduct business, and the need for competencies in English to obtain better jobs, especially in the private sector, the need to improve English education in the country has become an urgent need. Given this need, in 2001, under the then Education Secretary Dr. Tara de Mel, English was introduced as a medium of instruction in 2001. However, this was done without taking into consideration the capacity of the education system in the country to implement the policy. First, not all schools had the resources to offer English as a medium of instruction. Second, although schools were encouraged to

offer classes in English medium, there was no circular providing clear guidance on how to do so. As a result the initial proposal for introducing English medium education had to be changed several times over the years introducing many ambiguities to the system.

Conclusion

The above account illustrates only some of the examples of failed attempts to reform education policy in the country. Lack of clear policy making has resulted in two insurrections in the country. In the light of difficulties and failures in the reform process, comprehensive education policy reform remains a pressing need for the country.

This book offers valuable lessons to the modern day education policy maker on past mistakes in education policy making. It is highly recommended to anyone involved in education policy making in the country.

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