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Network Formation and Small Business Development: *The Case of Small Enterprises in Sri Lanka*

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Abstract: Entrepreneurship and entrepreneurial networks have been a considerable amount of academic interest over the last fifteen years. But there have been very few attempts to study the impact of entrepreneurial network formation on small enterprise performance particularly in developing countries. The aim of the paper is to examine the impact of entrepreneurial network formation on small enterprise growth. This paper argues that there is a positive relationship between entrepreneurial network formation and small enterprise growth. This hypothesis was tested for Sri Lanka using a sample of small enterprises. The results found significant positive relationship between network formations and small enterprise growth. However, some other factors like enterprise and entrepreneurial-related factors strongly influence network formation. The study gives a clear message to policy makers that governments can play a bigger role in facilitating the formation of networks and hence development of small enterprises.

1. Introduction

The paper explores the potential role and impact of the entrepreneurs' networks on the success of the small business. In this study, the entrepreneurial network indicates the relationship of entrepreneurs with the outside world, which includes relatives, friends, acquaintances, other firms, government bodies etc. Networks can be defined as

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'composite of the relationships in which small firms are embedded, which serve to link or connect small firms to the environments in which they exist and conduct their businesses' (Show and Conway 2000). This study is interested in an 'actor-centred' definition provided by Johannisson (2000): 'Networks are interconnected dyadic relationships in which various ties can be analysed in terms of content. Information ties provide business information, exchange ties extend access to resources, and influence ties legitimate the entrepreneurs' activities and create barriers to entry'. Networks are defined in this paper as long-term relationships between small business owners and external actors (persons and organisations) in order to obtain information, moral supports and other resources. Various studies point out that without involving these network relations, a single entrepreneur can hardly succeed in his or her business because a single actor (a single firm) does not have all of the resources required for success at his/her disposal. The literature (Arenius and Dirk 2005 Cromie *et al.* 1994, Donckels and Lambrecht 1995, Ebers 1997, Hand and Tomblin 1993, Jansson *et al.* 1995, Nokano 2004, Ostgaard and Birley 1996, Perry 1995, Perry and Pyatt 1994, Zanger 2002) argue that entrepreneurial network formation is an essential aspect of business development. Although network research literature covers a variety of theoretical perspectives[1] on various network involvements, there are a few empirical studies available (Donckels and Lambrecht 1995, 1997, Premaratne 2002) on the impact of entrepreneurial network formation on the growth of a small business. There are no such academic studies with empirical material on this area especially

[1] For example, this concept is common in transaction cost approach (Williamson 1991), industrial clusters and estates and regional development (Piore and Sabel 1984, Pyke *et al* 1990), social networks (Granovetter 1985, Johannisson 1996, Ostgaard and Birley 1996), resource dependence (Pfeffer and Salanick 1978), international business and marketing (Hakansson 1987, Hakansson and Johanson 1992) etc. This study is based on social network approach and used individualistic approach focusing on individual firm behavior within the network.

focusing on less developed countries like Sri Lanka. In that context, it is vital to understand (1) factors that lead to the formation of entrepreneurial networks in a developing country and (2) impacts of networks on small enterprise performance.

The aim of this paper is to analyse the impact of network formation on the growth of a small firm in Sri Lanka. The remainder of the paper is organised as follows. In the next section, we develop some testable hypotheses. Section 3 deals with the analytical techniques and issues. Section 4 presents the empirical results. Section 5 discusses the results, and concludes the paper. Finally, section 6 highlights policy recommendations.

2.1 Impact of Networks on Growth-Orientation and Expansion of Firms

Donckels and Lambrecht (1995, 1996) attempted to fill the gap in contemporary literature by testing an explanatory model of the impact of networks on small business growth. The results of both studies suggest that networks have an influence on the growth of a small business, especially through contact with other entrepreneurs. Meanwhile, the development of supporting infrastructure facilities is very important for the development of small business, particularly for LDCs (Premaratne 2001, 2002). Although measures of entrepreneurs' ability, such as level of education, self-employment experiences, influence the relationship between network formulation and growth, network formation is an essential aspect of business development. However Donckels and Lambrecht (1995, 1997) ignored some important variables such as discussion with friends, membership in professional associations (for example, trade associations, chamber of commerce *etc.*) and other social clubs. All of these variables are

important when studying entrepreneurial networks. Studies on entrepreneurial network are mainly based on social network theory.

How do entrepreneurs form networks? What are the relevant variables?

The network literature (Brereton and Jones 2002, Donckels and Lambrecht 1995, Johannisson 1986, Ozcan 1995, Premaratne 2002, Veciana and Clarke 1996) has identified three aspects of networks and networking: (1) the *determinants* of small business networks: social, communication, business and moral (2) the *link* between the relations: formal-informal, voluntary-compulsory, and direct-indirect, and (3) the *objectives* of networking. According to the literature (Donckels and Lambrecht 1995, Szarka 1990), the network formation elements are (for small firms) external consultations, attendance at seminars, participation in trade fairs, the geographical distribution of contacts with other entrepreneurs and discussion of important business decisions with relatives. In addition, membership in various clubs and societies is one of the efficient ways for managers to build up their external network relationships (Carroll and Teo 1996, Dodd 1997, Jansson *et al.* 1995, Premaratne 2002).

Relationships between the variables and network elements?

As the determinants of small business networks, social networks are mainly maintained with family, friends and acquaintances (Brown and Butler 1993, Butler and Hansen 1991, Johannisson 1986, Premaratne 2002). Managers/entrepreneurs use different types of activities in order to develop their social networks such as attending seminars, participation in the local chamber of commerce and other clubs and professional associations *etc*. For example involvement in different types of clubs and associations such as chambers of commerce, country clubs, allows the entrepreneurs to get to know others with

similar social interests, professional work experiences, business fields (Carroll and Teo 1996, Dodd 1997). This form of interaction provides entrepreneurs/managers with many opportunities for communication. The second determinant is communication (Aldrich and Whetten 1981, Mitchall 1973). Business consideration is the third part within which exchange networks, instrumental networks and strategic networks are included. Exchange network is defined by Szarka (1990) as the firms and organisations with which the small firms have commercial transactions. Johannisson (1986) identified the business elements in the instrumental network relations that are tools for realising business objectives. According to Donckels and Lambrecht (1995, 1997), seminars and trade fairs can contribute to this process (Table 1). According to Jarillo (1988), strategic behavior is the major reason for building linkages among firms. All network variables can, therefore, be fitted into strategic network relations (see Table 1). The final determinant is the moral aspect. Those network relations are fitted to contact with entrepreneurs and discussion with relatives.

Links between relations are also one of the factors that explain the network structure. There are different types of links: *informal against formal, indirect against direct, and compulsory against voluntary*. While informal links are constructed between family and friends, formal links take place between the entrepreneur and an organisation rather than an individual (Birley 1985, Donckels and Lambrecht 1995, Johannisson 1986, Kingsley and Malecki 2004, Ozcan 1995). In most cases, formal links are formulated and developed through informal network relations. Informal links occur in all the selected network elements. But formal links mostly occur in attending seminars, participating in trade fairs, and external consultants. The second aspect of links is compulsory against voluntary (Curran *et al.* 1993, Ozcan 1995). A firm must link with some organisations and departments such as banks, government departments (for the purpose of tax and

registration) in order to survive and operate successfully. These types of links are compulsory networks. Seminars, external consultants, and contact with other entrepreneurs may help to develop these links. Voluntary links provide numerous benefits. For example, participation in local chamber of commerce is not compulsory. Another classification of links is the direct against indirect links. An entrepreneur may have direct contact with relatives, friends, external consultants, and fellow entrepreneurs. Indirect networks imply that the network serves as an intermediate link. The entrepreneur obtains benefits through intermediaries. External consultants, other entrepreneurs, membership in some association, relatives and friends play the intermediary role.

Table 1: Comparison of Network Literature with Network Indicators

	External consultant	Seminars	Trade fairs	Contacts with entrepreneurs	Discussion with relatives
1. Determinants					
a) Social	*			*	*
b) Communication	*			*	*
c) Business					
- Exchange				*	
- Instrumental		*	*		
- Strategic	*	*	*	*	*
d) Moral				*	*
2. Links:					
a) Informal	*	*	*	*	*
b) Formal		*	*		
e) Direct	*			*	*
f) Indirect	*			*	*
3. Objectives					
a) Gathering information	*	*	*	*	*
b) Response from external environment		*	*	*	
c) Canvassing and looking after customers & suppliers	*	*	*	*	
d) Enrichment of own knowledge	*	*	*	*	*
e) Psychological significance				*	*

* Correspondence between literature and variables.
Source: Adapted from Donckels and Lambrecht, 1995: 274

Finally, objectives of networks have been identified by various researchers (Arenius and Dirk 2005 Benavente and Grespi 2001, Bjorkman and Kock 1995, Cromie *et al.* 1994, Donckels and Lambrecht 1995, 1997, Gibb 1993, Gilmore *et al* 2001, Hakansson and Johanson 1988, Jansson *et al.* 1995, Jarillo 1988, Joyce *et al.* 1995, Kingsley and Malecki 2004, Mitchall 1973, Tichy 1981, etc.): *(a) gathering of information; (b) response from external environment; (c)*

canvassing and looking for customers and suppliers; (d) enrichment of own knowledge; (e) psychological significance; and (f) sources of finance, exchange of technology (Figure 1). All of the network variables can be easily fitted in the purpose of gathering information. Canvassing and looking for customers and suppliers including subcontractors are also very important aspects of networking of entrepreneurs. For example, membership in professional associations is one of the ideal channels for discussion with business people. Trade fairs and seminars also provide more opportunities for managers and entrepreneurs to gather information about business and to identify new business deals. Entrepreneurs enhance their knowledge through attending seminars, participating in trade fairs, external consultants, and discussions with relatives, friends and professionals. Therefore, all of the network variables fit in with the objective of the enrichment of knowledge. Small entrepreneurs use their personal network relations to overcome their financial difficulties. Previous research studies (Ozcan 1995, Premaratne 2002) highlighted that relatives and family members were the major sources of financing for small business. Technology is also an important object of networking. External consultants and contacts with other entrepreneurs are better fitted into this purpose.

As seven network formation elements are identified from the literature: *(1) Memberships in various clubs and societies (MEM), (2) discussion with relatives (DR), (3) Discussion with friends (FRI), (4) External consultation (EXCON), (5) Attending seminars (SEM), (6) Attending trade fairs (TF), (7) contact with entrepreneurs (CE)*, we put forward the following hypotheses.

2. 2. Membership in Various Clubs and Societies

One of the efficient ways for a manager or a business owner (small business owners are, in fact, managers in their own right) to establish an external network of personal ties is through membership

in various clubs, societies, and associations such as chambers of commerce, country clubs, associations on special areas (Dodd 1997, Jansson *et al.* 1995, Oyelaran-Oyeyinka 2001, Ozcan 1995). Involvement in these types of associations allows managers/ entrepreneurs to get to know others with similar social interests, educational backgrounds, and professional work experiences. In particular, we argue that such professional involvements are important for managers/owners of small enterprises due to their lack of adequate technical and managerial skills (Teo 1996). These opportunities help entrepreneurs/managers to develop network connections, and as the result, their businesses. Therefore, we expect that:

Hypothesis 1a*: Owners' Membership in various clubs and societies has a positive impact on the business' performances.*

2. 3. Discussion with Relatives and Friends

Discussion with relatives and friends is a major element of the formation of networks and also has a strong impact on business performances, particularly in small businesses (Aldrich *et al* 1986, Dodd 1997, Hakano 2004, Scott 2000, Uzzi 1996, 1999). According to Uzzi (1996, 1999) entrepreneurs spend their time, drinking tea and other beverages with different people such as clients, contractors, and intermediaries. These meetings help small business owners to identify new customers, buyers, subcontractors, and also to obtain information, advice, etc. Previous studies (Chu 1996, Hand and Tomblin 1993, Johannisson 1988, Oyelaran-Oyeyinka 2001, Ozcan 1995) showed that small business owners are mostly dependent upon their personal networks as a supplement to their own resources. Relatives and friends are the small entrepreneurs' most valuable assets (Johannisson 1988, Johannisson and Peterson 1984, Ozcan 1995, Premaratne 2002).

Hypothesis 1b: *Discussion with family members has a positive impact on the performance of the business*

Hypothesis 1c: *Discussion with friends has a positive impact on the performance of the business.*

2. 4. External Consultants

In general, firms seek external consultants for various purposes (see Table 1). For example, it is one of the ideal channels for gathering information. Small firms particularly are looking for external consultants as they operate the business with limited resources comparing to large enterprises. In most cases, owners/managers of small enterprises do not have adequate managerial and technical skills to run their business efficiently and effectively (Duijnhouwer 1994, Ernst 1997, Holmlund and Kock 1998, Joyce *et al.* 1995, Lang *et al.* 1997, Staber 1996, Voeten 1993). Small firms also do not have their own research and development departments. Especially, they do not have the capacity to employ their own internal consultants. According to Bryson *et al.* (1993), the most important reason for small business service firms to use external consultants is to extend their existing internal staff, to manage the workload, to reduce costs, and to enhance flexibility. External consultations are also one of the important tools for network formation (Bryson *et al.* 1993, Donckels and Lambrecht 1996, Robson and Bennett 2004).We can, therefore, formulate the following hypothesis:

Hypothesis 1d: *Use of external consultants is positively related to the performance of the business.*

2. 5. Attending Seminars

Networks can be built from attendance at seminars and discussions. Cromie *et al.* (1994) state that first meetings from business people

take place at seminars or exhibitions. Participating in seminars (SEM) provides excellent opportunity to meet other entrepreneurs and resource persons. In addition, entrepreneurs can gather information on their product, market, technology *etc.* These meetings further help entrepreneurs to look for customers and suppliers, to ask for response from external environment, and to enhance their own knowledge. Accordingly, we posit

Hypothesis 1e: *'Attendance at seminars' has a positive impact on the business performance.*

2. 6. Trade Fairs

Attending trade fairs (TF), both national and international, is a very important tool for entrepreneurs as means of not only gathering market information but also identifying new network actors and markets. However, both entrepreneur- and enterprise-related factors influence this tool. For example, Donckels and Lambrecht (1997) put forward a hypothesis, though they failed to prove it, that service sector businesses are most likely to participate in trade fairs. Nevertheless, they managed to prove that the size of the company and the level of education significantly influenced participation in trade fairs. While the entrepreneur-and enterprise-related factors influence participation in TF, the participation in trade fairs influences network formation. Consequently, we would expect a positive relationship between participation in trade fairs and network formation. The more networks are formed, the better the firms develop their businesses because, for instance, trade fairs give opportunities to entrepreneurs for gathering information, enhancing their knowledge, canvassing and looking for customers *etc.* Accordingly, we posit

Hypothesis 1f: *the participation in trade fairs is positively related to business performance.*

2. 7. Contacts with Other Entrepreneurs

There are a number of factors associated with network relationships between companies (Borg 1991, Nokano 2004, Rothwell and Dodgson 1991, Steier 2000). First, according to marketing theory, interaction among firms is related to the creation of formalised distribution channel agreements between firms, which are interpreted as distribution networks. In this respect, other firms are trading partners of the small business. The distribution channel agreements can be either formal, such as franchising, licensing, or distribution agreements in connection with subcontracting, or informal, such as long-term business relationships without formal agreements. The informal distribution network always takes place through personal contacts. The ties are relationships of trust, with no records of the exchanges (Johannisson 1988, Uzzi 1996). In other words, these are 'gentleman's agreements'. Second, small enterprises develop contacts with other firms as a result of subcontracting activities. For small firms, subcontracting can be an important means of gaining access to new production technologies without having to invest heavily in expensive production equipment (Nokano 2004, Premaratne 2002). Third, interaction between firms is connected with use of common technology and information. This type of connection can be seen as a major channel for the spreading of new knowledge. Fourth, interaction is associated with mutual interdependence. And fifth, the interaction is associated with the production and marketing of services, which requires close cooperation between the buyer and seller of the services. Accordingly we posit that;

Hypothesis 1g: *The contact with other enterprises is positively associated with growth of the firm*

At the same time, we also expect;

Hypothesis 2: *The relations with other entrepreneurs (regional, national, and international) are boosted by other network elements (memberships in various clubs and societies, discussion with relative, discussion with friends, external consultation, attending seminars, and participating trade fairs).*

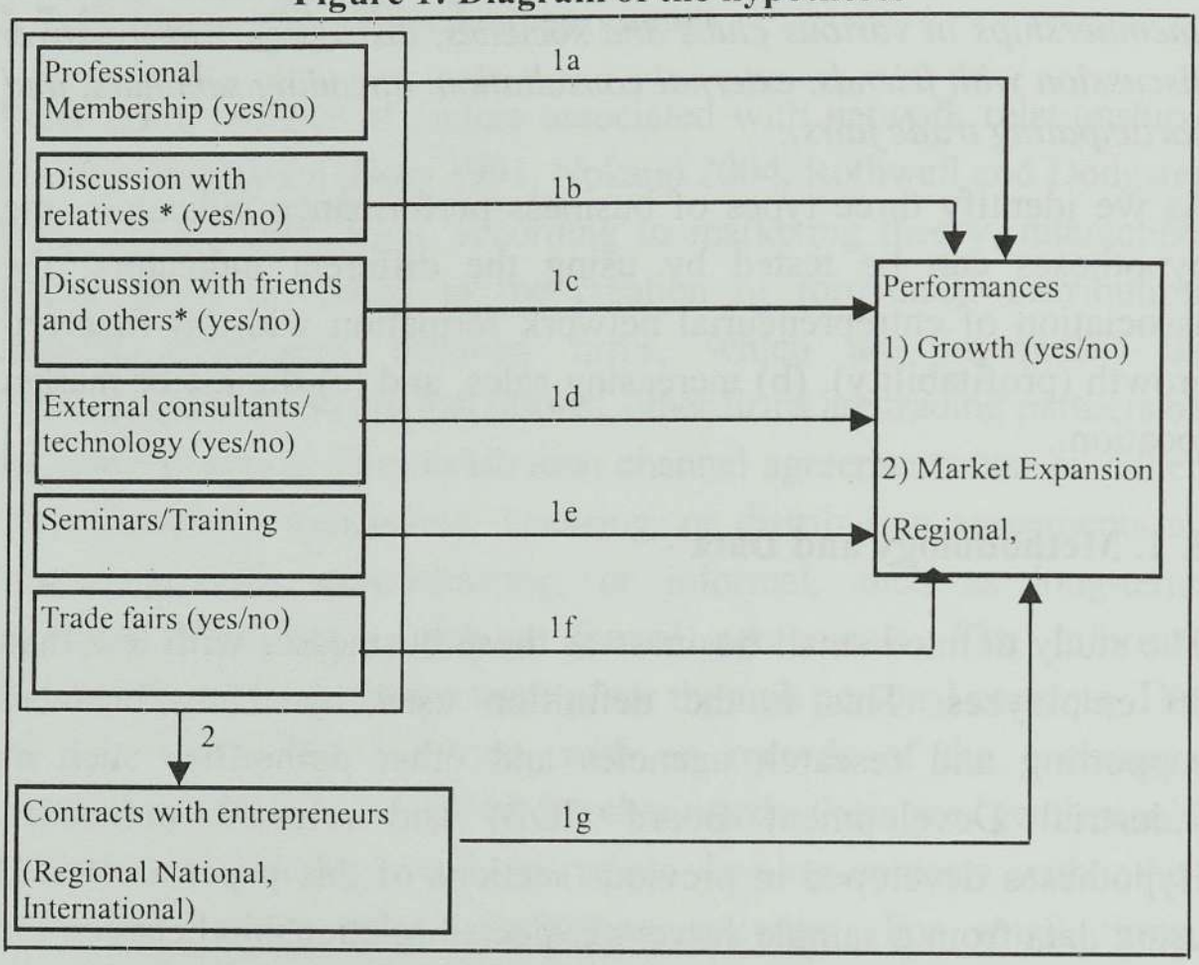
As we identify three types of business performance indicators, the hypotheses can be tested by using the different indicators: the association of entrepreneurial network formation with (a) financial growth (profitability), (b) increasing sales, and (c) the major market location.

3. 1. Methodology and Data

The study defined small business as those businesses with less than 50 employees. This is the definition used by many business supporting and research agencies and other authorities such as Industrial Development Board (IDB) and relevant ministries. Hypotheses developed in previous sections of this paper are tested using data from a sample survey. Expected relationship between the dependent variables and the independent variables is presented in Figure 1.

The diagram of the hypotheses can be presented as follows:

Figure 1: Diagram of the hypotheses



Following Donckels and Lambrecht (1995), the study uses the following explanatory variables as the network variables: *consultation of external consultants (yes, no), attendance at seminars (yes, no), participation in trade fairs (yes, no), discussion with relatives (yes, no), and geographical distribution of contacts with other entrepreneurs (regional, national, international).* In addition, the study uses '*discussion with friends*' (yes, no) and a '*membership of any professional association*' (yes, no) as supplementary explanatory variables to capture some component of the social networks.

The dependent variable is dichotomous (growth, no growth). Based on a review of the literature (Donckels and Lambrecht 1995, Hansen 1995, Ostgaard and Birley, 1996) pertinent to the measurement of performance, two objectives of measures of growth are included: sale growth and increase in profitability over a three-year period (Growth of Profit = [(Profit in t – Profit in t_{-3})/Profit in t_{-3})/3]* 100, and Growth of Sale = [(Sale in t – Sale in t_{-3})/Sale in t_{-3})/3]* 100). In addition, market expansion is used as a business performance measure. Studies (Johanson and Mattsson 1993) in the field of marketing and international business have identified a positive relationship between network formation and market expansion of small businesses.

3.2 Model

As the dependent variable in the models estimated is categorical, *log-linear* analysis (see DeMaris 1992, Hagenaars 1990 and Maddala 1983) is used in estimating the model.

4. Empirical Results

This section is divided into two parts. First a descriptive analysis of the data is given. Part two presents the empirical results of the regression models.

4. 1 Descriptive Analysis

Table 2 shows how small entrepreneurs participate in network formation activities. These figures relate to the on-going business phase. Of the total 303 enterprises, nearly 80 per cent of small firms have regular links with other firms (either formal or informal) out of which only 12.5 per cent of contacts are formal. The formal links

include: joint ventures, licensing, industrial co-operation agreements, supplier-buyer agreements *etc.*

Others are informal linkages such as long-term selling and buying relations, subcontracts (but without formal agreements) *etc.* Nevertheless, most of the small entrepreneurs discuss their business matters such as marketing, raw materials, product process, technology, subcontracting, financing *etc.* with other entrepreneurs. As Table 2 shows, 86.5 percent of respondents discuss on these matters with other entrepreneurs in similar fields. Only 52.7 percent of them discuss regularly. The study further finds that most of the discussions (38.6 percent) are on raw materials. Others are on market matters (35.5 percent), product process (11.5), subcontracting matters (8.9 percent), technology (4.5 percent), and financing (1 percent).

Table 2: Network Formation Activities of the Respondents (Percentages)

	Yes	No
Member of any professional association	26.7	73.3
Discussion with Relatives	75.6	24.4
Discussion with Friends	47.5	52.5
External Consults	31.4	68.6
Seminar Attendance	35.3	66.7
External Trade Fair	11.6	88.4
Any kinds of Regular links with Other Firms	79.5	20.5
Formal links with Others	12.5	87.5
Discussion with other entrepreneurs (in the same field)	86.5	13.5
Discussion with other entrepreneurs (not in the same field)	65.0	35.0

The results also show that 65 percent of respondents discuss with other entrepreneurs in different fields (Table 2). Only 28 percent of them meet regular basis. The subjects of the discussions are mainly marketing (33.1 percent), raw materials (28.4 percent), financing (25

percent), subcontracting (4.6 percent), production process (4.6 percent), and technology maters (3 percent).

As Table 2 depicts, besides the discussion with other entrepreneurs in similar field, the other most popular network element of the small business entrepreneurs is the discussion with their relatives (DR). Meanwhile, a few, only 26.7 per cent, has a membership of any kind of professional associations like chamber of commerce. Participation in external trade fairs and participation in seminars (SEM) and short-term training are very rare among the small business entrepreneurs. Only 11.6 per cent of small business entrepreneurs participates in external trade fairs (TF). During the year, 31.4 per cent of firms have looked for external consultants (EXCON).

4. 2 Networking and Growth

As mentioned above, the dependent variable of the first hypotheses was identified as firm growth (financial term and sale) and market expansion (international, national and regional). Table 3 shows that 61.4 per cent of firms are in growth category, while 10.2 per cent of them are reported 'not growth'. Nearly 28 per cent of them are in neutral (neither growth nor declining). In sale terms, 27.4 per cent are neutral. Sales increase in 47.2 per cent of firms. 18.5 per cent recorded sales declining during the five-year period. In the market selected, 64.4 per cent of the small businesses are limited to the region. In last-three years, 12.9 per cent of the small businesses expand their market beyond the region, but within the country. 17.5 per cent of the small enterprises expand their market at international level. This only relates to market expansion in last three years. However, it does not mean that 17.5 per cent of small businesses exports 100 per cent of their outputs. The study does not find a strong correlation between major maker expansion and business growth in terms of either profitability ($r = 0.232$, $p\text{-value} = 0.001$)

or sale ($r = 0.390$, *p-value* $= 0.001$), though the relationships are statistically highly significant and positive.

Table 3: Performance of Small Enterprises (Percentage)

	in financial term	In sale term	Major Market location	
Growth	61.4	47.2	Regional	64.4
Neutral	28.4	27.4	National	12.9
Decline	10.2	18.5	International	17.5

The models of growth (in financial terms, model 1, and in sale terms, model 2) and market expansion (regional, national, and international) are presented in Table 4. Entrepreneur-related and enterprise-related factors were used as control variables in all models.

Model 1 is statistically significant with a moderate goodness of fit as indicated by the value of chi-square. The model tests the impact of network elements on growth. In this model, growth is defined in term of finance (profits) (1 = if growth, 0 = otherwise). Model 2 also tests the same impact, but in sale terms. The second model is also significant at 0.01 levels. In addition to the growth measures (profit and sale), market expansion in last three-years is used as a dependent variable to test our first hypothesis. As explained above, there are three market locations: (1) regional market, (2) national market, and (3) international market. Most of the small enterprises mainly serve the local market (table 3). In our multinomial logistic model, model 3, we therefore used regional market as the baseline (comparison category). The baseline (regional market) is very important when the results are interpreted. Our multinomial logistic model is highly statistically significant. Tables 4 A and 4 B present the results of the estimated models. In model 1 and model 2 the baseline is no-growth group.

Table 4: Logistic Regression Analysis of Business Performance-A				
	Growth Model[a]			
	Financial		Sales	
MEM	0.40	1.66	0.67	2.07
DR	0.32	0.95	0.09	0.26
FRI	0.20	0.27	0.39	1.23
EXCON	-0.36	-1.68	-0.28	-1.66
SEM	-0.09	-0.26	0.16	0.48
TF	0.11	0.22	0.03	0.06
CE (RC)	-0.19	-0.55	-0.62	1.86
(RC&NC)	0.26	0.56	0.13	0.16
(NC)	0.05	0.08	-0.53	-0.85
Entrepreneur-related				
Age (log)	-1.01	-1.52	-0.62	-0.97
Gender	1.10	2.36	0.12	0.24
Birth place	1.11	2.36	0.85	2.32
Education	0.55	1.51	0.09	0.27
Parents' Business	-0.89	-2.14	-0.95	-2.46
Pre-training	0.22	0.54	0.11	0.28
Work experience (log)	0.38	1.71	0.19	0.88
Enterprise-related				
Sector[c] S_1	0.04	0.09	0.25	0.00
S_2	0.27	0.73	-0.21	0.00
Size[d] SIE_1	-0.55	1.11	-0.49	0.59
SIE_2	-0.11	-0.23	-0.14	-0.31
Location	-1.54	-2.96	-1.45	-2.80
Family workers	0.23	0.75	0.15	0.49
Firm's life time	-0.32	-1.51	-0.24	-1.14
Intercept	3.17	1.29	2.64	1.09
Nagelkerke R^2	0.36	0.36	0.24	0.24
χ^2	90.92	90.92	52.45	52.45
P-value for χ^2	0.00	0.00	0.00	0.00

Table 4: Logistic Regression Analysis of Business Performance-B				
	Market Expansion[b]			
	National		International	
Independent	Coef.	t-stat	Coef.	t-stat
MEM	-2.16	-1.93	-1.06	-1.74
DR	-0.52	-0.52	-0.19	-0.36
FRI	0.54	0.60	0.06	0.13
EXCON	-0.62	-0.68	0.11	0.22
SEM	2.70	2.33	0.75	1.77
TF	2.25	1.89	0.98	1.49
CE (RC)	-0.86	-0.77	0.94	1.57
(RC&NC)	2.16	1.64	1.80	2.60
(NC)	1.52	0.94	2.48	2.66
Entrepreneur-related				
Age (log)	1.92	0.70	0.04	0.04
Gender	-4.54	-2.30	-0.53	-0.67
Birth place	-2.96	-1.94	-0.67	0.99
Education	0.43	0.43	-0.02	-0.04
Parents' Business	-1.78	-1.49	0.00	0.00
Pre-training	-2.79	2.72	-0.68	-1.01
Work experience (log)	-1.43	-1.76	-0.17	-0.45
Enterprise-related				
Sector[c] S_1	-1.17	-0.91	1.22	1.42
S_2	-2.64	-2.45	-0.28	-0.50
Size[d] SIE_1	-3.66	-2.19	-2.54	-3.26
SIE_2	-2.88	-2.31	-1.62	2.46
Location	5.12	3.71	1.32	1.60
Family workers	2.23	2.34	0.40	0.84
Firm's life time	0.91	1.16	0.50	1.47
Intercept	-2.27	-0.22	-2.20	-0.53
Nagelkerke R^2	0.77		0.77	
χ^2	271.23		271.23	
N	303		303	

[a] Baseline (comparison category) is no-growth group; [b] Baseline (comparison category) is regional market

c Sector: S_1 (1 = Manufacture; 0 = otherwise); S_2 (1 = Service; 0 = otherwise)

d Size: SIE_1 (1 = ≤3; 0 = 4-25; 0 = ≥25); SIE_2 (0 = ≤3; 1 = 4-25; 0 = ≥25)

Table 5 shows the predicted probabilities for all of the network elements.

Table 5: Predicted probabilities

	Contact with other entrepreneurs[a]			Growth[b]		Market Expansion[c]	
	Regional	RC & NC	National	Financial	Sale	National	International
MEM	0.44†	0.61	0.55‡	0.60‡	0.66†	0.11†	0.26†
DR	0.31	0.33	0.29	0.58	0.52	0.37	0.45
FRI	0.46	0.88†	0.35	0.55	0.60	0.63	0.52
EXCON	0.58	0.67	0.46	0.41‡	0.43†	0.35	0.53
SEM	0.66‡	0.91†	0.70‡	0.48	0.54	0.94†	0.68‡
TF	0.64	0.76	0.82†	0.53	0.53	0.90‡	0.72
CE (RC)				0.45	0.34†	0.29	0.72
CE (RC&NC)				0.51	0.37	0.82	0.92*
CE (NC)				0.57	0.53	0.92	0.85*

** p value < 0.001; † p value < 0.05; ‡ p value < 0.10*

Note: [a] baseline or comparison category for contact with other entrepreneurs is 'no contact.

[b] baseline/ comparison category for growth models (financial and sale) is 'non-growth group'.

C baseline or comparison category for market expansion is 'regional market'.

Hypothesis 1a stated '*Owners' Membership in various clubs and societies has a positive impact on business performance'*. As shown in Table 4 the variable is statistically significant in all of the performance models. In terms of financial growth, for the entrepreneurs having memberships in some clubs and/or professional associations (MEM), the probability of belonging to the growth group is 60 per cent). In sale terms, the probability that the entrepreneurs, who participate in clubs and professional associations, belong to a growth group is 66 per cent (see table 5).

Hypotheses 1b and 1c are not supported. Discussion with relatives (DR) and discussion with friends (FRI) are statistically insignificant. However, the study finds a positive impact of these two network formation variables on business performance as expected in the hypotheses, but results are insignificant.

Hypothesis *1d* predicted that external consultancy (EXCON) is positively related to business performance. Although EXCON is statistically significant, the study is unable to find a positive impact of this network formation element on business growth (*profitability: -0.364, prob. 0.41, p-value < 0.10; and sale: -0.277, prob. 0.43, p-*

value < 0.10). For the entrepreneurs with external consultants, the probability of belonging to a growth group is less than 50 per cent (table 5).

Hypothesis *1e* stated that attending seminars (SEM) has a positive impact on the performance of the business. Logistic growth models do not support the hypothesis. In both growth models in Table 4 A the coefficient is statistically insignificant.

But the market expansion model shows a significantly positive relationship between market expansion and attending seminars. Accordingly, the entrepreneurs who attend seminars are significantly more likely to be found in national (*94 per cent probability*) and international markets (*68 per cent probability*) (compared with regional market) than the entrepreneurs who do not attend seminars. This result (market expansion model) confirms hypothesis *1e*.

Hypothesis *1f* indicated that the participation of trade fairs (TF) is positively related to business performance. In our growth models (financial and sale), we found a positive effect of trade fairs as expected in the hypothesis, but the results are insignificant (Table 4). Market expansion model supports the hypothesis. In other words, there is a significant impact of trade fairs on market expansion. Participants in trade fairs are significantly more likely to be found in national (90 per cent probability) and international markets (72 per cent probability) than non-participants (Comparison category is regional market).

Finally, hypothesis *1g* predicted that '*contact with other entrepreneurs*' (CE) has a positive impact on business performance. In general, the hypothesis is supported by all of the performance models. Entrepreneurs with national level contacts therefore are more likely to be found in the growth group than those without any contacts and those with regional contacts. As regards market

expansion, the entrepreneurs with national contacts (NC) and both national and regional contacts (RC & NC) are significantly more likely to be found in national and international market (comparison category is regional market). For example, for the entrepreneurs with both regional and national contacts (RC&NC), the probability of belonging to the group that produces their products for foreign markets (international market) is 92 per cent, compared with others (the entrepreneurs: no contacts with other entrepreneurs, only regional contacts (RC), only national contact (NC)).

Hypothesis 2 stated that relations with other (regional, national, and international) entrepreneurs are boosted by other network elements (*memberships in various clubs and societies, discussion with relatives, discussion with friends, external consultation, attending seminars, and participating in trade fairs*). As already mentioned during the processing of data, small entrepreneurs in the sample do not have direct relations with international firms. We found that two network formation elements (*attending seminars and participating in trade fairs)* significantly influence improving relations with national level firms. The results also show a significantly higher probability (*82 per cent*) that the entrepreneurs who participate in trade fairs have connections with national level entrepreneurs. On the other hand, membership in clubs and other associations does not show a significant effect, but the entrepreneurs who participate in these kinds of associations have higher chances (*55 per cent probability*) of developing contacts with national level entrepreneurs. 'External consultants' have a positive impact on network connections, but are not statistically significant. While 'discussions with relatives' (DR) show a negative impact on 'contact with other entrepreneurs' (CE), 'discussions with friends' (FRI) provide mixed results.

Table 6A in appendix further displays the relationships between network formation elements and the control variables (the

enterprise-and entrepreneur-related factors). The results show that 'membership in various clubs and societies' (MEM) is positively related to '*urbaneness*', education, and service sector. These results are not unexpected as urban entrepreneurs have more opportunities to join various clubs and associations. Most of professional associations and clubs are located in urban areas. The entrepreneurs with high education also tend to join such associations. It is also found that 'discussion with relatives' (DR) is inversely related to urbaneness, education, firms' location, and women entrepreneurs, while it is positively related to pre-training, service sector, and family employees. DR is not significantly related to other factors such as age, family business, manufacturing sector, and work experience. Meanwhile, 'discussion with friends' (FRI) is inversely related to age, education, family business, firm's location, and male (gender). These results do not surprise us as the entrepreneurs without higher education tend to discuss business matters significantly more with relatives and friends. 'External consultancy' (EXCON) is positively related to family business, service sector, firm's size, firm's location, and male. These results show that firm in the service sector and firms located in industrial estates and clusters contact significantly more external consultants. 'Attendance in seminars' (SEM) has positive relationship with the following factors: age, education, pre-training, service sector, size of firm, firm's location, and work experience. Highly-educated, including pre-training, formal education and work experience, entrepreneurs are significantly more like to attend seminars. Compared to manufacturing and trade sectors, entrepreneurs from service sector attend more number of seminars. 'Participating in trade fairs' (TF) is also positively related to education, firm's location, and male, while it is inversely related to service sector. Accordingly, it is observed that trade fair participation is positively related to level of education. In addition, firms located in industrial estates and run by male

owners relatively attend more number of trade fairs. The relationship between 'contact with other entrepreneurs' (CE) and manufacturing sector is significantly negative. Meanwhile, CE has positive relationship with education, service sector, and male (gender) (see table 6A). Highly educated and male entrepreneurs are significantly more like to have contacts with other entrepreneurs. Service sector entrepreneurs are significantly more contacts with other entrepreneurs.

To sum up; in general, though we anticipated that network formation elements are positively related to business performance, in our analysis, some of the network elements were negatively related to business performance. While some of our results therefore are consistent with other findings, some contrast with them mainly due to different cultural, social and economic settings in different countries.

5. Discussion and Conclusion

Network relations are vital and important for small business, as particularly a small firm itself does not have all resources such as raw materials, capital, machinery, etc. Therefore, small business network researches (Best 1990, Donckels and Lambrecht 1995, Gilmore *et al* 2001, Nohria 1991, Oyelaran-Oyeyinka 2001, Ozcan 1995, Szarka 1990, Uzzi 1999) suggest networking as a necessary strategy in obtaining resources such as gathering information, technology, finance, etc. Besides, MacMillan (1983) suggests that building contacts and networks are the fundamental factor in determining the success of any firm because through entrepreneurial networks, the entrepreneur can gather information, look for customers and suppliers, and obtain the other resources he needs. The purpose of this paper has been to explore the impact of network formation on small business performances.

The first hypothesis (this hypothesis includes seven sub-specific hypotheses) is about the impact of the formation of networks on growth. We tested this hypothesis by using three separate dependent variables. In the case of the growth in financial terms, there is only one significant direct network effect (membership in clubs and professional associations) on growth. There is an impact of external consultancy (EXCON) on growth, but it is negative. One reason for the negative impact could well be that most of the small entrepreneurs are seeking external consultants because declining of sales, market problems, machinery problems, etc. Therefore, though external consultants have an impact on the formation of networks, the relationship between growth and the network element is negative. On the other hand, entrepreneurs seeking external consultants are significantly less likely to belong to the growth group. As regards growth in sales, the study found that small entrepreneurs who are members of any professional associations are significantly more likely to belong to the growth group. The results of the study were unable to find significant impacts of 'attending seminars' (SEM) and 'trade fair participation' (TF) on business performance either in terms of sale or profitability, but there are positive impacts of these two on market expansion. One explanation is that the impact of those events on profitability and sale could not be visible in short term. One can attend seminars or trade fairs today, but (s)he has to wait some time for harvesting. The process could be two or three years even more. Different types of research methods such as longitudinal studies would provide such information.

When looking at the market expansion of the small enterprises, seminar participants are significantly more likely to belong to the group whose market has expanded last three-years at national or international level. This finding highlights the importance of examining reversal of causality that business growth stimulates

networking. Future studies should be addressed this issue of causality since it requires alternative econometric techniques. Entrepreneurs who discuss with friends are more likely to become exporters. This is true, as most of the small entrepreneurs deal with export markets through some linking firms, but not directly. For example, the export opportunities are in the Dhamadeniya Export Village. Most cases are subcontracts, which mostly take place among friends. TF is also consistent with our hypothesis. The variable has a significant impact on market expansion. National as well as international buyers and subcontractors can be identified in attending trade fairs and seminars. The impact of attending trade fairs and seminars on market expansion is positive. Accordingly, the study argues that firms use network relationships to overcome barriers to enter national and international markets.

Entrepreneurs with only regional contacts (RC) are significantly less likely to be in the growth group. But those who have national level connections are more likely to belong to the growth group. In the case of the market expansion, the formation of networks is positively related to the market expansion. The results conclude that when the market expands beyond the national border, the influences of the network connections are vital and important for the small entrepreneurs.

The second hypothesis (*hypothesis 2*) is about the network elements and the network relations with national and international entrepreneurs. We expected the relations with other entrepreneurs to be promoted by the network elements (MEM, DR, FRI, EXCON, SEM and TF), and they are positively related with the formation of networks. However, the study fails to identify considerable network relations with international entrepreneurs. International relationships are more critical to these small entrepreneurs because of their educational level particularly the knowledge of English. There are

other reasons as well. For example, most international businesses have been located in Colombo. At the same time, the study found that the small entrepreneurs do not have direct export opportunities. They deal with export market through some link-agents or firms. For example, *Dambadeniya Export Production Village,* women in this village produce tea boxes and other ornamental items for the export markets. But they do not have direct foreign orders. The orders come through *'Dambadeniya Export Village (pvt.)Company.* Therefore these are such types of subcontract activities.

Although we expected (*hypothesis 2*) that all of the network elements influence network formation, the contact with other entrepreneurs (CE) is not significantly influenced by external consultancy (EXCON). One reason for the lack of significant could be that the relationship between education and CE is positive and significant. Meanwhile, small entrepreneurs who attend seminars (SEM) and participate in (TF) have a higher chance of developing relations with other entrepreneurs. DR is also very critical because of Sri Lankan culture. Sri Lanka has been characterized as a family-oriented, group-dominated, collective society, in which social relations are largely built around the family. Unlike Western families, families in Sri Lanka represent networks of people jointed together by specific sets of familial relationships. In such a society, family ties occupy an important role in entrepreneurial networks. Family members work together in their businesses as well as at home. The family relationship is stronger in rural areas. We found that the rural-entrepreneurs discuss their business matters with relatives more than the entrepreneurs in urban areas do. However, when defining discussion with relatives we omitted very close family members if they were partners of their business. In most cases, the close family members are also a part of the businesses. Future research should be conducted in this direction. Cultural

variables should be included into the overall model. It is also important to study how the other enterprise-and entrepreneur- related factors such as gender, education, firms' location etc. separately influence on each of the network formation elements.

Finally, the study found that there are some significant relationships between the network formation elements and the enterprise-and entrepreneur-related factors, though they are not strong relationships. The results show that educated entrepreneurs are more likely to attend seminars and trade fairs, join professional and other societies, and contact other entrepreneurs, while they are less likely to discuss their business matters with relatives and friends. Meanwhile, female entrepreneurs discuss their business matters with relatives and friends more than their male counterparts. By contrast, compared to female owners, male counter-partners are looking for more external consultants, attending more seminars and trade fairs. The male entrepreneurs also have more contacts with other entrepreneurs. As pointed out above, the impact of these factors on network formation should be examined in details. Such studies would deepen our understanding of entrepreneurial network relationships.

6. Policy Recommendations and Further Research

In conclusion, this paper, which analyzed the impact of entrepreneurial network formation on the growth of small enterprises in Sri Lanka, found that network formation is an essential aspect of small business development. Networking, therefore, becomes an important element in the growth of small enterprises. However, networking is time-consuming, experience-based, and does not evolve overnight. The policy makers, small entrepreneurs, donors and others, who deal with the development of small enterprises in developing countries, can use the entrepreneurial network formation

approach instead of their traditional 'given-free' supporting approach. For instance, supporting institutions should organize network activities for small businesses. Nevertheless, the provision of basic infrastructure should be made a priority. The best strategy is to provide supports to establish industrial estates and clusters. Subcontracting would play a virtual role in such clusters. It is known that entrepreneurial networks and industrial clusters are interrelated. In addition, real professional services provision such as training, quality assurance including human resource development should receive government assistance in collaboration with private sector and professional associations. Small business owners should also realize the importance of constructing networks. Empirical studies available in this area particularly in less developed countries are rather limited. Therefore, further research is necessary in this direction. Causal relationships between network formation and business performances are also importance to study. Researchers should also deeply consider enterprise-and entrepreneur-related factors when studying networking and small businesses.

Appendix

Table 6A: Partial Correlations Matrix II

	MEM	DR	FRI	EXCON	SEM	TF	CE
Age	.065 (.259)	.046 (.425)	-.137 (.017)†	-.070 (.227)*	.155 (.007)*	.007 (.905)	.079 (.770)
Birth Place	.106 (.066)‡	-.121 (.035)†	.026 (.652)	-.089 (.123)	-.027 (.643)	-.027 (.640)	.062 (.278)
Education	.134 (.019)†	-.105 (.069)‡	-.101 (.081)‡	.045 (.430)	.123 (.032)†	.130 (.024)†	.137 (.017)†
Family business	-.083 (.144)	-.063 (.274)	-.116 (.044)†	.116 (.044)†	.027 (.634)	.063 (.274)	.019 (.739)
Pre- training	.069 (.234)	.115 (.064)†	-.088 (.124)	-.010 (.858)	.127 (.027)†	.020 (.732)	-.065 (.260)
Manufacturing	.059 (.308)	-.063 (.277)	-.074 (.194)	.047 (.414)	.085 (.139)	-.010 (.869)	.037 (.521)
Service	.021 (.714)	-.133 (.020)†	.013 (.825)	.114 (.048)†	.145 (.012)†	-.133 (.020)†	.044 (.447)
Size < 3	-.092 (.109)	.120 (.037)†	.010 (.858)	-.113 (.041)†	-.207 (.000)*	-.063 (.272)	-.253 (.000)*
Size 4- 25	.105 (.069)‡	-.083 (.151)	-.034 (.553)	.117 (.042)†	.231 (.000)*	.063 (.275)	.166 (.004)*
Firm' location	.040 (.492)	-.158 (.006)*	-.243 (.000)*	.134 (.020)†	.117 (.042)†	.171 (.003)*	.078 (.178)
Work experience	.042 (.470)	-.013 (.821)	.003 (.958)	-.056 (.329)	.184 (.001)*	.070 (.223)	.092 (.109)
Gender	.041 (.481)	-.162 (.005)*	-.253 (.000)*	.116 (.045)†	.178 (.002)*	.095 (.049)†	.101 (.080)‡
Family workers	-.046 (.424)	.104 (.071)‡	-.074 (.197)	.078 (.176)	-.004 (.952)	.035 (.545)	-.014 (.811)

Note: p-values (two-tailed significance) are in parentheses. N = 285

**p-value < 0.01; † p-value < 0.05; ‡ p-value < 0.10*

[a] Contact with other entrepreneurs (CE) has four categories: 0 = no contact (41.3 per cent); 1 = only Regional contact (38.3 per cent); 2 = Regional & National Contact (6.3 per cent); and 3 = only national (14.2 per cent)

(Gender: male = 1, female = 0; birth place: urban = 1, rural = 0; educational level: below A/L =1, A/L or above = 0; parent's own business: yes =1, no=0; pre-training: yes =1, no =0; firm location: industrial estate =1, otherwise =0; family workers: yes =1, no =0))

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Capital Stock and Labour Market Data Estimates for Sri Lanka

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Abstract: The paper estimates capital stock and employment, labour force and unemployment data for Sri Lanka. Total capital stock of the economy is estimated by the perpetual inventory accumulation method for the period 1960-2004. Using parameter estimates for the period 1990-2004, employment, labour force and unemployment data are interpolated for the period 1976-1989. Interpolated data may be combined with actual data to form long-term series. Estimated capital stock and labour market data are pretty consistent with output fluctuations of the economy.

Keywords: Capital stock, perpetual inventory accumulation, Employment, Labour force, Unemployment, Interpolation.

1. Introduction

The estimation of long-term aggregate or disaggregate production function, export supply function, labour supply and demand functions, the Phillips curve for Sri Lanka is largely hampered by the lack of or discontinuity of data for many important macro economic variables. For example, data for capital stock of Sri Lanka is not available. Consistent and continuous data for employment and unemployment are available only from 1990. This paper, therefore, focuses on the estimation of consistent data series for capital stock, employment, labour force and unemployment. First, the overall capital stock is estimated for the period 1960-2004 by the perpetual

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inventory accumulation method. Second, using estimated labour market parameters for the period 1990-2004, employment, the unemployment rate and labour force data are interpolated for the period 1976-1989. Estimated data fit well with business cycle fluctuations of the economy. In an application, the constructed capital stock and employment data explain aggregate output quite impressively.

The organisation of the rest of the paper is as follows. Section 2 constructs data series for the overall capital stock of the economy. Section 3 gives details of the interpolation of data for employment, the unemployment rate and labour force. In Section 4, the paper examines GDP forecast performance of estimated capital stock and employment data. Section 5 summarises the paper.

2. Capital Stock Estimates

The perpetual inventory accumulation method is used to calculate the overall capital stock of Sri Lanka (see Tsao, 1985; 1986; Young, 1992; Rao and Lee, 1995; Kemp, 2006 for previous work). By the perpetual inventory accumulation method, the capital stock at time t is given as follows:

$$K(t) = (1-\delta)K(t-1) + I(t) \qquad (1)$$

Where K is capital stock, δ is the rate of depreciation of capital, I is gross investment and time subscript is given in parenthesis. Eq. (1) implies that if gross investment exceeds capital depreciation ($\delta K(t-1)$), the capital stock is increasing over time.

In Eq. (1), data are observed only for investment, I. To compute K, one should know δ and the initial capital stock. In this paper, the rate of depreciation of the overall capital stock is approximated by the average of depreciation rates for various components of capital. These depreciation rates are originally reported in Hulten and

Wykoff (1980) and reproduced in Tsao (1985; 1986), Young (1992) and Rao and Lee (1995). The reported depreciation rates are as follows: 1.3 percent for residential constructions, 2.9 percent for non-residential constructions, 18.2 percent for transport equipments and 13.8 percent for machinery. The average of these depreciation rates, 9.05 percent, is used as the depreciation rate of the overall capital stock of Sri Lanka. The rate seems to be reasonable because high depreciating components of capital such as electronic items are not significantly large in Sri Lanka.

To find an approximate to the initial capital stock, the relationship between the average capital output ratio (ACOR) and the incremental capital output ratio (ICOR) is used (see Rao and Lee, 1995). The definitions of ACOR and ICOR are given as follows:

$$ACOR(t) = K(t) / Y(t) \qquad (2a)$$

and,

$$ICOR(t) = I(t) / [Y(t) - Y(t-1)] \qquad (2b)$$

where Y is output of the economy. It is important to note that for a given depreciation rate and an initial capital stock, a fairly stable ICOR could also mean the stability of ACOR. To elaborate this point, suppose ACOR is given by a constant, λ. Then, from Eq. (2a) capital stock at time t can be written as

$$K(t) = \lambda Y(t). \qquad (3)$$

The time derivative of (3) yields;

$$dK(t) / dt = \lambda dY(t) / dt$$

$$dK(t) / dY(t) = \lambda \qquad (4)$$

That is, the change in capital stock with respect to the change in output is given by λ, the value of ACOR. From Eq. (1), for a given

depreciation rate and an initial capital stock, we can show that changes in capital stock depend only on gross investment. That is, $dK(t)$ follows the path of I. Then, from equations (1), (2b) and (3), the ICOR can also be given by λ. This means that a stable ACOR implies the stability of ICOR. This necessarily implies the reverse case also. That is, a stable ICOR means the stability of ACOR too. Since data for K are unavailable, ACOR is unobservable. However, ICOR is computable as I and Y are observable. In this paper, ICOR is computed for Sri Lanka for the period 1960-2004. Gross investment and GDP are given in 2000 consumer prices.

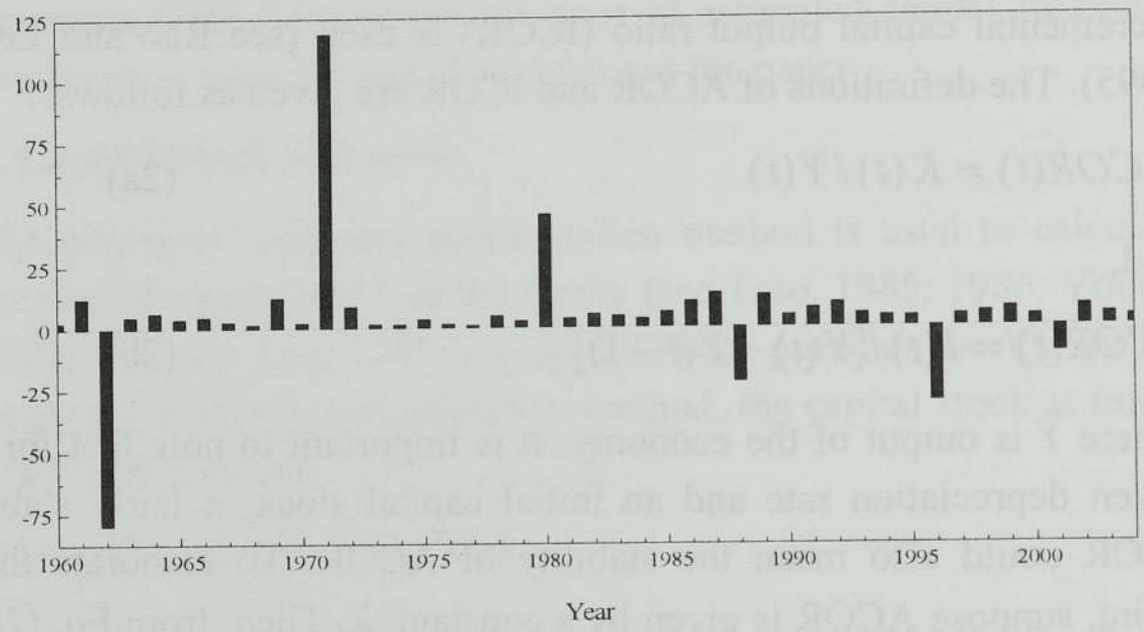

Figure 1: Incremental capital output ratio (ICOR) of Sri Lanka, 1960-2004
Source: Author's calculation based on Annual Reports, Central Bank of Sri Lanka.

As illustrated in Figure 1, ICOR varies largely in different investment and growth episodes. Nevertheless, it is relatively stable during the period 1963-1966. Since the stability of ICOR means a stable ACOR, average ICOR during the period 1963-1966, (4.77), is used as an approximate to the ACOR. Then, capital stock for the year 1966 is computed by multiplying the annual real GDP by 4.47. The computed capital stock for the year 1966 is LKR 8,989 millions

in 2000 prices. Then, 1966 capital stock is used as the initial value for the estimation of capital stock for the rest of the sample.

Two separate series of capital stock are computed. First, it is assumed that inventory accumulation is unintended. The accumulation of inventories is a result of market disequilibrium. Thus, gross investment does not include changes in stocks. In the second case, changes in stocks are assumed to be fully intended. Therefore, they are a part of investment. Since data for changes in stocks are available only from 1970, capital stock series constructed by both ways are the same during 1967-1970. Table A1 in Appendix gives gross investment and the computed capital stock series from 1966.

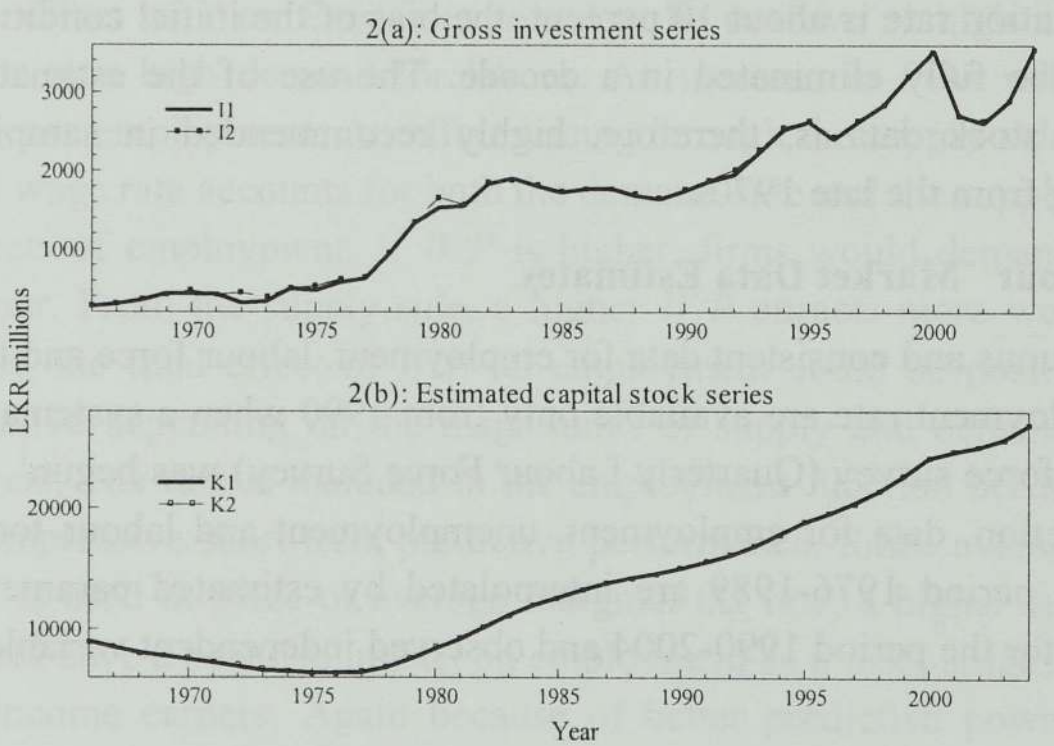

Figure 2: Gross investment and estimated capital stock, 1966-2004.
Note: *I1* and *I2* and *K1* and *K2* are gross investment and capital stock series given in Table A1.

As Figure 2(b) illustrates, the estimated two capital stock series do not differ largely. This implies that changes in stocks are not a significant part of capital accumulation. Another important feature is the declining trend in the estimated capital stock until 1977. For a given initial capital stock, this has the meaning that the depreciation of capital exceeds gross investment. As given in Figure 2(a), gross investment series was fairly stable during the period 1966-1977. Thus, gross investment was insufficient to offset the depreciation of capital. Another reason for the declining trend might be an over estimation of the initial capital stock. A higher initial capital stock could result in a higher amount of depreciation as well. One way to avoid the bias of possible over estimation of the initial condition is to discard some beginning years' capital stock values. Since our depreciation rate is about 10 percent, the bias of the initial condition would be fully eliminated in a decade. The use of the estimated capital stock data is, therefore, highly recommended in samples starting from the late 1970s.

3. Labour Market Data Estimates

Continuous and consistent data for employment, labour force and the unemployment rate are available only from 1990 when a systematic labour force survey (Quarterly Labour Force Survey) was begun[1]. In this section, data for employment, unemployment and labour force for the period 1976-1989 are interpolated by estimated parameter values for the period 1990-2004 and observed independent variables.

[1] For the pre-1990 period there are several labour force data sources such as the Population Census of 1981 and Labour Force and Socio Economic Surveys of the Census Department and Consumer Finance Surveys of the Central Bank. Referee notes that these data sources can at least serve as cross checks. However, employment and unemployment data vary largely across these sources because of differences in definitions and limitations in surveys

3.1 Employment

We estimate an employment function for the period 1990-2004 by fitting actual employment data by various observed variables. Even though the effort in this section was to find a best fit model, explanatory variables of the employment function are chosen carefully to preserve economic meaning. The employment function, which is specified as a function of demand-side and supply-side determinants of labour, is given as follows:

$$Emp = f(Y, POP, W / P, \tau) \qquad (5)$$

where *Emp* is number of persons employed, *Y* is real GDP, *POP* is total population, *W/P* is real wage and τ is average tax rate (*T/Y*).[2]

The effect of *Y* on *Emp* is expected to be positive as high income leads to a high demand for labour. An increase in *POP* will also increase employment: An effect arising through the supply-side. The real wage rate accounts for both the demand-side and the supply-side effects of employment. If *W/P* is higher, firms would demand less labour. From the supply-side, a higher *W/P* attracts more workers. Thus, the final effect of *W/P* on employment could be positive or negative depending on the magnitudes of supply and demand-side effects. Tax rate is included in the employment function because of its impressive short-term predictive performance. Since average tax rate is used in place of average marginal tax rate, a higher tax rate would have a negative impact on employment as it discourages firms or income earners. Again because of better predictive power, the first difference of *Y* is used in place of the level series. A dummy

[2] Population series shows a clear downward shift from 1990 onwards. The shift could be a result of measurement error. Corrected population data series is available from Karunaratne and Abeysinghe (2005). They have adjusted the series backward from 1990 by fitting a linear trend line and using the growth rate of population. The corrected population series is used for this study.

variable is included to capture an outlying effect in the year 1997. The estimated employment function for the period 1990-2004 is given as follows:

Table 1: Empirical Estimates of Employment Function

Variable	Coefficient	t-value
Intercept	-0.80	-0.72
ΔlnY	1.22	5.34
lnPop	1.25	4.32
ln(W/P)	-0.37	-3.71
Tax Rate τ	-1.23	-2.07
Dummy for 1977	-0.06	-3.62
R^2	0.99	
F (5,9)	220	(0.00)
Autocorrelation F (5,9)	0.43	(0.53)
Normality $Chi^2(2)$	1.44	(0.49)
RESET F(1,8)	0.39	(0.55)
Number of Observations	15	

Note: Diagnostic test p-values are given in parenthesis.

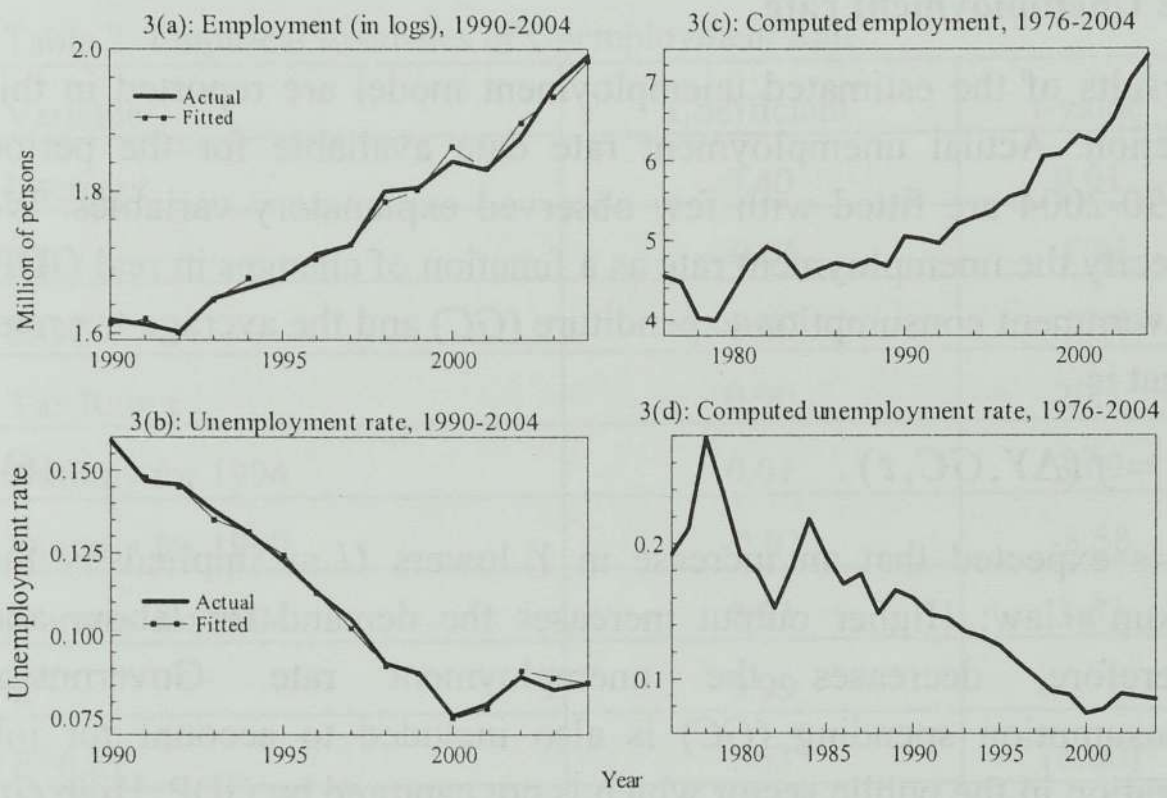

Figure 3: Employment and the unemployment rate

The fit of the model is pretty impressive as R^2 is 0.99. As illustrated in Figure 3(a), fitted values of the model track actual data quite well. The estimated model passes important diagnostic test criteria. Independent variables have the expected signs and are significant in the estimated employment function. Higher output and population increase total employment. The negative coefficient of the real wage implies the dominance of the demand effect. As expected, an increase in average tax rate results in lower employment. These estimated relationships seem to be robust as recursive estimates of the model are quite stable over time. Assuming the constancy of the estimated coefficients, the estimated employment function is used to predict in-sample and out-sample (1976-1989) employment figures. Employment data for the period 1976-1989 are interpolated by these constant coefficients and observed independent variables. Actual data for the period 1990-2004 and the estimated data for the period 1976-2004 are reported in Table A2 in the Appendix.

3.2 Unemployment rate

Results of the estimated unemployment model are reported in this section. Actual unemployment rate data available for the period 1990-2004 are fitted with few observed explanatory variables. We specify the unemployment rate as a function of changes in real GDP, government consumption expenditure (GC) and the average tax rate. That is

$$U = f(\Delta Y, GC, \tau)\,. \qquad (6)$$

It is expected that an increase in Y lowers U as implied by the Okun's law: Higher output increases the demand for labour and therefore, decreases the unemployment rate. Government consumption spending (GC) is also included to account for job creation in the public sector which is not captured by GDP. High GC reduces U as people find more employment opportunities in government undertakings which are vital for a smooth operation of the economy but traditionally treated as non-productive. Though the change in GC is appropriate, the level series is used because of better predictive power. The tax rate explains the dynamic behaviour of U over time. Since τ is used in place of average marginal tax rate, higher tax rate results in higher unemployment rate. The estimated U equation is given as follows:

Table 2: Empirical Estimates of Unemployment Rate

Variable	Coefficient	t-value
Intercept	0.40	9.01
ΔlnY	-0.06	-1.81
lnGC	-0.07	-12.0
Tax Rate τ	0.90	20.1
Dummy for 1994	0.01	3.09
Dummy for 1999	-0.01	-3.58
Dummy for 2004	0.01	3.53
R^2	0.99	
F (6,8)	363	(0.00)
Autocorrelation F (1,7)	1.23	(0.30)
Normality $Chi^2(2)$	1.71	(0.43)
RESET F(1,7)	0.06	(0.81)
Number of Observations	15	

Note: Diagnostic test p-values are given in parenthesis.

The estimated *U* equation fit well with the actual data for the period 1990-2004. R^2 value is almost one. Fitted values of *U* closely follow actual data series (see Figure 3(b)). As implied by reported diagnostic test statistics, the estimated *U* equation does not encounter serial correlation, non-normal errors and specification error. As expected, high *Y* and *GC* decrease *U* while high tax rate increases it. The estimated coefficients are significantly different from zero. Recursive estimates of coefficients reveals that they are highly stable.

The estimated equation is used to interpolate unemployment data for the period 1976-1989. Again, it is assumed that the estimated coefficients are constant over time. Then, by using the observed data for independent variables and constant coefficients, the unemployment rate is computed. Actual and estimated values for the unemployment rate are also given in Table A2.

One may combine the estimated and actual data to form long-term employment and unemployment data series. Time series behaviour of estimated employment and unemployment (rate) series are compared to assess the accuracy of the estimated data. As given in equations (5) and (6), data for employment and the unemployment rate were estimated by two independent regressions. The observed mirror image behaviour of employment and unemployment series, however, implies the consistency of estimated data (see Figures 3(c) and 3(d)). The following characteristics of estimated employment and unemployment data are observed: (i) Low employment and high unemployment in the late 1970s, (ii) A surge of employment opportunities, thus a significant fall in the unemployment rate, was evident in the early 1980s as the economy grew rapidly with 1978 policy reforms, (iii) A fall in employment and a rise in unemployment were occurred due to a slow down in the rate of growth of output in mid 1980s, (iv) A gradual increase in employment (and a gradual decrease in unemployment) was observed since 1989 (except in the year 2001) as the economy registered to a steady growth, and (v) A fall in employment and a rise in unemployment were occurred in 2001 in response to a sharp decrease in real GDP. These observations clearly imply the consistency and the accuracy of the estimated data as they closely follow business cycle fluctuations of the economy.

3.3 Labour force data

From the definition of the unemployment rate, labour force, LF, could be given as follows:

$$LF = \frac{Emp}{(1-U)} \quad . \qquad (7)$$

The interpolated data for employment and the unemployment rate were used to compute labour force data. Estimated labour force data can also be found in Table A2. It is observed that actual and estimated LF data for the period 1990-2004 are almost the same. It again reflects the accuracy of estimated employment and unemployment data.

4. Performance of Estimated Data

In Jayawickrama (2006), estimated capital stock data was employed in estimating the aggregate production and export supply functions. The estimated employment data were used to model labour demand equation, wage equation and the production function. Moreover the estimated unemployment data were used in the Phillips curve. The constructed data series have performed very well in each equation.

As an illustration, the estimation of the aggregate production function on constructed capital stock (*K1* series) and employment data is reproduced in this section. Employment series combines the interpolated data (1977-1989) and actual data (1990-2004). We assume that the aggregate output (Y) of Sri Lanka is produced by two factors, capital, K and labour, L. The production technology is assumed Cobb-Douglas with constant returns to scale.[3] The intensive

[3] The assumption of Cobb-Douglass technology however requires labour share (and capital share) of income to be stable. I show that the labour income share is relatively stable as it moves around 55% of GDP during the period 1992-2004 (see Jayawickrama, 2006).

form of production function is estimated as it provides more meaningful factor elasticity coefficients than the production function in level. The deterministic time trend is added to capture the effect of technological progress. The production function in log levels is given as follows:

$$\log(Y/L)_t = c + \alpha \log(K/L)_t + \lambda t + u_t \qquad (8)$$

where c, α and λ are constants and the magnitude of α ranges between 0 and 1. Since both (Y/L) and (K/L) are I(1) series, they need to be cointegated in Eq. (8).[4] The long-run solution to the above intensive form production function is obtained by a fully specified dynamic equation.[5] Following the model selection criteria, such as AIC, SC and sum of regression errors (sigma), the dynamic function is specified to include current and two period lagged values of (Y/L) and (K/L) and the time trend. Sample period runs from 1978 to 2004. The estimated dynamic aggregate production function takes the following form:

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[4] A unit root in (Y/L) and (K/L) series cannot be rejected at conventional significance levels as the ADF test statistics for the above variables (with a constant) are -1.352 and -1.993 respectively. ADF critical values are -2.97 at the 5% and -3.70 at the 1% significance level.

[5] Since (8) contains I(1) variables and the error term of this equation is I(0), (8) is a cointegrating regression. As is well known, the ordinary least squares (OLS) parameter estimates in a cointegraing regression are super-consistent. However, the estimated standard deviations and variances do not follow usual distributions unless the right hand side variables are independent and the errors have no autocorrelation. Therefore, standard t- and F- tests are generally inappropriate (see for example Enders, 2004, p. 342; Sims, Stock and Watson, 1990). Nevertheless, it is possible to calculate appropriate asymptotic standard errors for a static regression involving non-stationary variables (Hayashi, 2000, pp. 656-657). However, OLS estimators in a dynamic regression do follow standard distributions (see Pesaran and Shin, 1998).

Table 3: Empirical Estimates of Dynamic Production Function

Variable	Coefficient	t-value
Intercept	2.51	5.10
ln(K/L)	0.62	5.85
ln(K/L)(-1)	-0.57	-2.81
ln(K/L)(-2)	0.34	2.40
ln(Y/L)(-1)	0.68	4.16
ln(Y/L)(-2)	-0.47	-3.54
Deterministic Trend	0.01	4.54
R^2	0.99	
F (6,20)	539	(0.00)
Autocorrelation F (2,18)	3.57	(0.06)
Normality $Chi^2(2)$	1.14	(0.57)
RESET F(1,19)	0.25	(0.62)
Number of Observations	27	

Note: Diagnostic test p-values are given in parenthesis.

The fit of the dynamic model is impressive as R^2 is 0.994. The ECM unit root statistic (see Banerjee et al. (1999)) is -5.959 and clearly implies the cointegration of (*Y/L*) and (*K/L*). The long-run solution to the above dynamic function is given as follows:

Table 4: Derived Long-Run Coefficients of Production Function

Variable	Coefficient	t-value
Intercept	3.61	7.94
ln(K/L)	0.47	9.18
Deterministic Trend	0.01	6.42

The estimated α is roughly 0.5 which implies that the long-run output elasticities of K and L are approximately the same. Further, per worker output increases by 0.01 from one year to another due to technological progress. The estimated α and λ coefficients are very robust as they largely invariant for the changes in the specification. Using this cointegration solution, an error correction model (ECM) for the production function is formulated to explain the short-term dynamics. The estimated ECM takes the following form:

Table 5: ECM Estimates of Production Function

Variable	Coefficient	t-value
Intercept	1.09	2.25
Δln(K/L)	0.56	6.86
Error Correction Term	-0.34	-2.23
R^2	0.70	
Autocorrelation F (2,21)	0.54	(0.59)
Normality $Chi^2(2)$	0.72	(0.70)
Heteroscedasticity F(4,18)	1.20	(0.34)
RESET F(1,22)	0.27	(0.61)
Number of Observations	27	

Note: Diagnostic test p-values are given in parenthesis.

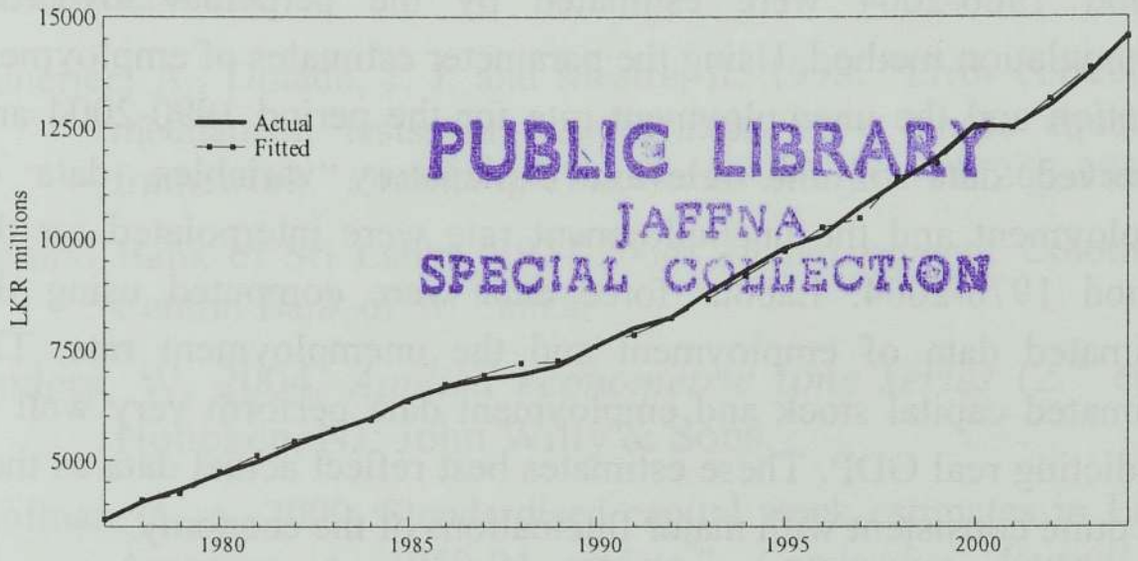

Figure 4: Actual and fitted values of real GDP in levels, 1978-2004

The above ECM captures the short-term behaviour of (Y/L) quite well. The estimated short-term elasticity of K is quite similar to the long-term elasticity. A null hypothesis that sets α in the long-term and in the short-term equal cannot be rejected. The estimated error correction coefficient implies that any deviation from the cointegrating relation adjusts slowly. That is, only 1/3 of any one percent deviation of (Y/L) from its cointegrating relationship adjusts within a year. The estimated ECM of $\log(Y/L)$ is, then, used to predict values of Y in normal levels. Figure 4 illustrates actual and fitted values of Y for the period 1978-2004. The estimated GDP series follows the actual series very closely. This, in fact, has the meaning that capital stock and employment estimates well explain the aggregate output of the economy.

5. Summary

Because unavailability of capital stock data and discontinuity of labour market data stand as a major barrier to the verification of many economic relationships, this paper estimated long-term data series for capital stock, employment, labour force and the unemployment rate for Sri Lanka. The capital stock data for the

period 1966-2004 were estimated by the perpetual inventory accumulation method. Using the parameter estimates of employment function and the unemployment rate for the period 1990-2004 and observed data of the relevant explanatory variables, data of employment and the unemployment rate were interpolated for the period 1976-2004. Labour force data were computed using the estimated data of employment and the unemployment rate. The estimated capital stock and employment data perform very well in predicting real GDP. These estimates best reflect actual data as they are quite consistent with major fluctuations of the economy.

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APPENDIX

Table A1: Capital Stock Estimates for Sri Lanka (1966-2004) (LKR millions in 2000 prices)

Year	(I1)	(K1)	(I2)	(K2)
1966	270	8,989	270	8,989
1967	305	8,481	305	8,481
1968	355	8,068	355	8,068
1969	438	7,776	438	7,776
1970	434	7,506	476	7,548
1971	423	7,250	429	7,256
1972	316	6,909	444	7,038
1973	332	6,616	388	6,672
1974	499	6,516	511	6,528
1975	474	6,400	530	6,457
1976	581	6,403	620	6,441
1977	629	6,452	657	6,480
1978	950	6,819	954	6,822
1979	1,333	7,535	1,362	7,563
1980	1,535	8,387	1,664	8,517
1981	1,553	9,181	1,575	9,203
1982	1,833	10,183	1,848	10,198
1983	1,904	11,166	1,893	11,154
1984	1,810	11,965	1,816	11,972
1985	1,730	12,612	1,740	12,622
1986	1,768	13,239	1,774	13,245
1987	1,774	13,815	1,780	13,821
1988	1,685	14,250	1,705	14,270
1989	1,645	14,605	1,660	14,620
1990	1,747	15,031	1,773	15,057
1991	1,869	15,539	1,890	15,560
1992	1,951	16,084	2,016	16,149
1993	2,237	16,866	2,270	16,898
1994	2,528	17,867	2,565	17,905
1995	2,624	18,874	2,639	18,889
1996	2,408	19,574	2,444	19,611

1997	2,634	20,436	2,637	20,439
1998	2,840	21,427	2,842	21,429
1999	3,203	22,691	3,204	22,692
2000	3,526	24,163	3,526	24,163
2001	2,712	24,688	2,712	24,688
2002	2,609	25,063	2,643	25,097
2003	2,892	25,685	2,908	25,702
2004	3,542	26,904	3,544	26,906

Source: Author's calculation based on data of gross investment and changes in stocks reported in Annual Reports, Central Bank of Sri Lanka.

Notes:

(a) Changes in stocks are assumed unintended. Therefore, investment and capital stock data do not include changes in stocks;

(b)Changes in stocks are assumed to be fully intended. Therefore, gross investment data include changes in stocks as well

Table A2: Actual and Estimated Data for Employment, Unemployment Rate and Labour Force

	Employment (million of persons)		Unemployment Rate		Labour Force (million of persons)	
Year	Actual	Estimated	Actual	Estimated	Actual	Estimated
1976	---	4.55	---	0.19	---	5.64
1977	---	4.47	---	0.21	---	5.67
1978	---	4.03	---	0.28	---	5.58
1979	---	3.99	---	0.24	---	5.24
1980	---	4.36	---	0.19	---	5.39
1981	---	4.72	---	0.18	---	5.75
1982	---	4.92	---	0.15	---	5.81
1983	---	4.82	---	0.18	---	5.89
1984	---	4.53	---	0.22	---	5.80
1985	---	4.63	---	0.19	---	5.72
1986	---	4.71	---	0.17	---	5.68
1987	---	4.67	---	0.18	---	5.68
1988	---	4.76	---	0.15	---	5.59

1989	---	4.67	---	0.17	---	5.60
1990	5.05	5.02	0.16	0.16	6.00	5.97
1991	5.02	5.05	0.15	0.15	5.88	5.93
1992	4.96	4.95	0.15	0.15	5.81	5.79
1993	5.20	5.20	0.14	0.14	6.03	6.01
1994	5.28	5.35	0.13	0.13	6.08	6.12
1995	5.36	5.36	0.12	0.12	6.11	6.12
1996	5.54	5.51	0.11	0.11	6.24	6.21
1997	5.61	5.61	0.11	0.10	6.27	6.25
1998	6.05	5.96	0.09	0.09	6.66	6.56
1999	6.08	6.07	0.09	0.09	6.67	6.56
2000	6.31	6.44	0.08	0.07	6.83	6.96
2001	6.24	6.24	0.08	0.08	6.77	6.77
2002	6.52	6.67	0.09	0.09	7.15	7.33
2003	7.01	6.91	0.08	0.09	7.65	7.57
2004	7.32	7.27	0.09	0.09	8.00	7.95

Source: Actual data are from *Annual Reports*, Central Bank of Sri Lanka

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Inflation Targeting & Central Bank Independence -New Directions for Sri Lanka's Monetary Policy?

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The growing consensus that the design of scientific monetary policy requires targets or rules rather than discretion is explained using a rudimentary macro theoretical framework. A quadratic loss function constrained by an expectations augmented Phillips curve has been used to demonstrate that an optimal policy rule or inflation targeting delivers superior inflation outcomes than optimal policy discretion. Furthermore, central bank independence and the role of alternative institutional mechanisms have been briefly reviewed.

The paper concludes that the design of scientific monetary policy identify inflation targeting and the enhancement of central bank independence as catalytic forces that will engineer a low inflation environment. Such policy innovations could distance monetary policy from the debilitating political business cycle and galvanise policy to face up to the competitive challenges of globalization.

Key Words.
Inflation Targeting, Central Bank Independence, Political business cycle, Sacrifice ratio, Time-inconsistency, Phillips-curve, Time-series, Cointegration. Vector error- correction models. Granger causality tests. Globalisation.

1. Introduction

Developing countries in the new millennium will integrate with the global economy through the process of trade liberalisation, removal of restrictions on cross-border capital transactions and by the adoption of revolutionary communication and information

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technology. This process of globalisation will engulf countries and pose challenges to attempts to regain monetary policy independence under pegged exchange rate regime given free capital mobility. The 'impossibility theorem' (Isard, 1995) or the open economy trilemma forewarns that policymakers can have only two of the three things: policy independence, pegged exchange rate and capital mobility and not all three and this was demonstrated recently by the financial crisis that engulfed the Asian economies recently.

In 1977 after pursuing a pegged exchange rate regime since independence switched to a managed float thus abandoning the nominal exchange rate anchor. The Central Bank of Sri Lanka (CBSL) established in 1950 under the Monetary Law Act No. 58, 1959 is empowered to implement monetary policy in Sri Lanka achieving price stability, exchange rate convertibility and long-term growth and development. The CBSL was besides the bankers' bank the government's bank and used narrow money and an array of policy instruments such as reserve ratio, bank rate, credit ceilings and moral suasion to control the money supply in order to stabilise price and establish a low inflation environment. During the period 1948-1977 through financial repression, administered prices, subsidies and incentives, import and exchange controls interventionist policies reined supreme and the Sri Lankan economy was heavily controlled by policy directives rather than by market forces.

During the post-independence era Sri Lanka embarked on policy of industrialisation under protection in order to diversify the narrow economic base concentrated on primary products (tea, rubber and coconut) and overcome the problems associated with the secular decline in the terms of trade. Sri Lanka switched easy import substituting industrialisation (ISI) to hard ISI through the production of intermediate and capital goods under highly protectionist policies.

The miracle Asian economies switched from easy ISI to export promotion to achieve their miracle growth rate whilst Sri Lanka's policy mis-step of switching to hard ISI landed the economy in a quagmire of stagnation and lack-lustre growth. However, in 1977 there was a policy regime switch from ISI to export oriented industrialisation (EOI). The exchange rate which had been pegged and made a dual exchange rate regime with an array of exchange and capital controls was deregulated. In regime-switch witnessed the introduction of managed float, trade liberalisation and establishment of free trade zone (FTZs) into which foreign direct investment (FDI) and capital flows were allowed unimpeded. The Sri Lanka growth rate which had stagnated accelerated and the economy was on export-led growth boom which was marred by insurrection an outbreak of separatist conflict in the North of the island. Nonetheless, policymakers steadfastly committed to economic liberalisation and promoting open economy policies facilitating the integration of the economy with the world economy or promoting the globalisation process.

The focus of the study is on how monetary policy in Sri Lanka should be redesigned to meet the challenges and use the opportunities of the globalisation process to which the country seems to be irrevocably committed. The CBSL as the prime architect of monetary policy of Sri Lanka in the globalised economic ethos has to play a new a political role distancing itself from the role of a compliant government bank. In a competitive global economy the development of sustainable market friendly policies are a prerequisite to attract the magic package of technology, managerial skills and firm specific assets that foreign direct investment (FDI) and transnational corporations bring. Price stability or a low inflation environment is a cardinal requirement to establish an economic environment that is conducive to FDI and foreign capital inflows.

The new insights from scientific monetary policy design reveals that in order to achieve low and sustainable inflation environment the establishment of institutional framework and commitment technology that will enhance policy credibility needs to be addressed. In a nutshell this involves the adoption of inflation targeting and avoidance of time-inconsistency in policy so as to enhance policy credibility (Clarida et al. 1999, Bernanke and Mishkin, 1997; Blinder, 1997).

In Section 2, the basic elements to redesign monetary policy through adoption of inflation targeting and the institutional mechanism of Central Bank Independence (CBI) will be further clarified. Section 3 of the paper will review Sri Lanka's experience due to violation CBI due to the political business cycle resulting in high sacrifice ratio in the 1990. The vacuum created by the abandoning the nominal anchor of the exchange rate peg in 1977 was not adequately met by monetary targeting resulting in policy discretion and spiralling inflation. Sri Lanka post-1977 transformed from a low inflation to a high inflation economy and was an outlier in the inflation stakes in the region. Section 4 will review the theoretical underpinnings of the rationale for Inflation Targeting (IT) and CBI. It will demonstrate using rudimentary macroeconomic theory how inflation targeting or rules deliver lower inflation than policy discretion, using the Phillips curve constrained quadratic loss function. Section 5 will examine the feasibility of IT.

Empirically testing transmission mechanisms linking inflation exchange rate dynamics using a vector error-correction model (VECM) for the sample period 1950-99. The validation of the VECM required the unit root and cointegration tests of the time-series data to avoid spurious regressions as explained in this section. Section VI distills policy conclusions for redesigning Sri Lanka's monetary policy architecture so that it can be more effective in

addressing policy requirements of the emergent borderless world or the globalised economy.

2. Inflation Targeting and Central Bank Independence

Inflation targeting requires that the monetary policy should be: *1.* Committed solely to the achievement of a pre-announced quantitative inflation target. *2.* Implemented to achieve a pre-announced inflation target or a forecast thick-point (numerical range) to be attained over medium term or the business cycle. *3.* Supported by an array of instruments geared to the achievement of the inflation target. *4.* Transparent or information in relation to the performance of the IT should be publicly disclosed to enhance policy credibility. *5.* Evaluated and that the Governor and the Central Bank be held accountable for failure to achieve the target. *6.* Based only on a single nominal anchor, the IT, and should not be distracted other nominal anchors related to the exchange rate or wage policy. *7.* Free of domination by fiscal imbalances and accommodation in order to monetise budget deficits. *8.* Based on the availability of other private debt instruments from well developed financial markets. *8.* Based on technically sound forecasts and presumes availability of the required technical expertise to implement the complex policies required for the achievement of the IT.

Some analysts conclude that developing countries do not have the required pre-conditions for implementation of IT. Because monetary policy is geared to structural adjustment designed to efficiency and functioning of private financial markets (Brown and Yousef, 1996). Besides, fiscal dominance and the absence of well developed monetary and capital markets would undermine the operation of the transmission channels linking the IT to monetary policy variables (Mosson *et al.,* 1997). However, the feasibility of IT for a

developing country such as Sri Lanka has to be tested empirically. Based on insights from the contemporary scientific monetary policy design and results of the empirical tests this paper will aim to establish that Sri Lanka can embark on IT and CBI to achieve a low inflation environment.

Central Bank Independence

Central Bank Independence (CBI) refers to the independence of the Central Bank from the influence of the political business cycle or manipulations of monetary policy by the incumbent government to maximise its re-election chances regardless its destabilising effects on macroeconomic performance. The insulation of the Central Bank from political process can be achieved by CBI. CBI has been defined as the delegation of ' monetary policy to an agent whose preferences serves as a commitment device that permits sustaining a lower inflation rate than would otherwise be possible.'(Alesina and Summers, 1993). Cross-country empirics by a number of analysts have confirmed the stylised fact that high CBI delivers low inflation with the "free lunch" of no apparent costs (Bade and Parkin, 1980; Alesina, 1988; Grilli et al., 1991, Cukierman, 1992).

In compiling a composite index of CBI a number of sub-indices related to facets of legal, instrument, goal, conflict resolution, transparency and accountability factors have been aggregated. It has been observed that CBI for advanced countries is much higher than that observed for developing countries by a factor of at least three (Cukierman, 1992). The factors that determine CBI are presented in sub-indices in Table 1 below:

Table 1. Composite Index of Central Bank Independence (CBI)

Characteristics of CBI	Measure / Description
1. Legal independence	Gubernatorial turnover
2. Instrument independence	Autonomy in setting interest rate
3. Goal independence	Targets set by CB (exchange rate, inflation)
4. Conflict resolution	Final arbiter: CB or Minister of Finance?
5. Transparency	Disclosure of Information.
6. Accountability	Responsibility for performance

Sources: Karunaratne (1999); Cukerman (1992).

For developing countries such as Sri Lanka the composite of CBI is about 0.30 compared to almost unity for advanced countries. Next we present a case study of Sri Lanka's economic performance during the post-independence era as a prelude to determining the feasibility of launching the new monetary policy of IT and CBI in Sri Lanka.

3. Sri Lanka's Macroeconomic Policy- Post independence era

Sri Lanka achieved political independence in 1948 with good initial conditions that led the Prime Minister of Singapore to state that he would develop Singapore taking Sri Lanka as the model. But the flawed sequencing of industrialisation strategies and the mismanagement of the economy through interventionist policies robbed Sri Lanka of the opportunity of emerging as a miracle growth economy in Asia. Sri Lanka embarked on an import substituting industrialisation (ISI) strategy under protectionist barriers. The aim was to diversify the narrow primary production export base and escape from the secular decline of the terms of trade trap. The ISI strategy first implemented easy ISI specialising in the production of light consumer goods. Thereafter in the 1960s adopted a hard ISI strategy involving the production of intermediate and capital goods

in order to establish a socialist economy where the commanding heights or basic industries would state controlled. The East Asian economies had switched from easy ISI to an export substitution strategy whilst Sri Lanka embarked on the flawed hard ISI strategy and converted the economy to one of the most protected economies in Asia. The growth rate plummeted and the country was enmeshed in a severe balance of payments crisis and economic stagnation and protection.

The high cost production under the heavy ISI created shortages and a black market in foreign exchange. Nearly two decades of lost growth opportunities were finally ended when a dramatic switch to an export oriented industrialisation (EOI) strategy was made in 1977. The EOI strategy witnessed the liberalisation of the economy from controls and the replacement of the pegged exchange rate by a managed float. The forsaking of the nominal anchor of the exchange rate peg created a vacuum and provided scope for discretionary policy resulting in the unleashing of inflationary pressures causing a massive loss of policy credibility.

The government in early 1980s engaged in time-inconsistent policies reversing open economy policies to rescue state owned enterprises that were in strife without import protection. The loss of policy credibility resulted in spiralling inflationary expectations and in 1980 the inflation rate reached a record peak of 26 percent. The blow-out in the budget deficit due to the government's undertaking of multi-million dollar infrastructure and river valley development projects. High inflation occurred due to the unpleasant monetarist arithmetic resulting from the monetizing rather than debt financing of the budget deficits (Sargent and Wallace, 1981). Moreover the absence of a nominal anchor and the volatility of the monetary aggregate despite a switch in 1980 from narrow money (M1) to broad money (M2) failed to control the money supply despite

reinforcement from an array of policy instruments (reserve ratio, bank rate, open market operations, selective credit controls and moral suasion). The monetary transmission linking the monetary aggregate to inflation had collapsed due to financial innovations and monetary targeting was no longer effective and inflation was on a roll after the switch to an open economy with a free float. Sri Lanka's inflation experience during the post-independence era can be trichotomised into three episodes as shown in Table 3. The inflation experience is reviewed in Karunaratne and Bandara (1999). The inflation rate remained relatively low and moderate in the pre-float era and averaged 6 per cent in the decade prior to the switch to the liberalised economy with a managed float. The inflation rate then reached double digit figures an averaged 12.5 percent during the post-float era (SeeTable 3).

Table 3. Inflation Episodes in Post-Independence Sri Lanka

Episode	Inflation	Average p.a.	Exchange regime
1948-1967	Low	1 per cent	Fixed
1968-1977	Moderate	6 per cent	Dual
1878-1998	High	12.5 per cent	Float

Source: Karunaratne and Bandara (1999)

Besides flawed sequencing of industrialisation strategies and the vacuum created by the absence of a nominal anchor and the policy inconsistencies in the 1980s fuelled inflationary expectations by eroding policy credibility as hypothesised in the time-inconsistency literature (Kydland and Prescott, 1977). Much of the blame for the loss of policy credibility can be attributed to the Political Business Cycle (PBC) or the manipulation of policy to be expansionary on the eve an election and contractionary post-election thereby destabilising the economy with deleterious effects on long-term growth performance (Nordhaus; 1975; Tufte, 1978). The operation of the PBC in Sri Lanka is clearly evident in the data provided in Table 4

below. The PBC undermined CBI and the credibility of monetary policy and unleashed inflationary expectations particularly in the absence of the nominal anchor provided by the exchange rate peg post-1977.

Once inflation rates takeoff they continue to persist at high levels and reducing inflation or disinflation involves a sacrifice of output which can be measured by the sacrifice ratio (Ball, 1994). The sacrifice ratio can be defined as the loss in output due to a reduction in inflation by one percent. In Sri Lanka during the past decade 1990-98 the disinflation has resulted in a sacrifice ratio of 7.6 percent of output per year. The calculation of the sacrifice ratio is detailed in Table 5 below. If the effects of the PBC are eliminated and monetary policy is made more credible then according the proponents of the rational expectations hypothesis (Sargent, 1982) the sacrifice ratio would be an overestimate of the cost of disinflation.

The Okun coefficient 2 assumes that one unit of inflation equals two units of output reduction. The inflation reduction for the period 1990-98 is estimated at 16.8%

Table 4 The Political Business Cycle in Sri Lanka

		(Percentage growth of GDP)									
Election Year	Phase	50	55	60	64	70	74	77	90	94	97
Election eve	Expansion	5.2	5.9	6.8	6.4	4.3	3.2	4.2	6.2	7.0	6.3
Post election	Contraction	4.6	.05	2.1	2.8	0.2	2.8	8.7	4.6	5.6	4.7

Table 5: Sacrifice Ratio for Sri Lanka (1990-98) (Percentages)											
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	
Unemp rate (u)	15.9	14.7	14.6	13.8	13.1	12.3	11.3	10.5	9.5	8.5	Σ
Natural rate (u*)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Cyclical (u-u*)	9.9	8.7	8.8	7.8	7.1	6.3	5.3	4.5	3.5	2.5	64.2

Notes: Sacrifice Ratio = [reduction in output/ reduction in inflation]

$= \Delta Y/\Delta\pi = 2x\ 64.2/\ 16.8 = 7.6\ \%$

According to proponents of the rational expectations hypothesis (Sargent, 1982) had policy credibility been enhanced in Sri Lanka the costs of disinflation would be much lower. In fact the sacrifice ratio calculated without taking account of the policy effects of expectations may be misleading according to the Lucas critique (Lucas, 1976). The important lesson that can be distilled from Sri Lanka's inflation experience is that cost of disinflation or sacrifice ratio could be painless by enacting credible policies on inflation reduction. Here rules or targets as opposed to policy discretion plays a critical role in enhancing policy credibility by precluding time-inconsistent behaviour that occurs due to effects of the political business cycle.

3. The Case for Redesigning the Monetary Architecture

Inflation has been an aged old foe of the macroeconomic policymakers. It has been dubbed the 'public enemy number one, a thief, a scourge. Nonetheless, governments of DCs have used the inflation tax or seigniorage for financing short-term macroeconomic goals mainly geared to re-election maximising strategies or the PBC. However, such opportunistic and time-inconsistent policies have resulted huge sacrifice ratios when it comes to disinflation and inflicted enormous long-term dead weight losses in the form of impaired policy credibility and reputation.

The new scientific approach for designing monetary policy so to deliver a sustainable low inflation environment can be explained using basic building blocks from macroeconomic theory. In order to demonstrate that inflation targeting or monetary policy rules will deliver superior low inflation outcomes that discretionary policy we use the expectations augmented Phillips curve (Equation 1) and a quadratic loss function (Equation 2).

$$\pi = \pi^e - \beta(u - u^*) \quad (1)$$

$$L = (u - u^*) + \lambda(\pi - \pi^e)^2 + \gamma\pi^2 \quad (2)$$

Where (1) is the expectations augmented Phillips curve and (2) is the quadratic loss function. u: unemployment rate. u* natural rate of unemployment. π: inflation rate. π^e: expected rate of inflation. π^*: target rate of inflation, γ: measures of the degree of inflation aversion of inflation-aversion parameter. λ is the measure of the importance attached to reduction of inflation relative to the expected inflation.

If the Central Bank follows a fixed rule or inflation target, then under the rational expectations hypothesis (REH), the public will expect actual inflation to be equal to the expected inflation or $\pi=\pi^e$. Therefore from equation (1) actual unemployment rate will be equal to the natural rate or u=u*. Since under IT actual unemployment equals the natural rate irrespective of the numerical value of the IT, the optimal inflation target would be zero. Therefore under IT the optimal inflation would be zero: (π = 0 Zero inflation).

Under discretionary policy the central bank would operate under a Phillips curve constrained loss function (L) derived by substituting equation (1) in equation (2) yielding:

$$L = u^* - \frac{(\pi - \pi^e)}{\beta} + \gamma\pi^2 \quad (3)$$

The optimal inflation outcome under policy discretion is obtained from the first order condition from minimising L thus:

$$\frac{dL}{d\pi} = 0 \text{ Resulting in } \pi = \frac{1}{2\gamma\beta} \quad (4)$$

A comparison of zero inflation (π=0) and equation (4) reveals that inflation targeting or a rule delivers a lower and therefore a superior inflation outcome than under policy discretion.

Furthermore, policy outcomes equivalent to the optimal outcome under IT can also be achieved by other institutional mechanisms such as the appointment a very conservative economist with a high aversion for inflation as the governor of the Central Bank. This would make the inflation aversion parameter in (5) large or $\gamma = \infty$ resulting in the same inflation outcome as under IT. Table 6 summarises the alternative institutional mechanisms that would generate the same optimal inflation outcome as under IT and CBI as proposed by various analysts.

Table 6 Institutional mechanisms for increasing CBI and inflation aversion

Table 6 Institutional mechanisms for increasing CBI and inflation aversion

Institutional mechanism	Proponents
1. CBI (Legal & instrument independence)	Alseina (1988); Summers (1992)
2. Appointment of conservative governor	Rogoff (1985)
3. Incentive contracts (penalty for failure)	Walsh (1985)
4. Numerical inflation targets (forecasts)	Svensson (1997)
5. Mandated targets	(Green, 1996)
6. Reputation and credible policies	Barro & Gordon(1983)

The rudimentary theoretical exposition above lends support to the implementation of rules or IT that will enhance CBI and deliver low inflation environments that are conducive to growth. Equivalent optimal outcomes could also be achieved by implementing alternative institutional mechanisms. However, since many economists have expressed reservations on the feasibility of IT and CBI in developing economies such as Sri Lanka the matter needs to be clarified empirically by econometric modelling. A task that is

undertaken next in relation to the transmission mechanisms linking inflation with other macro variables.

4. Modelling the Monetary Transmission Mechanism

The inflation and exchange rate dynamics of Sri Lanka has been specified using the following model equations. Equation (5) defines the general price level (p_t) as a weighted average of the prices of tradables (p_t^T) and nontradables (p_t^N) as postulated by Obstfeld and Rogoff (1996) and Pilbeam (1998). Equation (6) defines the price of tradables as equal to the price of exchange rate (e_t =domestic currency per unit of foreign currency) as defined by the purchasing power parity relationship. The foreign price is given by p_t^f. Equation (8) defines money (m_t^D) as direct function of real GDP (y_t) and an inverse function of the interest rate (i_t). All variables shown in lower case letters refer to log transformations.

$$p_t = \lambda p_t^T + (1-\lambda) p_t^N \quad (5)$$

$$p_t^T = e_t + p_t^f \quad (6)$$

$$p_t^N = m_t - m_t^D \quad (7)$$

$$m_t^D = \alpha_1 y_t - \alpha_2 i_t \quad (8)$$

Substituting equation (6) and (7) in equation (5) and after substituting equation (8) in (7) the following reduced form relation can be obtained:

$$p_t = \lambda(e_t + p_t^f) + (1-\lambda)[m_t - \alpha_1 y_t + \alpha_2 i_t] \quad (9)$$

Thus the general price level for tradables could be defined by the following reduced form equation:

$$p_t = f\left[e_t, p_t^f, m_t, y_t, i_t\right] \qquad (10)$$

The expected signs of the reduced form coefficients are: $\delta f/\delta e_t > 0$; $\delta f/\delta p_t^F > 0$; $\delta f/\delta m_t^S > 0$; $\delta f/\delta y_t < 0$; $\delta f/\delta i_t > 0$;

The empirical validation of the reduced form equation was based on a time-series database covering the sample period 1950-1999. The log of one plus percentage transformations were used in the case of the exchange rate and the interest rate variables. The variable transformations and the data sources are reported in the database in the Appendix I.

The time-series properties of the variables of interest were tested for unit roots using the Augmented Dickey Fuller test (Dickey and Fuller, 1981). The test results are reported in Table 7 and indicate that the variables are all nonstationary or integrated order one or I(1) and had to be first differenced to make them stationary or I(0).

Table 7 ADF Unit root test results									
Variable	ADF	AIC	Lag	I(d)	Var	ADF	AIC	Lag	I(d)
p_t: domestic price	-1.95	84.93	1	I(1)	Δp_t	-3.32	79.38	0	I(0)
e_t: exchange rate	-1,95	153.9	1	I(1)	Δe_t	-2.86	148.0	0	I(0)
p_t^f: foreign prices	-2.19	49.64	0	I(1)	Δp_t^F	-6.15	40.14	0	I(0)
m_t^s : money supply	-2.22	22.97	1	I(1)	Δm^S_t	-6.79	19.51	0	I(0)
y_t : real GDP	-2.26	126.7	1	I(1)	Δy_t	-4.13	119.9	0	I(0)
i_t : interest rate	-3.43	157.9	1	I(1)	Δi_t	-5.91	151.7	0	I(0)
CV 95%	-3.50					-2.92			

Table 8 Johansen Cointegation test (Var =2) $z_t = (p_t\ e_t\ p_t^{pf}\ m_t\ y_t\ i_t)$				
Null	λ–max	95 %CV	λ–trace	95 % CV
r =0	45.93*	39.83	135.29*	95.87
r =1	33.85*	33.64	89.30*	70.49
r=2	28.28*	27.42	55.44*	48.88
r =3	23.43*	21.12	27.17*	31.54
r =4	3.09	14.88	3.74	17.86
r =5	0.55	8.07	0.64	8.07

The Johansen cointegration tests based on both the maximum eigen value or λ–max and λ–trace both indicate that there are at least four cointegrating vectors spanning the space linking the inflation, exchange rate and monetary policy variables defined by the stochastic vector z_t where all the elements refer to the log transform of the variables (See Table 8).

The reduced form equation (10) can be empirically validated to test the transmission mechanisms linking candidate target variables and inflation. A general model or an autoregressive distributed lag model or ADL (1) is fitted to determine the error correction mechanism (ECM) that underpins the long-run equilibrium relations linking inflation and other candidate target variables. The Granger Representation theorem posits that cointegration implies that an ECM exists and a significant ECM implies cointegration (Engle and Granger, 1987). The ADL (1) model also gives a long-run static equation, and reveals that only the exchange rate has a significant long run effect. Also jointly the other variables such as the foreign prices, money supply, real GDP and the interest rate are jointly significant explaining inflation as the Wald Chi-Sq-statistic is highly significant as reported below:

$$p_t = \underset{(2.95)}{2.55} + \underset{(1.54)}{3.68}e_t + \underset{(0.55)}{0.69}p_t^f + \underset{(0.31)}{0.14}m_t - \underset{(0.35)}{0.10}y_t + \underset{(3.18)}{1.01}i_t$$

Wald Chi-Sq (5) =180.77**

Figures in parentheses are standard errors.

A general model or ADL(2) model was specified in terms of stationary (differenced) variables incorporating and an error correction mechanism (ecm) to capture the dynamics linking the inflation rate to exchange rate and monetary dynamics. The ecm has been estimated as the lagged residual of the empirically validated

cointegration equation. The Vector Error Correction Model (VECM) was sequentially reduced as per the general -to-specific methodology (Davidson et al. 1975) to arrive at a parsimonious conformable specific VECM model as reported below: The model passes a battery of diagnostics relating to autcorrelation, heteroscedasticity, normality, and functional form mis-specification:

$$\Delta p_t = 0.24\Delta p_{t-1} - 0.32\Delta p_{t-2} - 2.15\Delta e_{t-2} + 0.64\Delta p^f_{t-1} - 1.40\Delta i_{t-2} - 0.21 ecm_{t-1}$$
$$(2.41) \quad (3.33) \quad (5.11) \quad (3.18) \quad (2.40) \quad -(9.21)$$

$R^2 = 0.94$ DW=1.64

Diagnostics

AR 1-2 F(2,39) = 2.06

ARCH1 F(1,39) = 0.04

Normality Chi-Sq(2) = 5.56

Xi^2 F(12,24) = 2.57

RESET F(1,46) = 0.04)

The application of Granger causality tests incorporating the ecm as recommended by Granger (1987) provide insights on the robustness of the transmission mechanisms linking variables to the inflation rate. Inflation inertia or persistence, the exchange rate, foreign prices and nominal interest rate appear to Granger cause inflation. While, money supply and real output do not Granger cause inflation (See Table 9). The causality empirics suggest that past inflation or inflation inertia, the nominal exchange rate, foreign prices and the interest Granger cause inflation, while the money supply and GDP do not.

Table 9 Granger Causality tests

Lin Res subset	Test	Result
$\Delta p_{t-1}\Delta p_{t-2}, ecm_{t-1}$	F(3,41)=55.84**	Inflation-> Inflation
Δe_{t-2} , ecm_{t-1}	F(2,41)=45.53**	Exchange rate -> Inflation
$\Delta p^f_{t-1}, ecm_{t-1}$	F(2,41)=60.01**	Foreign prices -> Inflation
$\Delta i_{t-2}, ecm_{t-1}$	F(2,41)=42.50**	Interest rate -> Inflation

5. Conclusions

The empirical results indicate that past inflation is strongly linked to current inflation. Therefore inflation inertia indicates that inflation is strong candidate as a variable for establishing a target. The floating of the exchange rate due to the inauguration of economic liberalisation led to the abandoning of the nominal exchange rate as the nominal anchor. Therefore, despite the existence of Granger causality of inflation by the exchange rate we would rule it out as a candidate target variable. The monetary and GDP targets have been virtually eliminated when the parsimonious model was specified. The interest rate variable is also disqualifies itself as a potential candidate as a target variable in that it is inferior to monetary targeting when the economy is buffeted by real rather than monetary shocks (Poole, 1979). Therefore, it qualifies as the unblemished candidate for a target to replace the vacuum left by the abandoning of the peg in 1977.

The empirical results run counter to the conventional wisdom that developing countries have not got the prerequisites and preconditions to implement IT. For example, DC does not have financial deepening, well-developed capital and money markets, and are burdened with fragile systems. But more insidiously DCs suffer from fiscal dominance due to government's recourse to seigniorage through inflation taxes.

Despite the fact that during the post-liberalisation period the seigniorage from inflation and the inflation tax appears to have increased significantly compared to the pre-liberalisation period. Furthermore, the fiscal dominance as measured by the increasing budget deficit also has increased the empirical results demonstrate the prevalence of robust transmission mechanism linking inflation

inertia and inflation. This link justifies the conclusion that inflation targeting can provide the nominal anchor that has been lacking and therefore offering scope for discretionary policy in Sri Lanka. The operation of the PBC and the lack of CBI pave the way for manipulating monetary policy for short-term gain thus undermining the goals of stabilisation and development.

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Appendix 1 Database

Year	Pt	Pf t	Et	M t	Y t	I t	C t
1950	99	9.90	4.77	978	25,539	2.50	0.24
1951	100	10.40	4.78	1,090	28,191	2.50	0.19
1952	100	11.10	4.75	996	29,484	2.50	0.19
1953	102	12.10	4.75	927	30,057	3.00	0.19
1954	101	12.60	4.78	1,093	30,873	2.50	0.19
1955	101	13.10	4.76	1,225	32,680	2.50	0.19
1956	100	13.50	4.79	1,314	32,695	2.50	0.19
1957	103	14.10	4.76	1,256	33,376	2.50	0.19
1958	105	14.60	4.75	1,338	34,347	2.50	0.19
1959	105	14.50	4.76	1,477	34,829	2.50	0.19
1960	104	15.00	4.75	1,572	37,190	4.00	0.19
1961	105	15.60	4.76	1,643	37,971	4.00	0.19
1962	106	16.10	4.76	1,748	39,703	4.00	0.19
1963	109	16.40	4.76	1,074	40,819	4.00	0.19
1964	112	17.00	4.78	2,142	43,446	4.00	0.19
1965	113	17.46	4.78	2,283	44,431	5.00	0.19
1966	112	18.04	4.78	2,244	46,129	5.00	0.19
1967	115	18.47	5.93	2,495	48,490	5.00	0.19
1968	122	19.27	5.93	2,724	52,490	5.50	0.19
1969	131	20.35	5.95	2,861	55,027	5.50	0.19
1970	138	21.51	5.95	3,115	57,388	6.50	0.19
1971	142	22.45	5.96	3,435	57,484	6.50	0.19
1972	151	23.18	6.70	3,974	59,320	6.50	0.19
1973	165	24.63	6.75	4,154	61,527	6.50	0.19
1974	186	27.38	6.69	4,569	63,472	6.50	0.19
1975	198	29.84	7.71	4,777	65,221	6.50	0.19
1976	201	31.58	8.83	6,321	67,158	6.50	0.19
1977	203	33.61	15.56	6,717	69,959	10.00	0.18
1978	228	36.14	15.51	10,891	75,727	10.00	0.18
1979	252	40.27	15.45	15,057	80,514	10.00	0.18
1980	318	50.63	18.00	19,860	85,188	12.00	0.18
1981	375	55.77	20.55	24,447	90,110	14.00	0.18
1982	416	61.52	21.32	30,510	94,679	14.00	0.18
1983	474	65.32	25.00	37,257	99,375	13.00	0.16

1984	553	66.03	26.28	43,427	104,396	13.00	0.16
1985	561	70.27	27.41	48,409	109,570	11.00	0.16
1986	606	72.83	28.52	50,860	114,281	11.00	0.16
1987	653	74.16	30.76	58,335	115,922	10.00	0.16
1988	744	76.90	33.03	67,946	119,050	10.00	0.16
1989	830	79.99	40.00	78,434	121,729	14.00	0.16
1990	1,009	83.88	40.24	90,546	129,244	15.00	0.16
1991	1,132	88.39	42.58	110,575	135,204	17.00	0.16
1992	1,260	92.10	46.00	127,729	140,990	17.00	0.16
1993	1,408	94.80	49.56	160,106	150,783	17.00	0.16
1994	1,527	97.30	49.98	191,670	159,269	17.00	0.14
1995	1,645	100.00	54.05	228,536	167,953	17.00	0.14
1996	1,907	102.90	56.71	253,201	174,261	17.00	0.14
1997	2,089	105.30	61.28	288,257	185,236	17.00	0.14
1998	2,285	107.00	67.78	289,017	194,008	17.00	0.14
1999	2,392	104.70	72.12	317,257	202,407	16.00	0.14

E and I are transformed to log of 1 + percentage form::
e= log (1+.01*E) & i =log(1+.01*I)

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Search for the Fundamentals of Exchange Rate Determination

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Abstract: The determination of the real exchange rate, tracing and forecasting its behaviour has been in the issue that had not received the attention that it deserves. This study models the dynamics of real exchange rate behaviour in Sri Lanka. The model is extended following`g the analysis of Natural Real Exchange approach. In the long run it is cointegrated with nonstationary variables of terms of trade, productivity of nontradables, productivity of tradables, government expenditure and debt. Most of the impulse response analysis reveal that fall in terms of trade and productivity of tradables, and rise in productivity of nontradables and government debt have depreciated the real exchange rate of Sri Lanka in the long run.

1. Introduction

The primary purpose of the study is to examine the behaviour of real macroeconomic aggregates and its impact on long run real exchange rate *(RER)* in Sri Lanka. More specially, the study will make an attempt to examine the long run relationship between RER and fundamentals of terms of trade *(TOT)*, productivity of tradables (U_T) and non tradables (U_N), government expenditure *(g)*, government debt *(DEBT)*, national savings *(NS)* and foreign real interest rate *(RUS)*. It will also make an attempt to examine the shock effects of these variables on real exchange rates.

In the view of all above objectives the following methodological procedures have been adopted in the present study. The study models the different behavioral patterns of macroeconomic

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aggregates in the long run based on time series econometric methodologies. The analytical procedure is designed to study the RER in depth and capture the dynamics after any shock influencing the steady state. These models will also take into account how these shocks generated on one variable affect the dynamics of other variables in the system in which possible feedback effects remain active for a long time after such an impulse response. Sometimes these shocks are strong enough to make a complete alteration of the future time paths of the variables. The long run RER model in the study nests several models to test the validity of many hypotheses

2 Theoretical Implications of Dynamics of the Real Exchange Rate Fundamentals

Long term value is determined when the fundamentals reach the steady state. These investigate the convergent forces that bring the exchange rate to equilibrium over time. Changes in each variable after a shock may have three different effects on real exchange rate. This distinction is important as different relationships apply over the three runs. Short run analysis focuses on immediate impacts of a change in one variable on other variables in the system. On the other hand medium and long runs begin when the short run ends.

Shock on Terms of Trade

In the short run, an improvement in the terms of trade prompts an increase in exportables. This produces a balance of payment surplus. The short run effect of the terms of trade shock on the real exchange rate and the real domestic interest is that the combination of real exchange rate and interest rate which jointly yield the balance of payments equilibrium. The short run balance of payment surplus will cause that any given real interest rate, the real exchange rate must appreciate to achieve the balance of payments equilibrium. In the long run real exchange rate is expected to appreciate. That is, for any

given real interest rate, real exchange rate must appreciate to restore balance. The net effect from the terms of trade improvement is that the real exchange rate is appreciated.

In the medium run both capital and debt are allowed to evolve, and then approach their steady state values in the long run. In the medium run, improvement in terms of trade stimulates private investment resulting in capital accumulation. The addition to capital per worker has distinct effects on the economy. Firstly it will increase private output. Secondly it will raise wealth and therefore consumption. It is in a stability condition of the system that wealth effect outweighs the income effect and saving declines. The increase in output which acts as a proxy for retained earnings further stimulates investment and increases taxation receipts. With total government expenditure remaining constant, public debt falls. Increase in private debt and capital per worker improves the balance of trade and current account, causing the real exchange rate to remain higher than the initial level.

In the long run capital and debt approach their steady state values, but in the medium run they appear to exhibit strong growth. So how are they stabilized? The decline in public debt caused by increased taxation receipts is tempered by increases in total government expenditure. The growth in private debt is stabilized by a rise in savings and a fall in investment. The decline in private investment serves to temper capital accumulation in the long run.

In the long run, compared to their initial steady states, the improvement in the terms of trade has increased capital intensity, private debt and the current account while reducing public debt. The real exchange rate therefore will appreciate from its initial position.

Increase in Productivity

In the long run, differential productivity growth between the traded and nontraded goods and the changes in relative unit cost can lead to changes in the exchange rate. The terms of trade are exogenous for small countries facing exogenous world prices of traded goods. Endogenous relative price adjustment can only occur between the prices of nontradable and tradable goods. Real exchange rate is defined as a function of relative prices of tradables and nontradables. Therefore the effect of productivity improvement on real exchange rate depends on relative productivity between the traded and nontraded goods.

When the economy experiences a permanent, exogenous positive shock to productivity of tradables, it increases the marginal product of capital as well as output. Since capital is allocated so that the value of the marginal product of capital is equal in both sectors exportables will grow producing a balance of trade surplus.

With capital and debt given, the balance of trade surplus is also a balance of payments surplus. Therefore, for any given real interest rate, the real exchange rate must appreciate to restore balance of payments equilibrium. Therefore portfolio balance is restored by having an appreciated real exchange rate for any given real interest rate. In a similar vain to the terms of trade shock, the net short run impact is that there is a lower interest rate and appreciated real exchange rate.

In the medium run, the increase in the marginal product of capital stimulates investment resulting in an accumulation of capital. Since marginal productivity of capital is positive and decreasing and it is a proxy for retained earnings which increases private investment. Private savings initially rise with the productivity shock. According to the principal of investment accelerator, it begins capital

accumulates at a very faster rate, wealth effects dominate income effects and private savings begin to decline. While government expenditure initially remains constant, taxation receipts increase firstly from the initial productivity shock and then later investment induced output growth will take place. Similarly, rise in private debt and capital drives the current account into surplus such that the real exchange rate remains at an appreciated level compared to its initial position so as to achieve balance of payments equilibrium. Therefore, in the early stages of the medium run private debt rises, capital accumulates and public debt contracts substantially.

The expansion in private debt pushes up domestic interest rates which discourage private investment, stabilize capital accumulation and increase savings. Both of these effects temper private debt growth so that it may approach its steady state level. The decay in public debt is also abated by a rise in total government expenditure, since there is a positive relationship between g and $DEBT$

Finally, in the long run results tend to mirror the terms of trade scenario. The improvement in productivity in tradables compared to their initial steady state increases capital intensity, private debt and the current account, and causes a reduction in public debt. The real exchange rate, in the long run has appreciated from its initial position, which is a reflection of the decline in foreign debt.

According to Harraod-Balassa-Samuelson effect, international productivity differences can have implications for relative international price levels, i.e. real exchange rate. The Harrod-Balassa-Samuelson effect has a tendency for countries with higher productivity in tradables compared with nontrdables, to have higher price levels. It follows that home country will experience real appreciation if its productivity growth advantage in tradables exceeds its productivity growth advantage in non tradables. These

conclusions are derived through the Harrod-Balassa-Samuelson result by assuming perfect capital mobility and no possibility for change in relative prices of different traded goods. Yet for many developing countries like Sri Lanka, international capital mobility remains severely restricted and experiences therefore sharp terms of trade fluctuations. There are other theories that predict lower price levels in poor countries but depend on assumptions about demand.

An Increase in Government Capital Expenditure

Suppose now that there is an unexpected permanent increase in government capital expenditure, *g*, then in the short run capital and debt do not evolve, and so the rise in "*g*" is funded out of tax revenue and not public debt. Initially the rise in *g* provides a moderate impetus to output and exportables, and consequently the balance of trade and the current account now move into surplus. Therefore for short run balance of payment equilibrium, for any given real interest rate, an appreciated real exchange rate is required. Since RER is anticipated to depreciate in the long run, a depreciated real exchange rate is required to achieve portfolio balance at any given real interest rate. Here we have a higher real interest rate and a depreciated currency to maintain balance of payments and portfolio equilibrium in the short run.

In the medium-run the increases in public inputs have expanded income. This being a proxy for retained earnings induces investment and capital accumulation. The rise in output also encourages savings. The exogenous shock to government capital expenditure also has public debt implications. It will directly raise total government expenditure, and then as income rises there will be a positive impact on tax receipts. The reduction in public and private debt as well as the positive direct effect of *g* on the balance of trade, all serves to improve the current account. However the fall in both private and public debt will outweigh the current account effect, so that in order

to restore balance of payments equilibrium, the real exchange rate must depreciate in the medium run.

The decline in public debt is stabilized in the long run by an increase in total government expenditure, since *DEDT* and *g* are positively related. In the long run, the result of an exogenous shock to government capital expenditure impact positively upon private debt, capital accumulation and current account, while public debt is at a lower level than its initial position. Whilst there is some degree of ambiguity over the impact on the long run real exchange rate and it is likely to remain depreciated from its initial level.

3 Econometric Model and the Methodology

This study uses the cointegration methodology to model the long run behaviour of the real exchange rate. Even though many developments can cause permanent changes in the individual series, there is some long run equilibrium relation trying to keep the individual components together, representing linear combination of the set of variables (Marmol and Velasco (2004)). If the variables in the RER model exhibit a unit root and RER tends to move together with other variables over time, a long run relationship between variables may exist. If the model is to make any sense at all, any deviation in the RER must necessarily be temporary in nature. If the disequilibrium error of the model has a stochastic trend (or non-stationary), the errors in the model will be cumulative over time, and deviations from equilibrium will not be eliminated. Therefore identifying the difference between stationary and nonstationary variables is important, since failure to do so can lead to a problem of spurious regression, whereby the results suggest that there is a regression model when in fact all that evidence are contemporaneous correlations rather than meaningful causal relations.

The Johansen cointegration methodology is a system method which allows determination of how many independent cointegrating relationships exist among the set of variables being considered. As there are more than two variables in the long run model of the RER in this study, it may have several linearly independent cointegration vectors. If the number of variables *(n)* in the model is larger than two *(n>2)*, there can be more than one cointegration vector (r). Therefore the single equation model is extended to a multivariate framework by defining a vector of z_t of n potentially endogenous variables with *k-lags:*

$$z_t = A_1 z_{t-1} + \ldots + A_k z_{t-k} + u_t \qquad u_t \sim IN(0, \sigma^2) \qquad 1$$

Where z_t is *(n x 1)* vector, and each of the A_i is an *(n x n)* parameter matrix.

In this study there are seven fundamental variables in the RER model and therefore the matrix z_t can be written as follows.

$$z_t' = \left[RER_T \quad TOT_T \quad RUS_T \quad g_T \quad DEBT_T \quad U_{T_T} \quad U_{N_T} \quad NS_T \right]$$

Equation 1 can be reformulated into ADF test equation as follows,

$$\Delta z_t = A_1 z_{t-1} - z_{t-1} + \varepsilon_t$$

$$\Delta z_t = (A_1 - I) z_{t-1} + \varepsilon_t$$

$$\Delta z_t = \prod z_{t-1} + \varepsilon_t$$

Where z_t and ε_t are $(n \times 1)$ vectors

A_1 = an $(n \times n)$ Matrix of parameters

$I = \text{an } (n \times n)$ Identity matrix and $\prod$ is defined to be $(A_1 - I)$.

It is always possible to form $\prod$ matrix from the matrix A_1 with the product of another matrix Y. As $YA_1' = \coprod$ where A_1' is the transpose matrix of A_1'. For example in the n = 8 case, for any given matrix $\prod$ can always find 8x8 matrices. The effect of including a constant is to allow for the possibility of a linear time trend in the data generating process. In the equation $\Delta z_t = \prod z_{t-1} + \mu + \varepsilon_t$, $\mu = (n \times 1)$ has n-vector of drift parameters, but there can be cointegrating vectors of $r < k$ which makes ε_t (trend) stationary.

A fundamental result of cointegration analysis is as follows. Given the existence of r cointegration relationships between the elements of z_t, the parameter matrix $(\prod)$ will be of reduced rank r, is greater than or equal to 1, but less than n. The rank*(r)* of $(\prod)$ equals the number of cointegration vectors. If rank of $(\prod) = 0$, all the variables are non-stationary processes since there is no linear combination of the Z_t and variables are not cointegrated. If rank $(\prod) = n$, it represents a convergent system of different equations, so the variables are stationary and they are cointegrated. If rank $(\prod) = 1$, there is a single cointegrating vector, and there will be multiple cointegrating vectors if $1 \prec rank(\prod) \prec n.$ Number of cointegrating vectors can be obtained by checking the significance of the characteristics roots of $\prod$ since the rank of a matrix is equal to the number of characteristic roots that are different from zero. Once the estimates of $\prod$ are obtained and the characteristics roots, the test for the number of characteristics roots that are insignificantly

different from unity is conducted using the following two test statistics:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \qquad (2)$$

$$\lambda_{\max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \qquad (3)$$

Where $\hat{\lambda}_i$ = the estimated values of the characteristics roots (or eigen values) obtained from the estimated $\prod$ matrix using maximum likelihood method and T is the number of usable observations.

The first statistic (eq 2) tests the null hypothesis that the number of cointegrating vectors is less than or equal to r against a general alternative that the cointegration rank k. This test is based on the log-likelihood ratio of $\ln\left(L\max(r) / L\max(k)\right)$ which is the test statistic of the trace (= the sum of the diagonal elements) of a diagonal matrix of generalized eigen values. It is conducted sequentially for $r = k\text{-}1,..., 1,0$.

The second test (eq 3) is based on the log-likelihood ratio $\ln\left(L\max(r) / L\max(r+1)\right)$, and is conducted sequentially for $r = 0,1,..,k\text{-}1$. The test statistic involves is a maximum generalized eigen value and tests the null hypothesis that the cointegration rank is equal to r against the alternative that the cointegration rank is equal to r+1.

Vector of Error Correction Method (*VECM*)

A VECM is a representation theorem that connects the moving average, autoregressive, and error correction representations for cointegrated systems, and permits consistent estimation of the cointegration space providing short-run dynamics: movements in the short run which guides the economy towards the long-run equilibrium. Model 1 can be reformulated into a VECM form and the equation system is driven by stationary errors.

$$\Delta z_t = -\alpha\{(1-A_1)z_{t-1}\} + \Gamma_1 \Delta z_{t-1} + \ldots + \Gamma_{k-1}\Delta_{t-k+1} + e_t$$

$$(1-A_1) = \amalg \text{ and } \hat{u}_{t-1} = (\hat{\Pi})z_{t-1}$$

$$\Delta z_t = \hat{\alpha}(\hat{u}_{t-1}) + \Gamma_1 \Delta z_{t-1} + \ldots + \Gamma_{k-1}\Delta_{t-k+1} + e_t$$

$$\Delta z_t = \hat{\alpha}(\hat{u}_{t-1}) + \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + e_t \qquad (4)$$

This way of specifying the system contains information on both the short and long run adjustment to changes in u_{t-i} via the estimates of $\hat{\Gamma}_i$ and $\hat{A}_i$ respectively. The α adjustment coefficients, represent the speed of adjustment to disequilibrium while $\hat{A}_i$ is a matrix of long run coefficients which may have maximum of n-1 cointegrating vectors; $r \leq (n-1)$. Therefore the order of the vector α equals the number of cointergration vectors multiplied by one $(r \times 1)$. Assuming that z_t is a non-stationary process, and that they are cointegrated, then all the variables in Δz_{t-i} are stationary processes of *I(0)*. The second instance is when there is no cointegration at all,

implying that there are no linear combinations of z_t that are *I(0),* and consequently $\prod$ is an $(n \times n)$ matrix of zeros. Estimates of these ranks are obtained using the method of reduced rank regression, which was followed by Johansen (1988), and matrix $\prod$ will be estimated using the maximum likelihood method.

4 Data: Construction and transformation of variables

The data are drawn from the Central Bank of Sri Lanka and International Monetary Fund CD-Rom databases. The sample covers the period from 1950 to 2002, drawing in all 53 observations. The data used in this study are end of year observations for nominal exchange rates, terms of trade, interest rates and price indices for Sri Lanka and USA. The nominal exchange rate is the bilateral period average, expressed as Sri Lankan rupees per one US dollar. Price levels are calculated from GDP deflators drawn from the IFS CD Rom. Altogether there are four price indices; domestic price indices for traded and non-traded goods, and the foreign price indices for traded and non-traded goods. The real exchange rates are calculated using the above price indices, rather than the typical CPIs[1]. Labour productivity is measured as total output per worker. Productivity of nontradables is calculated by dividing the total production of nontradables by the total number employed in nontradable sector in the economy. Productivity of tradables is calculated by dividing the total production of tradables by the total number employed in tradable sector. The TOT index is calculated as the ratio of export to import prices, with the base year taken as 1990. Current account, total government debt, budget deficit are expressed as a percentage

[1] PPP theory might not be evident as the consumer price index may not be the most appropriate index to use. The weight of raw commodities,especially oil prices, in the CPI might have some bias in the calculation

of GDP. All the variables are in logs except for the percentage variables.

Estimation and Testing

Each variable is tested for unit root using Augmented Dickey Fuller (ADF) test. Results are given in Table 1. The null hypothesis is that a series does contain a unit root (series is nonstatioanry) against the alternative of stationary. The ADF test can be used to overcome the problem with serial correlation, where the lag structure is chosen to ensure the error term is white noise. The Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC) select the optimal lag length (k). The null hypothesis of a nonstationary cannot be rejected for the levels of the variables of $RER, TOT, g, DEBT, U_T, U_N, NS$ and RUS. Non-stationary hypothesis is rejected for the first difference of all the above variables. Therefore these variables are integrated of order 1, *[I(1)]*, and their statistical properties, mean, variance or both, do change over time. In other words they follow a random walk process with drift or without a drift. In summary the ADF unit root tests indicate that $RER, TOT, g, DEBT, U_T, U_N, NS$ and RUS are compatibly integrated of order one $[I(1)]$ and these variables are included in the long run cointegration model.

5 Johansen Cointegration Tests

This methodology goes beyond a simple statistical cointegration[2] relationship. It is distinctive in that it does not seek to answer the question of whether these variables cointegrate. Rather the goal is to measure consistently the long run effect of changes of fundamental variables on real exchange rates, while permitting the latter to be

[2] Refer Engle Granger Methodology

subjected to permanent shocks. In doing so it builds on recent advances in nonstationary data theory which demonstrate that long-run effects are not exclusively associated with cointegrating relationships[3]. The nonstationary nature of most economic time series data makes it necessary to employ both cointegration and error correction models, rather than applying conventional econometric techniques (such as OLS) used in the past. Johansen (1988) developed maximum likelihood estimators of cointegrating vectors and provided a rank test to determine the number of cointegrating vectors, r. [4]

The likelihood ratio tests based on estimating a VAR approach which was first proposed by Johansen and Juselius (1990)[5] calculates the different test statistics of λ_{trace} and $\lambda_{\max}$ in a multivariate VAR model in error correction form (VECM) with normal errors. The normality assumption allows a neat application of maximum likelihood theory, which produces both the test statistics and the maximum likelihood estimators (MLE) of parameters of $RER, TOT, g, DEBTD, U_T, U_N, NS$ and RUS.

The cointgration vector $\prod$ is solved out as the eigenvectors associated with the r, the largest statistically significant eigen values which are derived using two test statistics, "maximum eigen value statistics" and "trace statistics". The first statistic tests the hypothesis that there are $r = s$ cointegration vectors against the

[3] It is possible for a VAR model to estimate consistently long run coefficients even in the absence of time series cointegration.

[4] Appropriate lag lengths for the Johansen test are determined using standard likelihood ration tests with a finite-sample correction. However depending on the exact critical values used, this test suggests using 4 and 6 lags. The cointegration results were not sensitive to the choice of lag length.

[5] See chapter 4, Section 4.3.2.

alternative of $r = s + 1$ vectors, by calculating the maximum likelihood test statistics as given in equation 2 and 3., where T is the sample size and λ is an estimated eigen value.

Since λ_{trace} statistics of $r = 0$ is 182.9028, and it is larger than the critical value[6] of 122.65, the null hypothesis is rejected at the 5% significance level, so that the variables are cointegrated using this test. λ_{trace} statistics rejects null hypothesis of $r \leq 1$, $r \leq 2$, $r \leq 3$ as the 5% critical values are less than the calculated values. λ_{trace} statistic cannot reject the null of $r \leq 4$ which states that there are no more than four cointegration vectors.

In contrast to the λ_{trace} statistic, the $\lambda_{\max}$ statistic tests a specific alternative hypothesis. To test the null hypothesis specific $r = 0$ against the specific alternative $r = 1$, $\lambda_{\max}$ statistic is used. According to the $\lambda_{\max}$ test where $r = 1, r \leq 1$, and $r \leq 2$ null hypothesis are rejected but $r \leq 3$ cannot be rejected. $\lambda_{\max}$ statistic confirms that there are not more than three coinegration vectors[7].

When the cointegration tests displayed in λ_{trace} and $\lambda_{\max}$ are compared, they leave some ambiguity with respect to the number of cointegrating vectors. The test based on maximum eigenvalue statistic $\lambda_{\max}$ rejects the hypothesis of three versus four cointegrating vectors, while the test based on λ_{trace} rejects the null hypothesis that there are less than three cointegrating vectors, and

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[6] See page 420 of Enders. W. (1995), "Applied Econometric Time series", John Wiley & Sons, Inc, for the critical values.

[7] Note that the presence of coinegration implies that Granger-causality should exist in at least one direction between the long run variables. See Chapter 4 Section 4.6 for Granger-causality

hints towards four cointegrating vectors. On the other hand, neither test rejects the null hypothesis of three cointegrating relations. An examination of the roots of the companion matrix reveals that while there are four roots close to the boundary of the unit circle, only three of them lie clearly on the boundary, suggesting that there are three cointegrating vectors relating to the seven variables under consideration. The fact that we find multiple cointegrating relations suggests that the long-run relationship among the six variables is rather stable in the sense that following a shock there are several ways in which they can get back together in the long run.

6 Long Run Model

There are several significant findings to be gleaned from this analysis. The evidence for cointegration is particularly strong for real exchange rate, TOT, productivity of tradables and nontradables, and foreign interest rates measures. In the long run model, RER and *TOT* are negatively related. Negative sign is consistent with the hypothesis that RER depreciates (Rupees per Dollar increase) when TOT deteriorates. Regarding the magnitude of the parameters of the cointegration vectors, the estimated coefficient of elasticity between RER and TOT is –0.452. This indicates that 1% improvement of TOT, appreciates the currency by 0.452% *ceteris paribus*.

These results also confirm the issue that arises in international macroeconomics that the effect of TOT movements on macro variables is high. In fact some authors find these movements as pervasive in explaining output fluctuations. For instance in a cross-country study, Mendoza (1995, p.127) reports that the TOT shocks can account for up to 88 percent of the variation in some countries' GDP. This suggests that the explanatory power of a RER model would be improved substantially by taking the TOT effects into consideration. Since the TOT and the RER are closely related, the

model provides a suitable framework to incorporate various sources of fluctuations into the analysis.

Two productivity variables are statistically significant in the cointegration equation. The results show that each of the productivity variables has different implications for RER. Estimated results suggest that productivity of nontradables has a far more powerful positive impact on appreciation of the real exchange rate. The coefficient of the nontradable productivity variable is 0.51 and it is highly significant. The marginal impact represents the impact of one unit increase in productivity in nontradables will appreciate the currency by 0.51 percent. This is a robust positive relationship between RER and productivity of nontradables. In a similar manner increase in productivity of tradables will also appreciate the real exchange rate. One percent increase in the productivity of tradables will appreciate the currency by 1.985 percent or one percent decrease in productivity of tradables will depreciate the RER by 1.985 percent as well.

The sum of the coefficient estimates on percentage change in productivity of tradables and nontradables is 2.495(1.985+0.51) percent. Thus the differences in marginal impact related to country's structural attributes would generate different responses to productivity movements, while differences in actual impact reflect both structural elements as well as the actual TOT experiences of Sri Lanka. If both the productivities increase by one percent ceteris paribus, RER will appreciate by 2.495 percent. The other possible situation is that if nontradables' productivity increases by one percent while at the same time tradable productivity falls by one percent, the RER will depreciate by 1.475 percent.

The other four variables that appear in the long run cointegrating vector are foreign interest rate, government expenditure, debt and

national savings and all the coefficients are significant at 5 % level. Foreign interest rates are significantly related to the change in the real exchange rate. Estimated coefficient posses the correct sign. Interest rate elasticity remains at 0.0875. This indicates that increase in foreign interest rates by one percent depreciates the Sri Lankan rupee by 0.0875 percent. The effects of government expenditure, debt, and national savings expenditure on RER remain at a lower level. The respective coefficients are 0.046916, -0.069387 and 0.02819. Relative impact of all the three variables remains low throughout the sample period but the estimated parameters of the cointegrating vectors have theoretical plausible signs. In summary cointegration results shows that both TOT and productivity movements are strongly responsible in the determination of the long run RER compared to the other variables in the model.

7 Empirical Estimates of the Adjustment Process.

Each error correction (ECM) variant includes the error correction coefficient (α), error correction term lagged once (u_{t-1}) current and first lag values of variables of the first difference fundamentals (ΔZ_t and ΔZ_{t-1}). All repressors in the ECM models are predetermined and the values predicted one year remain as true ex-ante forecast. ECM captures the long-run relationship between exchange rates and their fundamentals.

Estimated long run disequilibrium error is,

$$\hat{u}_{t-1} = RER_{t-1} - 5.1 + 0.452TOT_{t-1} + 0.08175RUS_{t-1}$$
$$- 0.046916G_{t-1} + 0.069387DEBT_{t-1} - 0.02819NS_{t-1}$$
$$+ 1.985U_{T,t-1} + 0.517U_{Nt-1}$$

Estimated error correction model 5 is given below. They are extracted from the Table 4.

$$\Delta z_t' = \left[\Delta RER_T \quad \Delta TOT_T \quad \Delta RUS_T \quad \Delta g_T \quad \Delta DEBT_T \quad \Delta U_{T_T} \quad \Delta U_{N_T} \quad \Delta NS_T\right]$$

$$\alpha = \begin{bmatrix} -0.4674 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1067 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.584 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 3.03 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 5.43 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 90239 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0.192 \end{bmatrix}_{7\times7} \qquad \hat{u}_{t-1} = \begin{bmatrix} u_{1,t-1} \\ u_{2,t-1} \\ u_{3,t-1} \\ u_{4,t-1} \\ u_{5,t-1} \\ u_{6,t-1} \\ u_{7,t-1} \end{bmatrix}_{7\times1}$$

$$\hat{\Gamma}_{14\times7} = \begin{bmatrix} -0.12 & 139 & 139 & 0.33 & -7.76 & -1777 & 2.44 \\ 0.01 & -107 & -107 & -5.19 & -1.89 & -1089 & -6.9 \\ 0.00 & 0.11 & 0.11 & 0.01 & -0.01 & -0.86 & 0.01 \\ 0.00 & 0.04 & 0.04 & 0.00 & 0.02 & -0.99 & -0.01 \\ 0.03 & -10.5 & -10.6 & 0.07 & -0.17 & 17.38 & -0.83 \\ 0.01 & 4.73 & 4.73 & -0.14 & 0.50 & 2.07 & 0.69 \\ 0.02 & 3.13 & 3.13 & 0.23 & 0.26 & -12.1 & 0.03 \\ 0.00 & 1.1 & 1.1 & 0.12 & 0.73 & -25.55 & 0.01 \\ 0.00 & -1.28 & -1.28 & 0.02 & 0.21 & 18.96 & 0.01 \\ 0.00 & 2.22 & 2.22 & 0.09 & 0.04 & -8.95 & 0.07 \\ 0.00 & 0.04 & 0.04 & 0.00 & 0.00 & 0.06 & 0.00 \\ 0.01 & 0.00 & 0.00 & 0.00 & 0.00 & -0.16 & 0.00 \\ 0.00 & 2.58 & 2.58 & -0.06 & 0.79 & 11.03 & -0.03 \\ 0.00 & 1.02 & 1.02 & -0.05 & 0.12 & -11.66 & 0.06 \end{bmatrix}_{14\times7}$$

$$\Delta Z_{t-i} = \begin{bmatrix} \Delta RER_{t-1} \\ \Delta RER_{t-2} \\ \Delta TOT_{t-1} \\ \Delta TOT_{t-2} \\ \Delta RUS_{t-1} \\ \Delta RUS_{t-2} \\ \Delta g_{t-1} \\ \Delta g_{t-2} \\ \Delta DEBT_{t-1} \\ \Delta DEBT_{t-2} \\ \Delta U_{Tt-1} \\ \Delta U_{Tt-2} \\ \Delta U_{N,t-1} \\ \Delta U_{N,t-2} \\ \Delta NS_{t-1} \end{bmatrix}_{14\times1} \qquad e_t = \begin{bmatrix} e_{1,t} \\ e_{2,t} \\ e_{3,} \\ e_{4,} \\ e_{5,} \\ e_{6,} \\ e_{7,} \end{bmatrix}_{7\times1}$$

Given below is the estimated error correction model of RER

$$\Delta RER = -0.445(RER_{t-1} - 5.1 + 0.452TOT_{t-1} + 0.08175RUS_{t-1} - 0.046916g_{t-1} + 0.0693DEBT_{t-1} - 0.02819NS_{t-1} + 1.985U_{T,t-1} + 0.517U_{N,t-1}) - 0.12\Delta RER_{t-1} + 0.017\Delta RER_{t-2} + 0.012\Delta TOT_{t-1} + 0.0013\Delta TOT_{t-2} - 0.03DRUS_{t-1} + 0.023\Delta RUS_{t-2} + 0.015\Delta g_{t-1} + 0.017\Delta g_{t-2} + 0.0387\Delta DEBT_{t-1} + 0.0027\Delta DEBT_{t-1} + 0.013\Delta NS_{t-1} + 0.0029\Delta NS_{t-2} + 0.23\Delta U_{t-1} + 8.9\Delta U_{t-2} + \varepsilon_t$$

The estimated error correction is given in Table 4, second row with their respective standard errors. The magnitude of each error correction term shows how quickly the deviation of each variable from the long run equilibrium is corrected gradually towards the equilibrium level through a series of partial short run adjustments. The error correction model of RER is –0.4674 which is significant at

5% level. The interpretation of this error correction term is that, once the RER deviate from the equilibrium value determined by the fundamentals, the adjustment rate of the RER is –46.74% on an annual basis and this corresponds to the deviations from the long run equilibrium value of the real exchange rate. Values of the parameters show the speed of adjustment of RER towards its long run time path. In other words this error correction parameter indicates that –46.74% of the disequilibrium in RER will be adjusted towards equilibrium in one year. This is quiet a high rate of adjustment. This does not say that within one year –46.74% of the RER will be returned to its previous value. There will be substantial changes in fundamentals during the adjustment time, making the new equilibrium RER remain at a different level compared to the previous equilibrium value. Hence the correct interpretation is that –46.74% of RER will reach to the equilibrium value, which is determined by the fundamental variables in the model. Error correction parameter of TOT is insignificant at 5% level, which suggests that short run deviation of the Sri Lankan TOT cannot be explained by the changes in the other variables in the model. This indicates that TOT is a purely exogenous variable in the model.

As mention elsewhere impulse response experiments consist of shocking the driving process once at date 0, when both the variables are at their deterministic steady state. Consequently, impulse response function shows how all variables in the system respond following a surprise negative shock in any one variable. This in effect breaks the variation in the data into mutually uncorrelated pieces, helping to isolate the major regularities. The surprise changes are called "innovations," and the predicted patterns of change are called "impulse responses." Disturbances to the target variable can be generated by policy (policy disturbances), by disturbances outside

of the policy process in the domestic economy or by the rest of the world.

Figure 1.1 shows how each variable in the system responds to one standard deviation shock to RER at year 0. The level of the RER will immediately responded by increasing its value to a shock given in period 1 by itself and this deviation is persistent. The unit of observation is annual, and thus the dependent variable is the average annual growth over time. RER will not return to its previous value after the shock even in the long run. This is consistent with the findings in Section 2 that RER is a nonstationary variable and impulse response analysis confirms the property of nonstationarity once again.

Figure 2 plots the response of each variable to TOT innovation. First graph in Figure 2 indicates the response of RER due to an exogenous shock to TOT. From the impulse response analysis, TOT shock leads to immediate depreciation of the Sri Lankan rupee. This effect peaks after four years and is persistent for another few years. Thus the RER depreciates due to a TOT shock. The impact of TOT shock on RER will increase the rate of depreciation progressively over time and it is also permanent.

As explained in the theory, fall in TOT contributes to decrease in real wages and thus allows inter-sectoral shifts in mobile factors of production to the tradables sector which will lead to RER depreciation. TOT thus captures the influence of external demand and supply factors in the tradables sector. There are both income and substitution effects associated with the changes in the terms of trade. The income effect of a fall in TOT is that less is spent on all products, resulting in lower prices of non-tradables, which causes the RER depreciation. The substitution effect leads to an increase in prices of imported goods and services, thereby increasing the

demand for non-tradables, and hence causing appreciation of the RER. According to the impulse response function, the income effect associated with the TOT deterioration is stronger than the substitution effect and thus depreciation of the RER has happened. On the other hand if the income effect associated with the TOT deterioration was stronger than the substitution effect RER would have appreciated.

Decrease in TOT reduces the marginal profitability of exportables and importables of industries reflecting a direct negative impact of TOT on purchasing power parity of exports. Since initial aggregate capital is fixed, labour is elastically supplied in traded sector industries and the labour supply response in the nontradaed sector is insignificant. Households wish to smoothen consumption, given the shock's impact on permanent income, and face relative price increases in exportables and non-exportables. Net exports are reduced about as much as consumption when the shock hits and as the permanent income gain requires additional savings in deficit of what less investment can optimally absorb would induce foreigners to accumulate domestic assets. Alternatively deterioration of trade balance results in the decrease in purchasing power of exports, and increase in domestic demand for exports.

A positive shock on TOT will reduce the level of debt negatively. This is shown in Figure 2. Shocks on TOT significantly affect debt through the financial flows between debtor and creditor nations. The relevance of TOT effects on the debt situation depends mainly on the existence of a less than perfectly elastic demand for developing countries' exports which includes countries like Sri Lanka. This finding, that is the sharp deterioration in TOT and the recent behavior of commodity prices, suggest the existence of a strong connection between TOT changes in the debt situation.

The economic literature identifies other (direct or less direct) links through which debt, fiscal policy, the balance of payments and trade are intertwined. The impact of declining TOT caused by the problem of the structural decline in the TOT, and its impact on commodity dependent exporters, in particular their greater vulnerability to trade and current account imbalances and indebtedness, is recognized internationally[8]. A paper by Birdsall and Hamoudi (2002) provides evidence that declining export prices affect fiscal and external accounts negatively, contribute to reduced public consumption and investment, and force private companies due to lack of export receipts, to reduce imports of productive inputs, thereby preventing the diversification of local production.

Since a shock raises unevenly the productivity in traded and nontraded sectors, there is no strong wealth effect to households to increase savings, and this is reflected in the expansion scenario of the GDP. The decrease in savings will not be allocated to foreign assets accumulations. If there is a negative wealth effect due to the negative productivity shock, labour supply will slightly increase due to a wealth effect on leisure. Because the TOT does not move, the RER depreciation is larger in the short run because capital is in fixed supply in the nontraded sector.

Declining TOT during the past thirty years has led in to a drying up of domestic investment resources. In addition, poor market access prospects or deterioration of the TOT, are factors undermining a country's ability to access international markets on attractive terms. In practice countries with a low level of development and of

[8] In the Mundell-Fleming model with prices and interest rates fixed, the depreciation by worsening the TOT creates the necessary increase in aggregate demand to support the higher level of income required by monetary equilibrium.

integration in world trade, lack credibility in international capital markets, thereby failing to attract private capital flows and becoming reliant on external public debt. Under such a level of development, the low level of both domestic savings and investment, and the continued mismatch between the two, calls for external public financing for an extended period of time.

Impulse response function which plots the effects of TOT shocks on savings reveal that fall in TOT reduces the levels of national savings. Eventhough the magnitude of this impact remaines very low, but is in the correct time path. Thus adverse shocks to commodity prices in the world market can force them to reduce savings by a larger amount than they would have otherwise done. The transitory component in the TOT has a larger positive impact than the permanent component. When households and government face the possibility of borrowing constraints in bad times, favorable movements in the permanent component of the TOT may lead to higher rates of private savings.

Figure 3 shows how each variable responds to a permanent productivity shock in tradables and nontradables. Increase in productivity of tradables does not affect the TOT significantly. This can be accepted as far as the TOT is considered to be exogenous for Sri Lanka. The level of RER appreciates in response to a productivity shock. Increase in productivity of nontradables has a non-convergence effect on RER which will be permanently appreciated in case of an improvement. As shown in the long run cointegrating relationship, an exogenous shock on nontradable productivity will cause the RER to appreciate. The appreciation of RER does not take place immediately after the productivity improvement. According to the impulse response function, improvement of productivity of nontradables starts influencing on the RER after a 5 year time lag which is very late. One reason for

this is the slow adjustment in the price of nontradable goods and services. Both at short and long horizons, the rate of pass-through from exchange rates to prices are much lower for nontradable goods than for goods that are actually traded. Even though there is a slight increase in the productivity of nontradables, relative prices between tradables and nontrdables adjust slowly.

Figure 4 shows how a shock on debt affects the other variables in the model. RER initially appreciates, and then gradually depreciates with net long run depreciation. This is shown in Figure 4, graph 1. According to the impulse response function the exchange rate depreciation start four years after the shock. Borrowing to finance consumption leads in the long run to higher indebtedness and interest payments to foreigners, to lower wealth and to lower consumption, causing long term RER to depreciation. Borrowing to finance productive investment unequivocally increases long run wealth and consumption, which will possibly make the country a net creditor with even greater long run wealth and consumption. The RER initially appreciates, and then gradually depreciates. If the country becomes a net creditor, the RER eventually reverses itself. A developing country's external debt capacity also depends upon cash flows arising from its foreign trade.

8 Conclusions

Estimates of the long run model imply that a one percent decrease in the terms of trade depreciates real exchange rate by 0.452 percent *ceteris paribus*. Decrease in productivity of tradables causes real exchange rate to depreciate by 1.985 percent. Increase in productivity of nontradables eventually causes 0.51 percent appreciation of the real exchange rate per annum. Therefore if all three variables decrease by one percent, real exchange rate will depreciate by 2.947 percent. On the other hand if all three variables

increase by one percent, real exchange rate will appreciate by 2.947 percent. Therefore, to achieve a one percent real exchange rate appreciation, it is necessary to increase overall productivity in both sectors, and also the terms of trade by the minimum of 0.34 percent per annum remaining other things constant. During the last 13 years from 1990 to 2002, terms of trade has improved by 2.52 percent per annum and productivity of nontradables has increased by 2.09 percent per annum. At the same time annual productivity of tradabels has fallen by 3.4 percent while the actual average real exchange rate has depreciated by 8.2 percent. According to the forecasted value of the model, these three most important variables, real exchange rate would depreciate by 4.544 percent per annum *ceteris paribus*. Therefore these three variables alone can explain 55 per cent of total depreciation of the real exchange rate in last 13 years.

The two Productivity variables and terms of trade happen to be the key determinants of real exchange rate out of the seven fundamental variables in the model. Increase in both terms of trade and productivity of nontradables appreciate the currency. Decrease in productivity in tradables depreciates the real exchange rate in the long run. The most plausible explanation for these findings is that relative productivity of traded and nontraded goods can exhibit substantial persistence in real exchange rate and the importance of terms of trade suggests that a closer examination of the changing composition of Sri Lankan exports and imports over time is warranted. Further it must be admitted that the real exchange rate exhibits large swings away from the equilibrium rate predicted by its main fundamental variables.

Figure 1

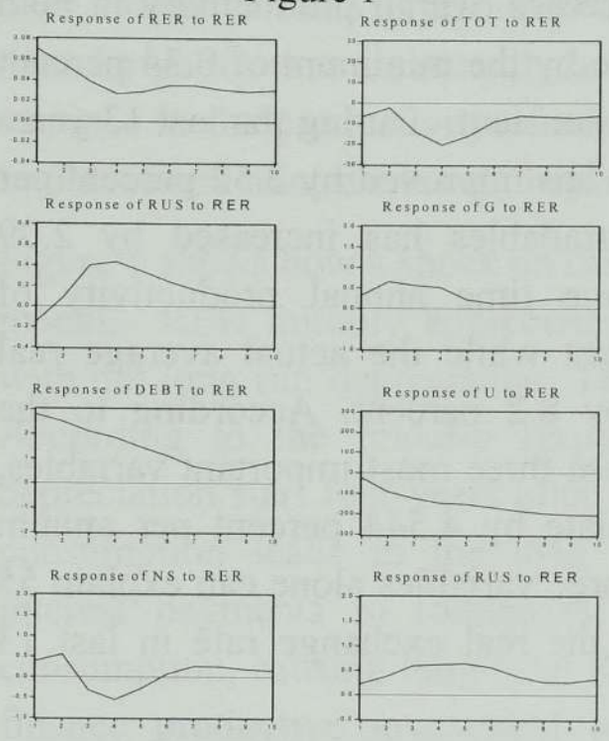

Figure 2

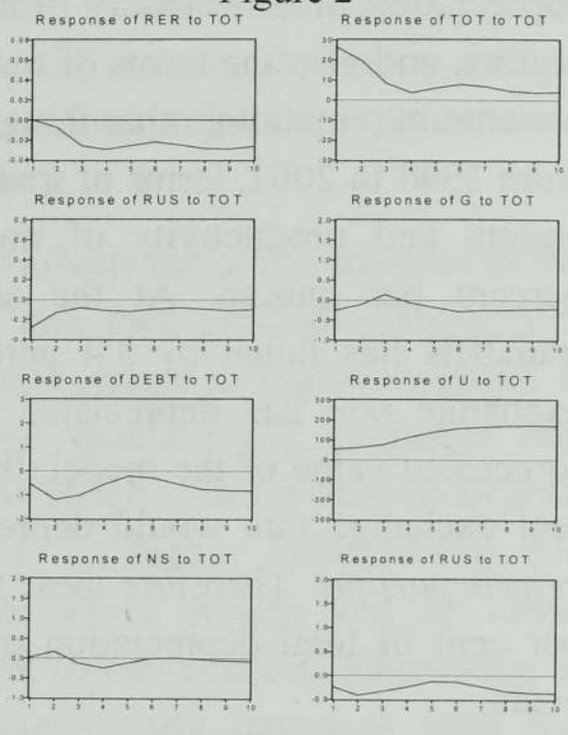

Figure 3

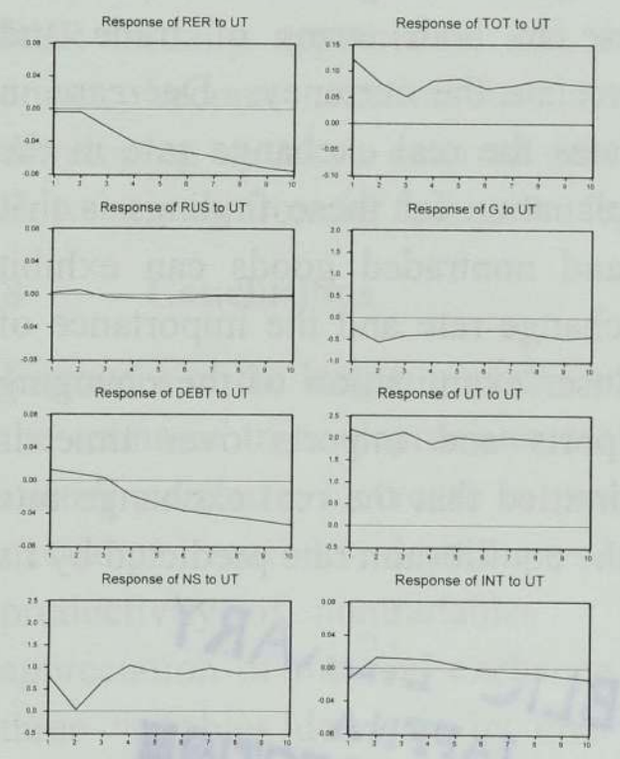

Figure 4

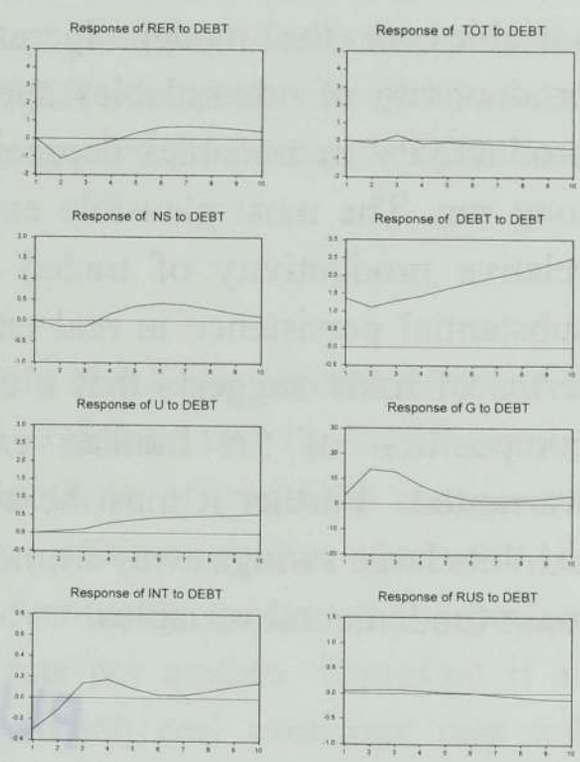

Table 1: Unit Root Test

Variable	No of Lags	Levels		Trend	1st [9]Difference
		With α	Without		
RER	1	-2.89406	-	-4.13994**	-7.42462
	2	-2.52055	-	-3.68380**	-5.81142
TOT	1	-1.5814	-	-2.47903**	-7.12208
	2	-0.9266	-	-1.58984**	-5.77824
r	1	-4.22733	-	-4.53447	-7.24335
	2	-3.30641	-	-3.73472	-6.40114
*r**	1	-	-	-3.67763	-6.46909
	2	-	-	-2.64521	-4.61484
g	1	-1.35511	-	-1.14480	-5.10739
	2	-1.57101	-	-2.70603	-4.20191
DEBTD	1	-1.31809	1.382906	-2.70603**	-4.43681
	2	-1.08115	1.297103	-2.69027**	-4.29890
U_T	1	-0.40964	-	-1.21334	-3.95861
	2	-0.13962	-	-2.52137	-2.15949
U_N	1	-1.26150	1.343321	-4.54542	-9.17341
	2	-0.37861	1.768255	-3.16360	-6.00602
NS	1	-1.910148	0.116789	-	-5.247011
	2	-1.995765	0.116916	-	-4.728596

[9] Unit root test have been repeated on first difference of each time series and found in general that the null hypothesis is rejected that the first difference had a unit root. In other words it is confirmed that the original time series are I(1).

Table 2: Johansen Cointegration Test

Cointegration LR Test Based Maximal Eigenvalue of the Stochastic				
Eigenvalue	Likelihood	5% critical	1%	
0.635046	178.6192	109.99	119.80	None **
0.593250	128.2200	82.49	90.45	At most 1 **
0.584007	83.24214	59.46	66.52	At most 2 **
0.354677	39.38780	39.89	45.58	At most 3
0.203430	17.48758	24.31	29.75	At most 4
0.114310	6.115578	12.53	16.31	At most 5
0.000923	0.046148	3.84	6.51	At most 6

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 3 cointegrating equation(s) at 5% significance level

Table 3: Johansen Cointegration Test

Null	Alternative	Eigenvalue	Statistic	5% critical
$r = 0$	$r \geq 1$	0.635046	182.9028	122.65
$r \leq 1$	$r \geq 2$	0.593250	135.9132	82.49
$r \leq 2$	$r \geq 3$	0.584007	88.23669	59.46
$r \leq 3$	$r \geq 4$	0.354677	41.75108	39.89
$r \leq 4$	$r \geq 5$	0.203430	18.53685	24.31
$r \leq 5$	$r \geq 6$	0.114310	6.48252	12.53
		0.000923	0.048942	3.84

Table 4: Vector of Error Correction Estimates

C Variable	D(RE	D(TO	D(r*)	D(g)	D(DE	D(U)	D(NS)
EC	**-0.4674**	-	**1.5835**	**3.0293**	**-5.4252**	**902.38**	**-0.1916**
t-statistics	-4.8659	-3.0046	-1.1672	-1.1749	-0.7156	-3.0508	-0.0543
D(RER(-1))	-0.1233	138.995	0.3261	7.7551	-7.7570	-	2.4394
t-statistics	-0.6881	-2.0986	-0.1288	-1.6120	-0.5484	-3.5907	-0.3707
D(RER(-2))	0.0120	-	-5.1947	-0.3175	-1.8864	-	-6.8957
t-statistics	-0.0561	-1.3606	-1.7144	-0.0551	-0.1114	-1.6500	-0.8753
D(TOT(-1))	0.0012	0.1082	0.0062	-0.0103	-0.0085	-0.8596	0.0065
t-statistics	-3.1284	-0.7504	-1.1230	-0.9873	-0.2764	-0.7153	-0.4550
D(TOT(-2))	0.0012	0.0434	0.0013	0.0117	0.0180	-0.9923	-0.0060
t-statistics	-2.9826	-0.2928	-0.2346	-1.0857	-0.5695	-0.8034	-0.4059
D(r*(-1))	-0.0033	-	0.0733	-0.2489	-0.1698	17.3757	-0.8305
t-statistics	-0.2716	-2.3671	-0.4297	-0.7673	-0.1780	-0.4669	-1.8714
D(r*(-2))	0.0254	4.7342	-0.1388	-0.1319	0.4955	2.0680	0.6889
t-statistics	-2.0434	-1.0304	-0.7906	-0.3951	-0.5050	-0.0540	-1.5091
D(g(-1))	0.0144	3.1333	0.2272	-0.4437	0.2590	-	0.0330
t-statistics	-2.3026	-1.3546	-2.5705	-2.6408	-0.5243	-0.6276	-0.1435
D(g(-2))	0.0166	1.1044	0.1152	0.1655	0.7273	-	0.0071
t-statistics	-2.8440	-0.5109	-1.3943	-1.0540	-1.5754	-1.4184	-0.0331
D(DEDTD (-	0.0049	-1.2833	0.0204	-0.1212	0.2082	18.9613	0.0101
t-statistics	-1.5678	-1.1149	-0.4646	-1.4494	-0.8472	-1.9771	-0.0879
D((DEDTD(-	0.0039	2.2202	0.0851	-0.0686	0.0445	-8.9499	0.0681
t-statistics	-1.1717	-1.8233	-1.8282	-0.7758	-0.1710	-0.8821	-0.5631

D(U(-1))	0.0000	0.0405	-0.0013	-0.0025	-0.0002	0.0563	0.0002
t-statistics	-1.1123	-2.5743	-2.1254	-2.2100	-0.0677	-0.4297	-0.1553
D(U(-2))	0.0001	0.0043	0.0001	-0.0007	0.0029	-0.1559	-0.0018
t-statistics	-1.9784	-0.2946	-0.1622	-0.6328	-0.9278	-1.2822	-1.2271
D(NS(-1))	0.0131	2.5804	-0.0605	0.0116	0.7860	11.0319	-0.0273
t-statistics	-2.7461	-1.4632	-0.8972	-0.0908	-2.0870	-0.7508	-0.1559
D(NS(-2))	0.0046	1.0192	-0.0466	0.0039	0.1184	-	0.0626
t-statistics	-0.9883	-0.5948	-0.7123	-0.0314	-0.3236	-0.8165	-0.3677
R-squared	0.4745	0.5717	0.3773	0.5400	0.1052	0.4961	0.2896
Adj. R-	0.2643	0.4004	0.1282	0.3559	-0.2527	0.2946	0.0055
Sum sq. resids	0.2190	29910.3	43.6850	157.795	1364.14	145.251	295.303
S.E. equation	0.0791	29.2332	1.1172	2.1233	6.2430	243.577	2.9047
Log likelihood	64.8243	-	-	-	-	-	-
Akaike AIC	-1.9930	9.8318	3.3029	4.5872	6.7441	14.0721	5.2139
Schwarz SC	-1.4194	10.4054	3.8765	5.1608	7.3177	14.6457	5.7875
Mean	0.0219	-4.4240	0.0192	-0.0761	1.6420	-	0.3740
S.D.	0.0922	37.7525	1.1965	2.6458	5.5778	290.010	2.9127

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The Prisoner's Dilemma Approach to Employer-Employee Relationships

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Abstract: Understanding how the employers and the employees develop long-term positive relationships in the organizational world in which they work is a key issue in management science. A deeper understanding of the moral or ethical effects on choice or decision-making behavior can give us a better grasp of their decision making processes and more especially, of their proper organizational relationship. In this paper, the author grapples with this issue by providing and explaining the choice behavior model between the employer and the employee within the business enterprise. The article first demonstrates interdependent relationships between the employer and the employee considering the "conflict of interest" situation. Secondly, the article demonstrates that cooperate behavior between the employer and the employee is a necessary condition for the success of business enterprises. Finally, the article presents the Prisoner's Dilemma solution, to the employer-employee cooperation that is based on ethics and morals such as justice and commitment. Justice based commitment behavior appears to constrain the employer's and the employee's short-term interests considering that the long-term interests that are created and maintained in the long-term is for the well being of both.

1. Introduction

Most organizational researchers describe co-operate behavior between the employer and the employee in terms of hierarchical influence and control power. This is an asymmetrical influence relationship requiring that one actor agrees to accept the decisions of another actor in a defined 'zone of acceptance' (Simon, 1951)[1]. In

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[1] Simon, H.A. (1951), "A Formal Theory of the Employment Relationship" in *Econometrica*, 19:PP.293-305

this sense, an authority-based analysis typically considers that the employee must accept the decisions of the employer. It can be assumed that if the employer is completely motivated by self-interest as far as control power is concerned, the loser is always the employee while the employer generally wins. According to Lind et al. (1993)[2] "people generally recognize that ceding authority to another person provides an opportunity for exploitation, so they worry about obeying orders that might be guided by some covert, Machiavellian motives on the part of authority".

According to the orthodox view, the employer's primary purpose is the maximization of profit. In fact, the very concept of maximization of profit could lead to a problem of negative employment relationship within the organization. In a critical sense, such a problem may arise when one's outcomes depend on other's choices and actions in addition to one's own (Baier, 1977)[3]. In other words, 'conflict of interest can arise when the relationship is an interrelated one' since this is not necessary to occur. Therefore, some recent researchers argue that value-based leadership (Prilleltensky, 2000)[4] practices are necessary for business development.

Therefore, the first aim of this paper is to explain how the 'conflict of interest' will occur between employer and employee taking into

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[2] Lind, Allan E., Kulik, Carol T., Ambrose, Maureen, and Park, Maria de Vera V. (1993), " Individual and Corporate Dispute Resolution: Using Procedural Fairness as a Decision Heuristic in *Administrative Science Quarterly*, 38:PP.224-251

[3] Baier, Kurt (1977), "Rationality and Morality" in: *Erkenntnis*. 11:PP.197-223

[4] Prillenltensky, Issac (2000), "Value Based Leadership" in Organizations, in: *Ethics & Behavior*. 10(2): PP.139-158; the value-based leadership is considered that employer or manager must treat his or her employees in a fair way, which is motivated by moral norms.

account the reasons for opportunistic behavior. The second aim is to argue that organizational justice and commitment is needed in order to reduce or prevent "conflict of interest" between the employer and the employee and to explain the positive outcomes from applying moral or ethical values such as justice and commitment to the Prisoner's Dilemma Game (PDG). Before discussing the above-mentioned aims, it is important to explain the interrelated relationship between the employer and the employee.

2. Interrelated Relationship between Employer and Employee

According to Solomon (1994:272) [5]business enterprises are "organizations of people, people with (more or less) shared assets and interests". Employers in management need to coordinate employees' personal interests towards expecting organizational interests or goal(s). Whenever there is a gap between organizational interests and the employees' interests, the employer needs to select one alternative as a co-ordination mechanism (Baier, 1977)[6] to achieve the organizational goal(s) through minimizing "conflict of interest" between the employer and the employee. In this sense it is better to understand that the conflict[7] situation usually enhances more than one alternative in choice making behavior.

If the employer and employee tend to value only their own short-term well being independently, the organizational activities between

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[5] Solomon, Robert C. (1994), "The Corporation as Community; A reply to Ed Hartman", in *Business Ethics Quarterly*, Vol. 4 No.3

[6] Ibid.

[7] Conflict can be defined as the perceived incongruity between one's interests and another's interests. Therefore conflict and cooperation cannot coincide with each other and it is better to consider both as two separate dimensions. Thus, choice behavior is varied between conflict and cooperation since there is more than one alternative.

them could be enhanced by short-term transactional relationships. Such short-term attitudes can be explained by using give and take behavior among them. Normally classical contractual agreement is based on this type of short-term transactional exchanges among the parties rather than by considering long-term relationships. Usually the prospects of business enterprises are based on long-term relationships; therefore business enterprises must take moral or ethical considerations into account in their choice or decision-making behavior, because it will enhance their long-term relationships better.

If each party -employer or employee- adopts a selfish maximization strategy as their absolute choices without considering a basic moral obligation such as justice or fairness this could gain in a lower payoff to both parties in the long-term. The employer and employee also have two equilibrium points within the organization, namely cooperate (C) defining shared values and non-cooperate or defect (D) considering only self well being. No matter what the other does, the selfish choice of defection (D) behavior yields a higher payoff than co-operation (C). However, if both defect (DD), both do worse than if both had cooperated (CC). If the employer and employee have to prefer either co-operate or non- co-operate behavior, they have to choose mutual co-operate (CC) or Pareto efficient point from the existing strategies, because that will obtain for them the best and most stable long-term relationships with more well-being, when compared to short-term maximization choice behavior which is based on defection.

The choice behavior from the existing alternatives is explained by the very famous example of the Prisoner's Dilemma Game (PDG), where each party has two choices: cooperate (C) or defect (D). If one prisoner chooses cooperate behavior and the other prisoner defect behavior, it yields a higher payoff of '0' years prison term for

defector & a lower payoff of '20' years for cooperator. But if both choose defect behavior (D), both receive a smaller payoff of '10' years prison term. However, if both choose cooperate (C) behavior, a pay off of '2' years prison term is gained for each prisoner. The PDG is, without any doubt, dealing with an interrelated situation that explains that one's choice behavior is affected by the other's choice behavior.

To avoid this choice dilemma situation or the 'conflict of interests' situation, most of the game theories established joint-action based on reciprocity relationships. According to Komortia et al. (1991)[8], "the reciprocity norm prescribes that people should help those who have helped them, and should not injure those who have helped them. Similarly, the reciprocity norm prescribes that people should retaliate against those who injure their interests..." Axelrod (1997:16)[9] illustrates the TIT FOR TAT strategy to explain co-operate behavior based upon reciprocity.

In this sense, the reciprocal relation seems to be a casual mode of mutual help such as an "I will scratch your back if you scratch my back" theory. The casual mode of mutual help is generally based on short-term give and take transaction relationships and its core value usually based on the short-term self-interests maximization. The short-term give and take expectations may concern the work they do and the relationship may end there. These expectations may not necessarily have anything to do with the organizational values, goals and missions in the long run.

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[8] Komortia, S.S, J.A. Hilty and C.D. Parks (1991) "Reciprocity and Cooperation in Social Dilemmas" in *Journal of Conflict Resolution*, Vol.35 No.3, pp.494-518

[9] Axelrod, Robert (1997), *The Complexity of Cooperation*. New Jersey: Princeton University Press

According to McDonald (1977:141)[10], "where long-standing norms are absent, any solution outside the core will be unstable, even if adopted into law". Therefore, it is better to consider that any casual model like the short-term give and take relationship is lacking a long-term core value from its starting point. If the employer and employee's choice behavior concerns only his or her own self-interests maximization based on a short-term give and take relationship, then we are confronted with a similar situation to the PDG. On the one hand, the employer or employee cannot read the other's mind and on the other hand, the employment contract is usually incomplete (Hart, 1993)[11].

3. Incomplete Contracts and Employer / Employee Relationships

In general, most organizations are based on a hierarchical structure with co-ordination at the center. But Lind and others (1993)[12] pointed out "people generally recognize that ceding authority to another person provides an opportunity for exploitation, so they worry about obeying orders that might be guided by some covert, Machiavellian motive on the part of the authority".

One partner cheating on the other can be defined as opportunistic behavior. If the employees feel that orders from authority are trying to exploit them, then the work behavior is affected by reducing effectiveness, efficiency, productivity, creativity and flexibility. If

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[10] McDonald, J. (1977), *The Game of Business*. New York: Anchor Book

[11] Hart, Oliver D. (1993) "Incomplete Contracts and the Theory of the Firm" in *The Nature of the Firm; Origins, Evolution, and Development*, Oliver E. Williamson and Sidney G. Winter (Edits.) 1993, New York: Oxford University Press

[12] Ibid.

employer is willing to seek his/her well-being from the employee's worst off, it violates the employee's rights and vise versa. When the contract is incomplete, the employee and the employer have subjective options and subjective ability to choose his/her work behavior according to his/her own choices. In this case, the employee's behavior goes beyond formal authority, and then that authority has limited control power over the employee by the usual means of incentives and sanctions.

However, the contractual agreement is well recognized in the thesis of "The Nature of the Firm" (Coase, 1937)[13]. But some scholars indicate that contractual agreement is not enough to maintain a proper employment relationship (Leibenstein: 1984; Hart, 1993)[14]. The employer can practice his/her authority to give the employee directions, but it may cause alienation of the employees as well, as it is not able to override the employee's autonomy. This is because the employer's authority does not enable to put him/herself in a position to decide what employees are going to do. Therefore, the employer's authority has restricted power to control the employee's individual interest.

Employment contracts are usually incomplete on bounded rationality; therefore employees have residual rights (Hart, 1993)[15];

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[13] Coase R.H. (1937), "The Nature of the Firm", in Oliver E. Williamson and Sidney G. Winter (eds.), *The Nature of the Firm: Origins, Evolution, and Development* (1991), New York: Oxford University Press

[14] Leibenstein, Harvey (1984), "The Japanese Management System: An X-Efficiency Game Theory Analysis" in: *The Economic Analysis of the Japanese Firm*. Masahiko Aoki (Edit.): 331-357; Hart, Oliver D. (1993) "Incomplete Contracts and the Theory of the Firm" in *The Nature of the Firm; Origins, Evolution, and Development*, Oliver E. Williamson and Sidney G. Winter (Edits.) 1993, New York: Oxford University Press

[15] *Ibid.*

effort on the part of the employees (Leibenstein: 1984)[16]; as well as employees' knowledge in professional organizations (Etzioni: 1993)[17]. Most of the employees who have competence and skill may seek opportunistic behavior where less experienced and skilled employees may not. A contractual exchange that is without well-defined limits, allows residual subjective power to the employer as well as to the employees. For this reason, the authority holds limited rights to direct these employees towards production activities by using only its power of control.

Furthermore, it appears that the PDG situation exists between the employer and the employees if the choice behavior is based on the individual rational maximization aspect. If both were willing to act considering immediate short-term self-interest on non-cooperate (D) behavior rather than cooperate (C) behavior, the pay-off order of the choices (DC>CC>DD>CD) may gain a worst outcome for the organization in the long run. Therefore, moral or ethical precepts like justice and commitment become important rules, guiding behavior in order to develop proper employment relationship in the areas that have not been addressed in the formal contractual agreement and the game theories.

If the employee and employer have independent subjective power that go beyond the contractual agreement. If one party tries to dominate or exploit other party also chooses non-cooperation as their dominant strategy that non-cooperate behavior earns bad outcomes to the parties in long-term. Therefore, conflicted parties need to seek some kind of coordination mechanism that may ensure long-term cooperate behavior by providing more well being to them rather than non-cooperate behavior. Then, the situation of

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[16] *Ibid.*

[17] Etzioni, Amitai (Eighth Printing 1993), *Modern Organizations*.PP.81-87 New Delhi: Prentice-Hall of India

employment relationships should be bound with some kind of assurance or agreement mechanism. This is because "the person with assurance game preferences will behave cooperatively as long as he can be assured that the other person will behave like cooperatively" (Nida-Rumelin, 1997:122)[18].

Sometimes, if one party chooses his/her actions ignoring other party's existence, then the other party also does the same. As well as, if one party tries to dominate or exploit the other party, then the other party also chooses non-cooperation as their dominant strategy. In that case, ethics or norms will be the only other hope for coordination, which is able to develop long-term relationships among the parties, because that behavior is based on mutual support.

As discussed by Etzioni (1993)[19] and Leibenstein (1984)[20], the contract is not completed on knowledge specificity and the employee's effort side that creates residual subjective power to the employer and employee. From the alternatives, both parties are allowed a free choice to these residual rights. As noted before, incomplete contracts also may work as a driving force for each party to seek opportunistic behavior. In fact, as a basic moral aspect, justice or fairness and commitment are needed to gain the respect and manage the long-term interests of both parties within the organization.

Employee or employer's knowledge specificity means that the employee and employer contribute to different types of knowledge, allowing each party to exploit its comparative advantage. Therefore the contract agreement becomes incomplete, especially concerning

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[18] Nida-Rumelin, Julian (1997), *Economic Rationality and Practical Reason*. The Netherlands: Kluwer Academic Publisher

[19] *Ibid.*

[20] *Ibid.*

the issue of the employee's knowledge and efforts, since the employer's authority power does not seem to be able to control it. Therefore, the contract agreement has limited capability to accomplish volunteer commitment from the employees. Under these circumstances, each party is likely to choose opportunistic behavior, considering the individual better off.

4. Employee's and Employer's Opportunistic Behavior:

When the contract is incomplete, the employee as well as the employer has subjective options and subjective ability to choose his/her own work behavior according to their own choices. In this case, the employer's behavior goes beyond formal authority, and then that authority has limited control power over the employee by applying the usual incentives and sanctions. Then the employee becomes motivated by self-interest; hence, his/her interests may conflict with the employer's interests. However, if his/her own interests did not motivate the employee, there is no reason for a conflict in interests to occur, and then the need for organizational justice would not arise. But researchers show that conflict is an inevitable part of all human associations (Adams, 1965; Straus, 1979)[21]. Basically, two factors may encourage the employee to estimate that opportunistic behavior is a better strategy than co-operate behavior.

Firstly, the motivation to secure their short-term well being at the expenses of the employer creates opportunistic behavior among the employees. Opportunistic behavior always encourages choosing

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21 Adams, B.N. (1965), "Coercion and Consensus Theories: Some Unresolved Issues" in *Journal of sociology*, 71: PP.714-716; Straus, M.A. (1979), "Measuring Intra-family Conflict and Violence: The Conflict Tactics (CT) Scales" in *Journal of Marriage and the Family* (February): 75-88

non-cooperate behavior over co-operate behavior at any point in time. For example, if the employee becomes aware of his/her subjective ability to knowledge, then there may be a higher probability that he seeks his or her own better off from the worst off of the employer.

Secondly, most employees are willing to choose opportunistic behavior from the belief that his or her personal influence is insignificant to the organization. On the other hand, if the employee perceives that his or her efforts are costly rather than beneficial then he or she motivates to contribute less effort to the organization. These two situations are known as the *'free-rider'* problem in neo-classical economics.

It is obvious that authority power encourages the employer to seek non-cooperate behavior, because the employer has authority power to issue the orders and control power over the employees. The employer can practice his/her power as an opportunity for exploiting the employee according to the "machine model" developed by Frederick Taylor. But if the employer appears to be acting unfairly, the employees question the employer's motives and may well disobey (Lind et al., 1993:225)[22].

Further, incomplete contracts allow residual rights to the employer, including reneging (Milgrom and Roberts, 1992:128)[23] and incongruence (Morrison and Robinson, 1997)[24]. The former occurs as a result of unwillingness by the employer to fulfill his/her

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[22] Ibid.

[23] Milgrom, P. and Roberts, J. (1992), *Economics, Organization and Management*. New Jersey: Prentice-Hall International Inc.

[24] Morrison, E.W. and Robinson, S.L. (1997), "When employees feel betrayed: a model of how psychological contract violation develops" in *Academy of management Review*, 22:226-256

obligations to the employees. For example, pay reduction, new requirements for promotions, extension of probation period etc. The latter occurs when the two parties to the exchange have different understandings of the promises made. For example: assures lifetime employment but consequently applies lay off procedures.

Assume that either employee or employer by acting individually and without benefit to the other would generate nothing in compensation transactions. Let's assume also that the employee puts in his minimum effort or no effort at all, considering all the while only his/her self-interest maximization, without considering the employer's interest. Assume as well that the employer has also decided to pay his/her minimum or no payment at all to the employee, considering only his/her own self-maximization interest without considering the employee's interest.

If both employee and employer select his/her choice-making behavior according to their self-maximization approach, the worst outcome for the both parties will ensue. The payoff strategy on the Pure Conflict Line in Figure Three explains that each strategy available for both on individual self-interest maximization behavior creates a similar situation to a zero-sum game. Then the payoff for each can be categorized as follows:

Employer Choice D>C = (+5)> (-5)

Employee Choice D>C = (+5)> (-5)

The above payoff is very similar to non-cooperate or defective choice behavior in the PDG. But if the employee and employer have a reason to think that each party must behave by accepting what is improbable on the basis of his/her own evaluation, then both are able to avoid the worst outcome situation. The reason for this evaluation

is based on the minimum moral obligation such as fairness or justice, which is based on the principle of "each individual should think that everyone else is in pursuit of his/her own happiness". Consider an interdependent situation where is two people with some equal absolute choice level (consider Employee and Employer expect 5), but one person is at '0' well being and the other at '5', then the first person has a stronger utility claim for an increment in one unit of his/her own well being. It would be reasonable to assume that ability to increment of one marginal utility (from '0' to '1') of the person who received '0' well being is receiving more happiness than marginal utility decrement from '5' to '4'. Therefore the shape of the Preference Possibility Curve is bowed out or "concave to the origin". Considering justice or fairness, if employer or employee may give up his/her rational maximization by a given amount 'Ui'it will increase other person's well being given amount '+Ui'.

That would help to judge the worth of their actions - to decide whether they are able to satisfying their long-term interests rather than their short-term interests. Then the payoff strategies can be explained by using the Preference Possibility Curve in Figure Three. Each choice-making strategy of this curve gives a better payoff to both parties than the Pure Conflict Line in Figure Three. In fact, cooperate payoff for the both can be exhibited as follows:

Employer & Employee well-being more than '0' or C>0<C

Minimum moral obligations such as justice can be applied to organizations via the group-value theory of justice (Lind and Tyler 1988)[25]. The employment relationship, which is based on organizational justice as we illustrated in following Figure Three by using Preference Possibility Curve gives a non-zero-sum payoff to

[25] Lind, Allan E. and Tyler, Tom R. (1988), *The Social Psychology of Procedural Justice*, New York: Plenum Press

the employer and the employee. In a non-zero-sum game, "the sum of the payoffs accruing to different players is itself variable according to the strategies adopted, so that, under some conditions, every player might have something to gain if one combination of strategies were chosen rather than another"(Benn and Mortimore, 1976:177)[26].

Lind and Tyler (1988)[27] proposed the group-value theory of justice for a better relationship between individuals and their organizations. They considered justice to be the key in developing a co-operate based relationship and in successful commitment behavior in the organizations. To resolve the 'conflict of interest' between the employer and employee, justice or treating everyone fairly would arise as a necessary condition. For this reason, business enterprises have to choose morally or ethically motivating instruments in order to perform proper coordination, rather than traditional rewards and punishments. Consequently, the employee's perception of organizational justice breeds a trust that will enhance the employee's long-term commitment behavior to the organization. If both parties were judge their actions based on the fulfillment of long-term interest, which may help to maintain a better employment relationship between the employee and employer.

Those moral or ethical egoists consider the interests of others according to his/her own justification because it is enhancing his/her long-term advantage too. The long-term advantage for either moral or ethical egoists can be achieved through cooperate behavior rather than through seeking only individual rational maximization

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[26] Benn, S.I. and Mortimore, G.W. (1976), "Can ends be rational? The methodological implications" S.I. Benn and G.W. Mortimore (eds.), Rationality *and the Social Sciences*. London: Routledge and Kegan Paul: 268-298

[27] *Ibid.*

behavior, but this cooperate behavior should be based on a minimum moral obligation like justice or fairness. Then, the cooperative game is one in which the players have common interests and are allowed to get together and act jointly (McDonald, 1977:102)[28].

Justice, as a minimum moral obligation, not only describes self-interested motivation, but also describes the consequences of that behavior in the long-term. The consideration of both self-interest and consequences are the important points in the attaining of goals or end-results. The consequences explain the 'rightness' or 'wrongness' of the action depending upon the action's effects. In that case, the act behavior, which directs towards the goals or end-results, becomes rational.

Therefore, the employer must be concerned about the employee's interests in achieving his/her goals, and the employee must be concerned with the employer's interests in achieving his/her own-interests. In this manner, justice becomes the rule for stability in cooperate choice behavior. When the employer and employee take moral or ethical consideration into his or her choice behavior it paves the way towards developing a proper employment relationship in the long run.

In the long run, justifications based on knowledge provide the permanent agreement on trust between the employer and employee. Trust proves to be the only way to determine the employee's present interests and future expectations of their own volition, by giving them reason to follow certain behavior. Therefore it is better to understand trust as an accumulative value of justice at a given time and commitment is the predicted behavior obtained from the wedge of past knowledge and future expectations. In this sense, justice and commitment create the ability of the employee to assume him or

[28] *Ibid*

herself as part of the organization with shared values. Therefore the employee is willing to internalize the organizational goals and values continuously to become a corporate member, because it is one of the ways to achieve employee's self-interests.

The employee, who internalizes the organizational goals and values, will stay in the same organization even in periods when business is bad. They cannot be attracted by better benefits from other organizations. On the one hand, those who attempt to seek personal well-being by defecting they may get negative consequences from the other organizations. On the other hand, moral or ethical values such as justice and commitment lower the temptation to defect. If everyone internalizes justice strongly, "there is negative temptation to defect rather than positive" (Axelrod, 1997)[29].

Thus, justice provides motivation to respect the other's rights to exist by choosing what is morally right, while at the same time achieving one's self-interest. Further, "sound fairness principles can provide clear standards by which a peer's behavior can be evaluated. Usually sound fairness principles facilitate in detecting "*free riders*" easily (Folger & Cropanzano, 1998: XX)[30].

Organizational justice provides an incentive to fair communication exchange between the parties. Fair communication makes possible the prevention of free riding behavior, because everyone knows his/her personal effect on the organizational goal achievements through this process. Furthermore, justice guarantees a fair allocation of the resources to the employee; and therefore the

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29 Axelord, Robert (1997), *The Complexity of Cooperation*. New Jersey: Princeton University Press

30 Folger, R. and Cropanzano, R. (1998), *Organizational Justice and Human Resource Management*, California: SAGE Publications Ltd.

employee is committed to contribute his/her maximum effort to the organization.

The relationship between the employer and employee based on justice may originate commitment behavior and give rise to long-term mutual well-being. If there are no any other environmental restrictions, it is better to assume that commitment behavior is harder to generate without justice. As noted before, commitment behavior is found in the wedge between past knowledge and trust in future expectations; hence commitment behavior is always related to the present.

Therefore "a commitment is motivationally credible if the players continue to want to honor the commitment at the time of performance (North, 1993:13)"[31]. If the action is not committed, the intention of the act takes into account different thoughts, different pathways of action, and different means before the action is committed. But, the committed action is focused on a single action, on self-enforcing motives, which should, however, be rooted in justice. The justice based commitment relation within the business organization can be illustrated as Figure 1 in Appendix.

An intention to every act of the individual is basically based on self-interest. If the employer and employee both intended to self-maximize, as discussed before, it generates a conflict situation within an organizational structure. It generates the worst outcome for both parties as in the PDG situation. In the PDG, no matter what the other's choice, the selfish choice of defection yields a higher payoff than other behavior patterns. Defect is the dominant strategy for both prisoners. Let the applied utilitarian believe that the end sought is

[31] North, Douglass (1993), "Institutions and Credible Commitment", in: *Journal of Institutional and Theoretical Economics*, 149:11-23.

self-rational maximization to the employer and the employee behavior. Consider the employer's utility function to be:

$$U (P +[– W]),$$

Where U is utility, P is the net profit maximization to the organization, and (-W) is the reduction of the wage by the employer. Consider the employee's utility function to be:

$$U (Low + [-P]),$$

Where U is utility, Low is the less work participation that is gained by self-maximization or financial better off through less work, and (-P) is the reduction of the profit by the employer. Reducing the employee's wage gives net profit gain to the employer and reducing the employer's net profit gain derives net well being to the employee.

Now, the problem becomes how the employer and the employee can achieve long-term cooperation in order to escape the source of the psychosocial (inter-personal) interest conflicts. If the conflict attitudes grow they will create dissatisfaction among the employee and then the employer, observing these conflicts caused by the existence of differences in interests, should address these properly and take appropriate action.

There is no question of an expectation of self-well being for both parties. However, if both parties are highly concerned with only their individual well-being and strive for self-maximization through non-cooperative behavior, a long-term worst outcome will accrue to both. Now, they have to consider a new choice from preferences in order to gain a new pay-off for both parties. The alternatives allowed selecting the correct choice taking into account one that is maximal and proper.

5. Justice and the Employment Relationship

If an employee faced with a psychosocial (inter-personal) interest conflicts within an organizational structure that will influence that employee's proper job behavior. Thus, Etzioni (1993:27)[32] pointed out that the control pyramid could serve as a conflict resolving function. If the 'conflict of interests' is being suppressed by authority power, it can result in stagnation and failure to adapt to changed circumstances, and/or it can erode the bond of group solidarity because of an accumulation of hostility. Therefore the management is conventionally responsible for reducing conflict between the employer and employee through proper co-ordination mechanisms.

However, all activities cannot be coordinated and organized under management authority alone. This is because the authority structure may not be able to completely predict an employee's mental state and behavioral patterns, and thus rationality is 'bounded'. But it is important to note that this bounded rationality does not arise only because of the inability to predict employee's mental and behavioral patterns; the authority or employer may treat the employees as parts of a given environment, and may not try to predict the employee's behavior and mental state adequately. Therefore, whatever method exists to control, it is important to consider justice or fairness that can help to achieve cooperate behavior as a conflict resolving mechanism.

A conceptual element of justice is fairness (Rawls, 1999)[33]. Justice will provide converse association between moral aspects of both

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[32] Ibid.

[33] Rawls, J. (1999). *A Theory of Justice*, (Revised Edition). Oxford: Oxford University Press

parties (Rawls, 1999; Buchannan and Mathieu, 1986)[34]. If, the employer and employee have a reason to think that the choice behavior of each party is improbable on the basis of self-interest, then both will be willing to behave according to minimum moral obligations such as justice. The notion of justice or fairness is widely recognized as essential for mutually satisfying exchanges and is tied to two concepts: procedural justice and distributive justice (Lind and Tyler, 1988: Tyler and Lind, 1992)[35].

Procedural justice refers to fairness issues concerning the methods, mechanisms, and processes used to determine outcomes. Distributive justice is the perceived fairness of the outcomes or allocations that an individual receives (Folger and Cropanzano, 1998).

In order to coordinate the 'conflict of interests' between employer and employee, organizational justice or fairness can be used to achieve and shape corporate behavior within the business enterprises. However, all cooperate behavior is not involved with justice. For example: the lack of alternative job availability can make co-operate behavior without justice. This makes it compulsory for the employee to concur with the employer's dominant strategy without any conflict. This is objective behavior on the part of the employees - preferring the *status quo* situation. The necessity for justice in organizations arises due to the employer realizing that the

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[34] Ibid; Buchannan, A. and Mathieu, D. (1986), "Philosophy and Justice", in *justice: views from the Social Sciences*, R.L.Cohen (edit.). New York: Plenum: 11-46

[35] Lind, Allan E. and Tyler, Tom R. (1988), *The Social Psychology of Procedural Justice*, New York: Plenum Press; Tyler, T.R. and Lind, E.A. (1992), "A relational Model of Authority in Groups" in M.P. Zanna (Ed.), *Advances in Experimental Social Psychology*, 25:115-119 San Diego: Academic Press

employee's subjective power is needed to achieve the organizational goal(s).

Justice specifies what actions one should take in a given environment to overcome the problems related to choices of self-maximization. Now, the employer and employee consider choice behaviors from the "Win-Win Order" of preferences. That gives better results than individuals working alone as separate entities. Therefore the achievement of the common goal is always associated with shared values. Justice guides this shared value.

With the development of shared values, the employer and employee will organize themselves to reduce strong attachments to self-rational maximization considering their own long-term well being. Then again, both parties attempt to overcome conflicts by seeking direction and developing the required knowledge and trust to choose the probable alternative from the preference order. At this stage, an action to be taken by each party has affected cooperate behavior.

If both parties had selected cooperate behavior considering their long-term well being, there is a new pay-off order (CC<DC< DD<CD) rather than the individual self-rational maximization pay-off order (DC>CC>DD>CD). The new pay-off order will enhance cooperate behavior between the employer and employee considering their long-term well-being. Further, when probable preference choice processes develop to accommodate with knowledge and trust characteristics continuously, the employer and employee will reach the well-known state known as cooperative behavior, like in the Prisoner's Dilemma Game (PDG) solution.

6. Prisoner's Dilemma Model applied to Employer-Employee Cooperation

The PDG has been much discussed in the literature of psychological, sociological and economic research "of resource allocation as an

illustration of the failure of individualistic decision-making and as a justification of a collective contract" (Sen, 1982:63)[36]. According to the game theories, in the core of the PDG, each prisoner (A or B) receives a higher payoff for a non-cooperative choice than for a cooperative choice, but both prisoners are better off if both cooperate than if neither cooperates. The prisoner's dilemma arises with only the particular individual choice that is called rational maximization. If the prisoner considers non-cooperative choice strategy at the expense of long-term well being, he/she gets a less preferable outcome when the situation is interdependent.

This indicates that choice behavior in rational maximization does not bring better results when the situation is interdependent. However, if the parties consider cooperative strategy at the expense of short-term well being, each party gets a higher preferable outcome in the long-term. As illustrated in Figure 2, the strategies for each prisoner can be summarized as cooperative (C) or non-cooperative (D) choice behavior according to the preference order.

Within the PDG structure all non-cooperative choices are improbable. Therefore, there is only one probable process that is based on minimum moral obligation - that is, based on fairness or justice. Justice can be defined as "a choice-making procedure without partiality to persons or things" and it is natural. The underlying rule of justice is "that each individual should think that everyone else is in pursuit of his/her own happiness". In this sense, justice may require one to act against one's short-term desires; and to be just involves being disposed towards certain behaviors or committed to certain behaviors. However, the situation depends on the premise that one's own well being and the other's well being

[36] Sen Amartya K. (1982), *Choice, Welfare and Measurement*. Oxford: Blackwell

are interdependent, and they can be intended to be solved what to do problem through assurance. But, different political ideologies, ethnic and racial feelings and refusal to understand the real nature of the problem, and other misdirected influences may interfere with this situation.

If both were endowed with assurance and conscience and they act with one another by accepting what is improbable on the basis of their own evaluation from justice, this will provide a rationale for human choice and conduct. Justice subjectively justifies itself by perceiving that everyone else is in pursuit of his/her own well-being. Assurance is objectively justified by the fact that one's well being depends on the other's choices. Moral obligations such as justice, as an apparatus for assurance or agreement coordinates one's own and the other's well being in connection with economic as well as non-economic interests.

The solution to the dilemma situation in the PDG is based on the assumption of equality - hence one party need not be subordinate to the other. In this case there is a 'sense' of justice rather than any forced contractual relationship. However, there is still a need for assurance, because if this were not so, each party would receive bad outcomes in the long run by some one's opportunistic behavior. Therefore each person is able to choose his/her final preference from the preference order, considering both subjective and objective states, instead of the rational maximization choice.

New comers in a business organization face a similar situation to that of the prisoners in the PDG. Why is this so? Because, among the new comers there are no relationships in their past that will cause distrustful behavior and non-committed behavior in the organization. Obviously, employees are willing to accept orders from the employer and to do their work according to the job contract.

However, the lack of past knowledge and trust may induce them to choose the Tit-for-Tat behavior or the status quo behavior. In this sense, we can consider that mere orders from the employer will not give rise to committed behavior on the part of employee or serve to develop proper employment relationship with the employee; for this kind of commitment to take place, we need organizational moral and ethical behavior.

7. Long-term Payoff in a Cooperate Game;

Past Prisoner's Dilemma research indicates that co-operation can be enhanced between strangers (Macy and Skvoretz, 1998). The researchers explained that, "if the game provides an option to exit (or to refuse to play), strategies based on 'projection' (of a player's intentions) and 'detection' (of the intentions of a stranger) can confer a co-operator's advantage." As noted before, new comers to the organizations have very similar relationships between employer and new employee who cannot rely on past behavior or the prospect of future interactions to establish mutual trust. Therefore, there is no expectation in commitment work behavior in the short-run.

According to Kreps et al. (1982),[37] research shows how reputation effects due to informational asymmetries can generate cooperative behavior in finitely repeated games of the prisoner's dilemma. However, past prisoner's dilemma research suggests that co-operation is enhanced when the other party can gather information about the cooperative strategy of one party easily. Working together often involves interdependence, and people must therefore depend on others in various ways to accomplish their personal and organizational goals.

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[37] Kreps, D., Milgrom, P., Roberts, J., and Wilson, R., (1982), "Rational cooperation in the finitely-repeated prisoner's dilemma" in *Journal of Economic Theory*, 27:486-502

According to Folger and Cropanzano (1998)[38] "sound fairness principles can provide clear standards by which a peer's behavior can be evaluated. This could make it easier to detect free riders". Justice or fairness principles enhance the ability of an employee to see him/her as a part of the organization and share some information and join in some decision-making processes with the employer. If someone violates these principles, others can detect him easily. The net result of justice-based information is decreasing self-maximization behavior, and then everyone is motivated to choose a justice based preference order.

Prisoner's Dilemma research indicates that the more equal the balance in power between the two parties, the more likely they are to co-operate (Pruitt and Kimmel, 1977)[39]. But this phenomenon is not observed when the employment relationship considers only authority power. The core of this hierarchical authority structure is the employee, who must suppress his/her self-interest to authority. As discussed before, the employees have residual rights on effort and knowledge. The residual rights provide subjective power to the employees. Therefore, the employer who is concerned about the long run prospect of the business must respect the employee's interests by applying the organizational justice process.

Further, because there is alternative job availability in a competitive market most employees are in search of short run gains and leave the organization whenever opportunities arise. As noted before, justice is subjectively justified by the fact that each one should think that everyone else is in pursuit self-interest and the assurance game is

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[38] *Ibid.*

[39] Pruitt, D. and Kimmel, M. (1977), "twenty years of experimental gaming: Critique, synthesis, and Suggestions for the future" *in Annual Review of Psychology*, 28:363-392

objectively justified by the fact that one's well being depends on the other's choices. Therefore interdependent similarity arises through subjective and objective assumptions. Thus, the employer and the employee will consider that the behavior of the other cannot be altered through force (Pruitt and Kimmel, 1977)[40]. With the development of the justice process, the employer and employee will organize themselves to reduce strong attachments to self-rational maximization. Further, both parties become willing to select their choices from the preference order. Everything tends towards co-operate behavior.

If an organization expects to achieve its goals, it would have to seriously address the current work force through justice or fairness. Lack of justice or fairness affects proper work behaviors. Distributive and procedural perceptions of justice will increase the employee's knowledge and trust, and hence, affect the choice behavior of the employee. As the organizational justice process improves, it will reduce the employee's alienation due to powerlessness, meaninglessness, normlessness, isolation and self-estrangement (Seeman, 1959)[41] areas.

Employees share organizational feelings when justice or fairness exists, rather than when facing a situation without a justice. The necessity for the introduction of justice arises due to people realizing that working together with common goals enables people to achieve better results, than those achieved by individuals working only by considering self-maximization as a separate entity. Employees' long run expectations require administrative mechanisms based on justice

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[40] *Ibid.*

[41] Seeman, M. (1972), "Alienation and Engagement" in *The Human Meaning of Social Change*. Angus Campbell and Philip E. Converse (eds.) New York: Russell Sage Foundation: 467-527

or fairness but not specifically addressed in formal contractual agreements.

The employer and employee must rely on justice principles that address all aspects of the exchange relationship including relational exchanges. However, formal contract and authority power fails to discuss these criteria. Following moral or ethical principles such as justice allows the administration of exchange relationships in a way that depends on mutual respect and honor for one another's words and behavior. Finally, a justice based employment relationship will facilitate the achievement of the goals of both parties. Figure 3 illustrates this relation.

To illustrate this choice behavior with the aid of Figure 3 we need to explain why the shape of the Preference Possibility Curve is bowed out or "concave to the origin". It gives new information about A's and B's choice behavior by giving them a new possibility of preferences. If, A or B has to give up his/her rational maximization that will add to the other's well being more. For example, if A give up his/her rational maximization by a given amount 'Ui' it increase B's well being by a given amount '+Ui' and vice versa. This satisfies the Pareto Superiority condition which says that if one world yields more welfare for at least one person, and at least as much for everyone else, as compared with a second world with exactly the same number of people, then the first world is morally better than the second world.

In terms of the above Figure Three, the two situations are contrasted at points PC (Pure Conflict) and PP (Preference Possibility). The point PC on the Pure Interest Conflict situation line does tell us that justice can minimize the conflict of interest between the players, but that point is given 'equal potion' to both players. But the point PP of the preference possibility curve tells us that justice can minimize the

interests' conflict between the players and what can be obtained for each player.

The point PP shows that justice as a moral rule determines more well-being to both players than an equal share to both does, but it is less than an individual rational maximization. A player who is receiving more well-being than his/her equal share is willing to be bound by a commitment action with his/her own involvement based on long run expectations. This enhances stable commitment to particular act behavior with strategic aspects of co-operation, without indulging in opportunistic behavior.

But, this article does not propose that every employee thinks of himself or herself as being an integral part of the organization. Some employees are considerate and some may only relate with give and take relationships. The latter employees will have feelings relating to themselves, but they have very little organizational feeling. Some employees work only for a short-term existence. Thus, it is very important to consider justice formations as a management principle, serving as an employee's long run commitment creator to the organizations by constraining rational maximization behavior. We can, at least, consider that organizational justice maintains an employee's higher commitment behavior, rather than having a situation in an organization without any justice, where this commitment is absent.

8. Conclusion

Several conclusions can be drawn from this article. First, an understanding of the 'interests conflict' between employer and employee in the employment relationship and the underlying moral and ethical exchange that is essential to the achievement of self-interests of both employer and employee is given. Second, analyses of both contract and moral and ethical foundations highlight the

growing impact of moral or ethical values such as justice and commitment moves across co-operate behavior between employer and employee. Third, the implications for organizational structure that is interested in moving toward more moral and ethical based employment relationships are that greater emphasis should be placed on implementing moral and ethical considerations into the organization's decision-making behavior. Building justice and commitment appear to be important self-interested achievement dimensions for both employer and employee maintained through a long–term relationship.

Figure (1): Employer-Employee Relationships from a Prisoner's Dilemma Perspective

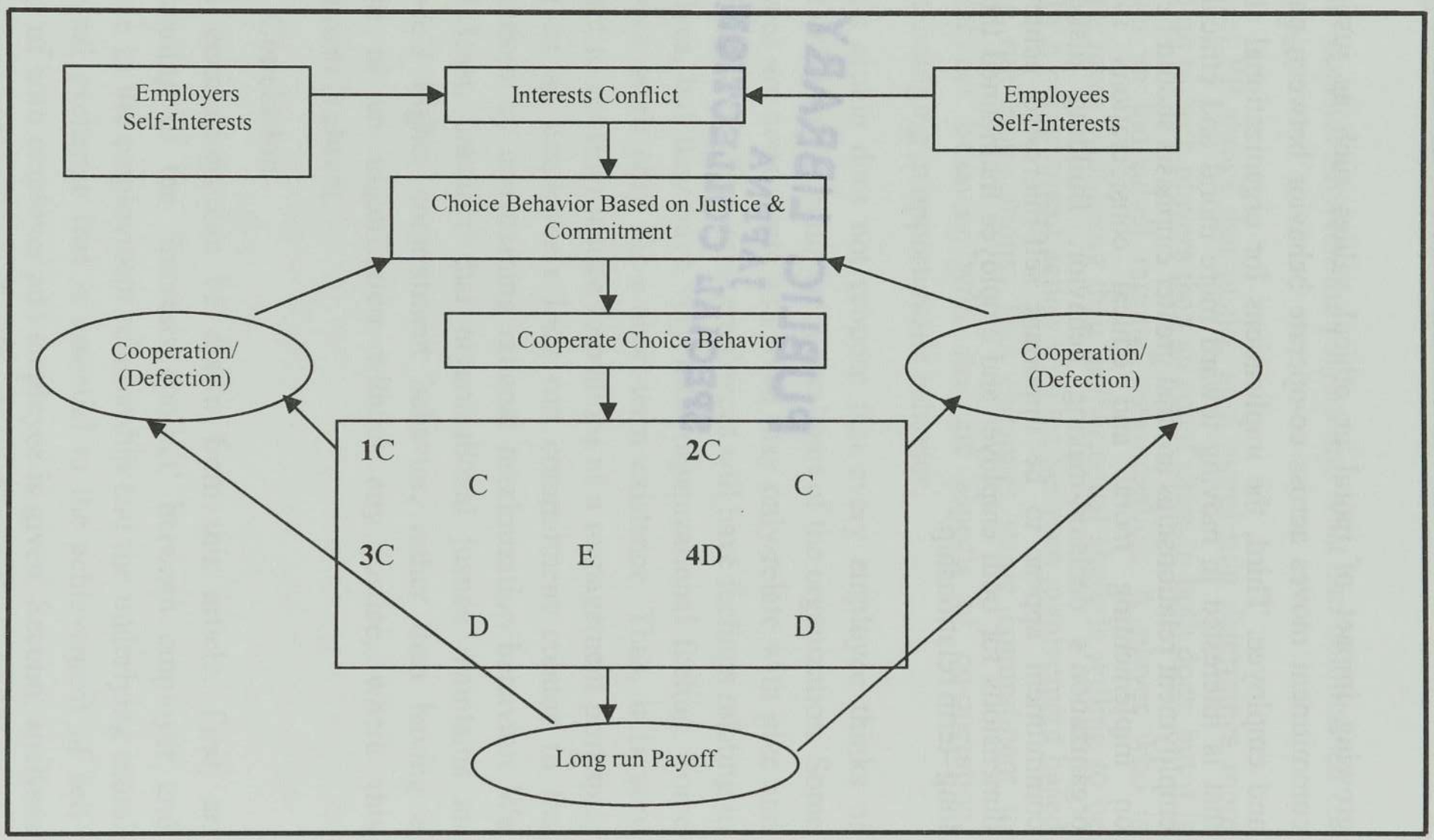


Figure (2) Network Relation of the Prisoner's Preferences

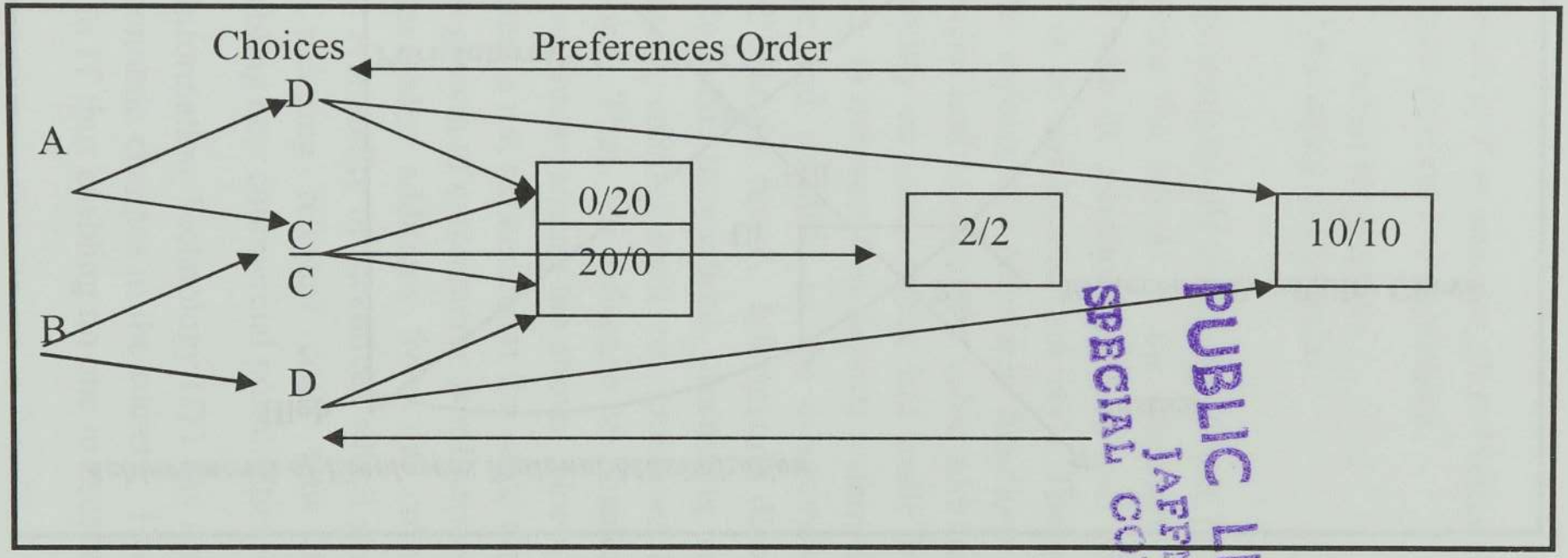
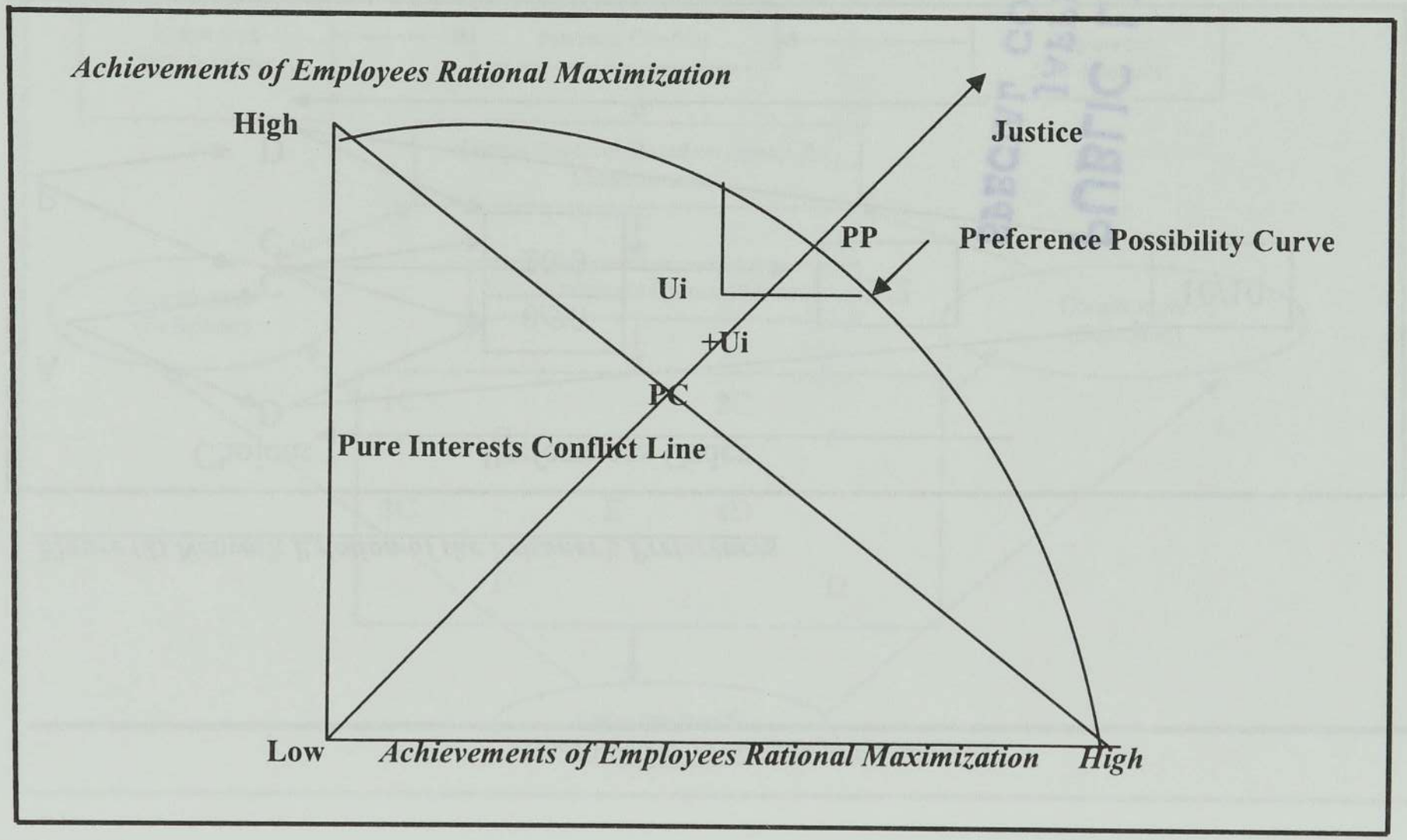


Figure (3): Relationship between Pure Interest Conflict and Coordination by Justice



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Book Review: ***Economics of E-commerce***, [S.P. Premaratne] 2005, Deepani printers and publishers.

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E-commerce (EC) is potentially the most significant business and social development since the advent of the telephone. The new economic era emerged with EC advancements are well known to be an 'internet economy' or an 'information society'. The adoption of EC within most of the aspects and economic functions of human beings has made it crucial and essential for value addition in every respect. The dependability on e-commerce has made individuals, firms, organizations etc. to innovate new aspects within the internet economy. The scope and potential of the e-commerce is still developing and it 'will' for the future. Information dissemination, product / service development, transactions, processing, relationship enhancement, recruitment, entertainment etc. embraces the use of EC throughout the globe. Thus, the influence on business through EC is significant and prominent among the above. Notwithstanding the fact that e-commerce is not expanding at the same rate in every sphere of business; the growth of e-commerce is influenced by many factors which includes value additions from the consumer and producer perspectives, availability of incentives which stimulate the internet acceptance, reducing relevant costs thus stimulating economic activity, enabling new commercial possibilities etc.

The development of Information Technology (IT) has lead towards social, cultural and economic changes in the society. Every part of human life is bonded to IT thus enabling no one to escape from this

influence. This has contributed towards changing the aspects of the ways at which certain structures do function. For instance the on-line marketing has tremendous influence on the traditional market structures.

Though many analysts have made attempts to elaborate their perceptions on e-commerce, many have not focused on the economic aspects of the newly emerging markets of e-commerce; thus a marked lack of literature on this dimension of e-commerce is evident. In that context the book on 'Economics of e-commerce' is a noteworthy publication especially in the context of micro economics. The major aim of the author appears to investigate the economic aspects of the newly emerging market of e-commerce by applying standard economic tools.

This book has primarily been organized under seven main chapters with seven different topics. The book with its introduction in the first chapter, and in the second has presented the nature and different impacts of e-commerce. The new changes in the banking industry is discussed in chapter three followed by a discussion on e-payment system, while discussing changes in traditional market structures in chapter four and five respectively. The examination on the pricing behaviour is organized under chapter six with its concluding chapter discussing on e-finance for small and medium scale enterprises.

The author with his opening remarks in the introductory chapter tries to construct the required environment for the reader who may be at any level of knowledge to understand the nature and the extent of information age. He in this context defines this aspect as the growing information super highway. The definitions given on e-commerce have enabled the reader to focus his mind and get prepared for the detailed contents of the upcoming chapters. The

concept of digital products along with their categorizations has been discussed in depth as one of the basic components of the information age.

As the author gradually paves the way for the subject matter, in the second chapter he describes how e-commerce has influenced on the traditional functioning of an economy, however covering some significant areas. In this context the book reviews the positive impacts or the benefits of e-commerce from the perspective of an organization, customer, society, while discussing on there relevant limitations. Special emphasise has been made on discussing the impacts of EC in areas such as marketing, organizations, finance and accounting, trading, intermediaries, prices, job market as well as banking.

However, when elaborating on these positive impacts the author has not paid much attention on discussing the challenges or the alternative implications specially the negative impacts. Though the explanation focus on the technical and non-technical limitations of the EC, limitations on the above mentioned areas are rare in the discussions. For instance when discussing the impact on the job market the author outlines almost all the advantages of e-job markets both for the job seekers as well as the employers. But similarly to the inability in touching or feeling a product when purchasing a good from the internet, the employer in this context may require to limit his selections for the paper qualifications of the job seeker or merely relying on what the job seeker expresses irrespective of whether it is true or false. Such issues are of greater importance in human resource management. But however the author seems to be biased when he only explains the positive implications of all these important aspects.

The continued discussion done on the impacts on the banking sector is elaborated with move flesh added in the third chapter. The author has been knowledgeable enough to provide with a comprehensive introduction as to what is e banking while discussing on the emergence of internet banking influencing Customers and banks in different ways. He has taken a remarkable approach to start up the discussion by examining on the changes in the banking industry due to the introduction of e-banking. These changes have been viewed not only from the organizational structure itself but also the people's value systems including time and money in social, demographic and economic aspects. A relatively sufficient explanation is given for the home banking concept while briefly discussing on their categories. The challenges that the e-banking need to face with the continually changing financial needs is identified through the potential risks, by the author. These are analysed both from the administrative and banks point of view. However, in the latter part the author has identified some major tools that regulators need to focus on to address these new challenges posed by the growing of e-banking. The final part of the chapter examines the impact of e-banking towards an economy's monetary policies. It explains the shift of a Central Bank's traditional role as an operator while discussing the possible risks of the banks, not involving the Central Bank in their operating procedures. Moreover the implications to the financial markets in this regard are discussed. However the author at the end has provided possible strategies to the Central Bank to make to these challenges. The chapter has come to an end by discussing issues on the alternative currencies due to the emergence of e-banking.

Chapter four provides a detailed analysis on the major types of e-payment systems with their relevant characteristics and in this analysis the author has also paid considerate attention to discuss on the legal issues of e-money while also discussing on the regulatory

framework for money issues. A comprehensive explanation on e-cash which includes the definition, the technological processing on e-cash, buying and selling of e-cash, properties of e-cash etc. are done by the author which gives a fair amount of knowledge to any person in need. This is followed by another critical review on the e-cheques system by the author while comparing and contrasting with the available traditional methods.

A considerable portion of the chapter is devoted in explaining the credit card based e-payment systems starting from processing the transaction until outlining the potential risks of using credit cards via internet. After identifying the potential risks the author deals with how a proper e-payment system should be designed .This includes the necessary requirements, policy issues etc. with relation to the e-payment system. The discussion on policy issues of e-currency has created a background to analyze the monetary effects on major macroeconomic variables including the money supply and monetary policies.

The next chapter has significant relevance to any reader with sufficient micro economics background. The chapter's core focus is on the market role within an e-economy. The author has outlined the issues emerged within traditional market structure due to the introduction of e-commerce. In this context he has mainly focus on the implications on the traditional market structures paying considerable attention on their assumptions and how e-markets made some of these structures more practical and applicable while making some far from reality. Within this discussion the author has given prominence in discussing some vital principles of welfare economies while explaining how e-markets influence for the welfare level of both the consumers and producers. This discussion has been further expanded into significant areas of micro economic which includes the market power, economies of scale, externalities etc. More

importantly when evaluating upon the market strategies of e-commerce the author has emphasized on the aspects of game theory from economics perspective. This outlines the situations where the firms can either be competitive or / and cooperative within e-markets. The author has brought forward some major competitive strategies in e-commerce in this respect.

Chapter six is solely set about to discuss the issues on pricing for goods and services with e-commerce. Chapter outlines different pricing techniques for both goods and services while the author argues that the diversity of applications and user quality of service requirements lead to a need for different pricing policies. Accordingly a comprehensive explanation on the pricing mechanisms are pointed out while providing some means for method of calculation and enabling comparisons within the mechanism itself. The pricing strategies are mainly discussed within the context of cost curves used in micro economic analysis. The author has made a remarkable attempt in figuring out the cost curves of the digital markets while enabling the reader to compare them with the traditional / normal cost curves. Further he has outlined the implications of product differentiation on cost curves and product pricing. These facts have been enhanced with the discussion on price discriminations in e-markets. He for this purpose has made use of the price discriminating concepts within the study of micro economics, and identified different levels of output quantities and price levels with regard to different discriminatory stages. The concept of price dispersion within e-markets is explained using the traditional economic literature which includes information asymmetricity, search costs and product heterogeneity. The chapter is concluded by the author arguing that e-markets bring more efficient market clearing mechanisms, for them removing most of the barriers with regard to the traditional markets.

The concluding chapter of the book, focuses the attention of the reader to an area where the application of e-commerce is growing, but still not appropriately used in most of the economies. The e-finance aspects of small and medium enterprises (SMEs) are discussed for this being the interesting subject area of the author. He in this analysis has given different aspects of the SME sector where e-financing is possible and areas where further advancements need to be taken. He make use of this chapter in order to promote that the internet is an ideal venue for the promotion of SMEs. A critical analysis is done comparing the promotion of SMEs through internet both in the developed and developing countries perspective along with the public and private sector initiatives. A greater part of the discussion is devoted towards out lining the pre-requisites necessary for the developing countries for holding e-financing mechanisms in the SME sector. This evaluates on how a country should prepare or arrange itself in order to promote e-financing which will contribute towards value addition of an economy's GDP. The conclusion of the chapter is based on a critical analysis on the advantages disadvantages of e-commerce for SMEs while outlining the possible challenges for e-finance for SMEs. In here the author has not forgotten to analyze the implications on GDP poverty alleviation through the e-financing systems.

E-commerce is embracing the entire human sphere throughout the globe. No individual can be independent of e-commerce; rather being a victim of it. A greater percentage of the market today is almost under the influence of e-commerce. It is no doubt that e-commerce is a tool which will enhance the growth of an economy when applied to different means in the economy. But however, the use of e-commerce for the betterment of the mankind lies on the

way applications are chosen. This provides more relevance for the markets which are functioning within an economy.

Thus this book covers a wide range of issues relating to the wide spread use of e-commerce within an average market condition. However, of course one cannot expect a full coverage of economic implications of e-commerce in such a volume of this nature. The author has paid satisfactory and justifiable attention in reviewing different aspect of e-commerce within a general framework of an economy. The use of microeconomic tools within the principles of e-commerce by the author can be regarded as an eye-opener for e-commerce to further establish its roots within the solid frame of economics.

The author is of the view that e-commerce has still potentials to be embodied in significant economic issues such as the SMEs e-finance analysis undertaken by the author. This approach might pave the way for the readers and critics to encroach other possible avenues within the economy to be influenced and benefited by the aspects of e-commerce.

The acceptance of text book models within specific markets are moving far from reality as they directly impact on the market mechanisms, competition, price mechanisms etc. In this way the book has tried to be more in line with the current developments in this field. At the same time introducing on-line activities within the Banking sphere has converted the economy towards a cashless paperless one. The mode of approaching the market, market strategies, and competitiveness has made dynamic impacts towards the traditional functioning of an economy.

Thus, the seven chapters taken together provide valuable case for analysing few insights of the wider subject area of e-commerce with micro economic fundamentals. Undoubtedly this book will provide

useful reference to researchers, policy makers practitioners, students and to the general public, where this book need to be given place in the racks of libraries of universities, other institutions in which they resemble a virtual absence of publications in this area, which will provide a useful background to fashion their thinking on a solid factual background.

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Global Free Trade versus Trade Agreements: Case of Sri Lanka
Prof. A.D.V de S. Indraratna, Dr. Athula Ranasinghe, and Ms. Subashini Abeysinghe (eds.)

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Sri Lanka Economic Association has launched its third publication under the title "Global Free Trade versus Trade Agreements: Case of Sri Lanka". The two previous publications of the Association were (1) Human Development in a Knowledge-based Society: Sri Lankan Scene (2004) and (2) Public-Private Partnership in Economic Development: A Case for Sri Lanka (2005).

The current publication of "Global Free Trade and Trade Agreements" is an outcome of the SLEA Annual Sessions held in last July on the same theme. It is a remarkable achievement of the SLEA to publish the proceedings of the annual sessions, after editing, in a book form within a short period of four and half months.

This publication is timely as it deals with a very crucial issue of international trade relevant to both global and national contexts.

World Trade Organisation (WTO) successor to GATT, acronym translated by some critics as a General Agreement to Talk and Talk, was established primarily to achieve free trade across the globe, based on the principle of non-discrimination and the process of multilateral trade negotiations.

Despite its achievements since the first round of multilateral trade negotiations were held, the effectiveness of the process has been called into question. The collapse of the WTO talks in Seattle and Cancun (and more recently in Hong Kong) has made countries more pessimistic about the effectiveness of multilateralism. Most WTO members are now proposing new regional trading agreements (RTAs) and bi-lateral trade agreements as an insurance policy.

By the end of 2004, there were nearly 300 such agreements in force, including the countries forming the European Union, and 229 agreements if they are counted as one country. The WTO puts the number of Regional Trade Agreements at 32.

This is however not the end of the story. There are a number of additional Regional Trade Agreements, extensions of such agreements and a great number of bi-lateral agreements under negotiations, at present. Almost all counties in the world and virtually all WTO members today are party to, or are in the process of negotiating, at least one RTA. Thus, regionalism has become a policy option for most countries and is a permanent feature of the international trading environment for the foreseeable future.

The question of whether regionalism is a building block or a stumbling block towards global free trade has been a much debated issue among trade economists since the beginning of 1990s. It is an extremely important issue, since international trade has been and continues to be a crucial factor for economic progress. Sri Lanka, in particular, is a highly trade dependent country with a dependence ratio close to 70%. Trade will remain a major engine of growth for the Sri Lankan economy in the coming years. Thus Sri Lanka's trade policy is important in the context of further integration with the global economy.

The current publication of the SLEA – **Global Free Trade versus Trade Agreements,** jointly edited by Prof. Indraratna, the President of SLEA, Dr. Athula Ranasinghe, Senior Lecturer of the University of Colombo and Ms. Subashini Abeysinghe, Economist, Ceylon Chamber of Commerce comprises of ten (10) research papers presented at the Annual Sessions of 2006.

They have been edited and published under four (04) sub-themes reflecting different dimensions of international trade, namely;

(i) Multilateral Trading System and Regional Trading Blocks

(ii) Globalisation versus Trade Agreements

(iii) Bilateral Trade Agreements: Case Studies and

(iv) Trade Liberalisation and the Domestic Economy

In addition to the four sub-themes, there is a Background section containing two chapters written by Prof. Indraratna and Prof. Harry Flam, Professor of International Economics at Stockholm University, respectively.

Prof. Indraratna investigates the development of trade policy in Sri Lanka from a historical perspective, while Prof. Flam provides an overview of the current trends in global trade as **Regionalism versus multilateralism**.

Prof. Indraratna observes that regional cooperation and economic integration in South Asia is not easily achievable as compared to the West. There are several reasons for this. One is the geographical contiguity and similarity in the social make-up of the countries of the West unlike in Asia.. The second is the availability of transport facilities and the latent and potential labour mobility whereas in Asia with rapidly expanding populations any talk of labour mobility

would be frightening. The third factor is the sizeable intra-regional trade already existing among the countries of the West, whereas in Asia this is not significant. Another characteristic of Asia is the vast differences in the size of respective countries and their populations, domestic markets and the level of their development whereas in the West divergences are not so marked.

It is true that South Asian Association for Regional Cooperation (SAARC) came out of a collective will for broad economic cooperation among a group of contiguous countries. However, its progress during the first 10 years was relatively slow. Then in 1995, SAARC countries ratified South Asia Preferential Trading Arrangement (SAPTA) which hardly had any economic impact on member countries. Prof. Indraratna attributes this to the small size of SARRC's intra-regional trade which was around 4% as well as the small number of items prescribed under preferential treatment – that is limited coverage. Sri Lanka, for example, received concessions only on 62 of its export products covering only 1% of its total exports of 1994. Even under SAFTA situation did not improve at any appreciable level.

The dissatisfaction with the multilateral trade performances under SAPTA and SAFTA has compelled some member countries to enter into bi-lateral free trade agreements between them. In his brief analysis on the performance of the Indo-Lanka Free Trade Agreement, Prof. Indraratna observes that the distribution of benefits shows a marked inequality. Bigger partner India has benefited relatively more than her smaller island partner. However, according to him, one positive element of this outcome is that Sri Lanka's trade expansion with India was due to trade creation rather than trade diversion. Most of the exports that have indicated rapid growth are new products that have never been exported by Sri Lanka to any other country in the world before signing of the agreement. For

example, copper products, vegetable oil (mainly Vanaspathi oil), and aluminum products account for 82% of exports to India under the agreement.

Prof. Indraratna sounds a note of warning to those who expect to enter into free trade agreements in the future. Sri Lanka should be cautious in her negotiations in regard to whatever reciprocal concessions it may agree to, without rushing into decisions in her enthusiasm to conclude an agreement for mere political prestige, because of the un-level playing field that may emerge because of the vastly different sizes of countries in the absence of special and differential treatment.

Dr. Saman Kelegama presents a critical overview of Sri Lanka's trade policy since late 1970s. He distinguishes four (04) tracks of the trade policy towards global integration initiated by Sri Lanka during this period. They are namely, (i) unilateral, (ii) bilateral (iii) regional and (iv) multilateral.

Sri Lankan economy was 50% more closed in 1977 than in 1948. In late 1977, Sri Lanka became a pioneer in South Asia to liberalize its trade unilaterally. Since the mid-1990s, multilateral, regional and bilateral trade liberalization has added to the unilateral initiatives. Since 2004, unilateral liberalization has been slowed down to secure more 'policy space' to pursue national development programmes based on rural development, SME promotion, etc. More defensive trade policy was adopted after facing adverse consequences by attempting to engage in rapid deregulation without developing domestic capabilities.

Since mid-1990s multilateral and regional trade liberalization under the WTO and SAPTA gathered momentum and since early 2000, bilateral trade liberalization came into picture with the Indo-Lanka

Bilateral Free Trade Agreement and Pakistan-Sri Lanka Bilateral Free Trade Agreement coming into effect.

As Prof Indraratna, noted, Dr. Kelegama also confirms that SAPTA did not have any significant impact on Sri Lanka's trade largely due to

(i) Limited amount of concessions

(ii) Irrelevance of much of the concessions offered

(iii) Limited depth of tariff cuts

(iv) Failure to deal with non tariff issues and

(v) Restrictive rules of origin.

As Sri Lanka did not gain much from SAPTA, it was compelled to go for bilateral free trade agreements with India and Pakistan. Dr. Kelegama is more optimistic about the prospects of bilateral trade agreements for Sri Lanka. From the strategic point of view, an FTA with India is important for two reasons.

(i) First, the rapid growth of the Indian economy will have spillover effects on Sri Lankan economy

(ii) Second, the good relation with India would be helpful to work out a solution to the North-East conflict.

The free trade agreement came into operation in 2000. There have been more positive effects on Sri Lanka. According to Dr. Kalegama, the trade balance in favour of India declined from 15:1 in 1998 to 10:1 in 2000 and to 3:1 in 2005. India which was the 21st destination for Sri Lankan exports in 1998 became the third largest destination in 2005. India was the largest source of imports to Sri Lanka before the free trade agreement and this position was consolidated after the agreement with Indian imports stabilizing around 18-20% of overall imports of Sri Lanka.

India which was mainly exporting agricultural items to Sri Lanka until the late 1980s (sugar, potatoes, onions chilies etc.), today is a major supplier of industrial goods and services (petroleum products, pharmaceuticals, iron and steel, motor vehicles etc). Further, Indian investment, followed trade and 50% of the Indian investment in the SAARC region today is in Sri Lanka. India is the fourth largest investor in Sri Lanka, after Singapore, UK, and Australia.

Another comprehensive analysis on Indo-Lanka Free Trade Agreement has been carried out by Ms. Subashini Abeysinghe who is also very positive on the long-term effects of the free trade agreement and the Comprehensive Economic Partnership Agreement (CEPA) which is being negotiated at present. According to her analysis, Sri Lanka is located in a unique position to benefit from the economic boom that is taking place in India. The Indian middle class alone is 16 times the population of Sri Lanka. Indian economy has been growing rapidly at about 7-8% a year for the past several years. The consumption boom has already benefited Sri Lanka in certain ways. For example, there is an increase in traveling abroad by Indians, and Sri Lanka has become a major destination of travel to Indians. In 2005, tourists from India accounted for 21 percent of the total tourist arrivals to Sri Lanka and this is expected to increase further.

Both Dr. Kelegama and Ms.Abeysinghe have emphasized the supply-side problems which prevent Sri Lanka reaping the full benefit of improved market access under bilateral free trade agreements. The state needs to address the supply side constraints that undermine the competitiveness of its industries and also introduce regulatory reforms needed to facilitate domestic firms to restructure and adjust to face increased competition. Sri Lanka can export 4150 items at 6 digit level free of duty to India. However exports are limited to a handful of products.

Applying the dynamic general equilibrium model in the light of new growth theory, Dr. Thenuwara derives several interesting conclusions useful for drawing strategies to form preferential trade agreements and to evaluate such agreements. He examines the validity of the prevalent hypothesis of export-led growth. According to empirical evidence, the relationship between export growth and economic growth is not systematic. Although some countries show evidence on export-led growth, many other countries including some of the newly industrialized countries do not show any evidence on export-led growth. New growth theory states that principal factors of economic growth are productivity improvement through accumulation of human capital and technology spillovers. Thus trade may promote growth due to dynamic comparative advantage and international knowledge spillovers. Hence, policies should be designed to promote trade in areas with greater knowledge spillovers and technology transfers. Based on these theoretical findings, it is concluded that a country with superior knowledge and human capital is the preferred partner for special trading arrangements. Hence, policies should be designed to promote trade in areas with greater knowledge spillovers and technology transfers.

The relationship between trade liberalization and the domestic economy is another controversial current topic receiving attention from both researchers and policy makers. This volume contains two research papers on this subject. Dr. Athula Ranasinhe investigates the effects of trade liberalization on SME development and Dr. Ratnayake focuses on the implications of trade liberalization on domestic agriculture and rural economy.

Dr. Ranasinghe's paper is based on a survey conducted in 2002 on 286 SMIs in Colombo and two other rural districts, namely Kurunegala and Puttalam. He uses statistical and econometric analyses to investigate efficiency, labour productivity and factor

intensity of these industries. The efficiency parameter indicates that SMIs are capable of generating increasing returns to scale. This study further reveals that firms established before liberalization are more unstable in their production technology than the firms established after liberalization. Another interesting finding of the survey is that liberalization has no significant impact on the SMIs. No improvement or deterioration after liberalization is observed.

Dr. Ranasinghe presents some case studies to support his arguments. Liberalization process has created a lot of valuable opportunities for the SME sector which has failed to realize them due to absence of facilitation by the government and other agencies such as chambers of industry and commerce. There is a similarity in the problems faced by SMEs located in urban and rural sectors. Economic and political instability, lack of credit facilities, problems of raw materials and skilled labour are more significant problems common to all categories of SMEs.

Liberalization has created many opportunities in the service sector, but there is hardly any arrangement by the government to provide this information to the potential entrepreneurs. With the advent of ICT revolution, currently there are many MNCs willing to outsource various parts of their secretarial functions. At present, Philippines and India play a dominant role in this field as suppliers of outsource services. Sri Lanka has the comparative advantage in this business. However, sometimes the existing regulations act as a barrier for such businesses. Dr. Ranasinghe illustrates a case study to support his argument. A request made by a foreign investor to BOI to start up a business was turned down as he could not produce the minimum capital requirement under BOI regulations to form a company, although the nature of his business was such that it did not require that much of capital. There is a need for regulatory changes,

technical skills development and information to create a conducive environment for business development.

In his analysis of the impact of trade liberalization on domestic agriculture, Dr. Ratnayake concludes that the overall impact is mixed. The benefits accrued to the rural economy by way of access to new employment opportunities in the other sectors of the economy is viewed as a positive contribution.

According to him, though trade liberalization has been operative for almost three decades, the existing tariff structure is crowded-out due to new tariff surcharges and re-introduction of specific duties for agricultural products, with new tariff bands for minimum duty and case by case duty adjustments. At the point of imports, the duties and fiscal levies are charged on all imports which include customs duty, value added tax (VAT), Ports and Airports Levy (PAL), Cess, and social responsibility levy (SRL). However, with the imposition of so many other duties and taxes, the impact of tariff reforms has not only become less meaningful but also complicated.

Another notable feature of the tax policy as observed by Dr. Ratnayake is the lack of predictability as rates have been raised and lowered frequently. He further notes that Sri Lanka has not followed a consistent policy of trade liberalization though committed to a more rigorous reduction of tariffs. The unpredictability, inconsistency and enforcement of tariff on ad-hoc basis have reversed the international commitments in this regard. Therefore, a more pragmatic view is needed to implement a predictable and a competitive tariff structure to improve the trade and development of the economy.

Dr. Ratnayake highlights another crucial issue in the domestic agriculture. A rapid growth in agricultural productivity is vital for reducing poverty since nearly 90% of rural poor live in the rural

sector. One of the factors inhibiting development in the agricultural sector is the lack of secure tenure and clear private property rights to land. Many farmers operate land parcels for which they do not have clear title. As a result, land cannot be used as collateral for loan, reducing the credit worthiness of agriculture operations. Most of the poor depend on land and related activities, to secure their livelihood than any other form of natural resource.

As a result of this insecurity and government restrictions on land use, the poor are not empowered to make choices in land use and land allocation and hence cannot use their land to their most productive potential.

This volume contains two more iterating research papers dealing with liberalization of services and foreign investment respectively.

On the whole, let me conclude that this publication is indeed a valuable addition to the limited analytical literature on international trade issues in Sri Lanka and it would be of great interest and value for policy makers and administrators as well as students and researchers in social sciences. The efforts made by the writers of these research papers and by the board of editors who compiled this book are commendable.

Aims and Objectives of the Sri Lanka Economic Journal (new series)

The SLEJ provides a forum for academic discussion of economic issues in the developing world. It accommodates theoretical and empirical studies mainly in development economics and political economy of development, although other branches of economics and development studies are also accommodated. While the emphasis in the choice of empirical studies for publication will be given to those about Sri Lanka, comparative studies as well as studies concerning other individual developing countries can also be accommodated depending on the issues raised and the analytical rigour maintained.

Notes to Contributors

1. Manuscripts may be initially submitted in hard copy or soft copy. Hard copies should be submitted in duplicate. Once the manuscript is accepted for publication, a soft copy must be submitted.
2. Articles should be accompanied by a record of the author's name and affiliation, and by an abstract, not exceeding 150 words, giving a clear indication of the nature and range of results in the paper. Articles should contain a final section in which the author sets out the main conclusions, in a manner at least broadly intelligible to the non-specialist reader.
3. Broad divisions and section headings should be clearly marked in the text where appropriate. Any quotations should appear in single marks, with longer quotations (exceeding 40 words) appearing indented in text.
4. Bibliographical references should be carefully checked. In the case of books these should be complete in respect of edition, place and date of publication, and name of publisher and in the case of journal articles in respect of volume and issue number, month and year and inclusive of page numbers.
5. The full mathematical workings necessary for justifying each step of an argument should be given in the case of articles of a mathematical character. These workings will not be published.
6. Diagrams should be clearly drawn, with clearly marked axes. These should be submitted on separate files and accompanied by the basic statistics required for their preparation.
7. Statistical tables should be clearly titled and the reader should be able to understand the meaning of each row or column without hunting in the text for explanations. Units of measurement, base-dates for index numbers, geographical area covered and sources should be clearly stated.
8. Footnotes should be numbered consecutively throughout. It is preferred if reference to books, articles etc. is made in the text within brackets (author's name, year of publication) rather than in footnotes.
9. Authors are expected to correct proofs expeditiously and to keep alterations down to a very low level. The original typescript must be regarded as definitive.

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