



INSTABILITY IN AGRICULTURAL EXPORTS: DETERMINANTS OF INSTABILITY OF SRI LANKAN TEA EXPORTS

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ABSTRACT

Developing countries exports fluctuate more because it comprises mainly of agricultural products which have an unstable supply. Unstable exports tend to destabilize the income of these countries as long as export earnings constitute a significant proportion of GNP, which has serious economic and social implications. This study analyzed the export instability of tea from Sri Lanka to look into the causes for instability in the quantity, price and export earnings from tea exports. The study used secondary data of the Sri Lankan tea exports for the period 1961 to 2012. It is concluded that export instability is mainly due to geographical concentration of exports, exchange rate, and the quantity of tea produced. Instability of tea export prices was significantly affected by the geographical index, while changes in the average export value of tea were influenced largely by the changes in the mean export prices and mean quantity of tea exports. Instability in quantity of tea exports, earnings and prices implies the need to take stabilization measures such as trade or commodity agreements. Tea export earnings and export quantity fluctuations can be mitigated by increasing the volume of exports to more export destinations or new markets.

Key words: tea, exports, instability, geographical concentration, exchange rate.

INTRODUCTION

The importance of trade in agricultural products for Developing Countries in their period of economic growth and development has been well analyzed. Many Developing Countries have a comparative advantage in the production of agricultural products. The earnings from agricultural exports pay for the import of industrial goods, technology and other manufactured products necessary for sustained economic growth. Earlier studies indicate that the exports of Developing Countries fluctuate more than that of Developed Countries because the exports of Developing Countries mainly comprises of agricultural products have an erratic supply or seasonality in production (Wasim, 2003). Unstable exports tend to destabilize the income of these countries as long as export earnings constitute a significant proportion of GNP, which has serious economic and social implications.

Tea Export Industry of Sri Lanka

Sri Lanka has relied heavily on plantation agricultural exports, especially tea exports, as a primary source of economic surplus to generate resources required for development programs

(Bhalla, 1991, Ganewatta *et al*, 2005). Thus, the growth of tea exports has been a major concern of the Sri Lankan government. In 2015, the tea industry contributed 2.5% of Sri Lanka's GDP and 12.8% of its merchandise export earnings, providing direct and indirect employment for about 800,000 members of the labor force (Central Bank of Sri Lanka, 2015). In 2015, Sri Lanka produced 329 million kg of tea, about 10% of world tea production, and accounted for 23% of global tea exports (SLEDB, 2015). More than 93% of the tea produced in Sri Lanka goes to the export market (Athukorala and Huynh, 1987; Bogahawatte, 1989; Fonseka, 1997). Tea exports have traditionally been in the form of bulk black tea to be processed into "value-added" forms of tea in foreign countries. However, in recent years an increasing proportion of tea exports has been in the form of value-added teas (40% of Sri Lanka's total tea exports in 2012), especially flavoured tea bags (Ganewatte *et al*, 2005; Central Bank of Sri Lanka, 2015), which generate higher net returns for Sri Lankan tea exporters.

In contrast to the traditional studies on the tea export industry, there have been no systematic analysis done on the degree of instability and determinants/causes of instability of tea exports of Sri Lanka, vis-à-vis, export quantity, earnings and prices. The case of Sri Lankan tea exports is considered in this paper, since Sri Lanka continues to be the world's second major exporter of tea. This paper presents the findings of the analysis of the instability of components of tea exports earnings of Sri Lanka which could assist policy makers seeking to promote primary product industrial exports as part of their development strategy. Specifically, the study examines the factors determining or causing instability in tea exports earnings, prices, unit value and export quantity. Since more than 90 percent of tea produced in Sri Lanka goes to the export market, any fluctuations in export quantity, tea prices and market concentration have serious implications on export earnings for Sri Lanka. Thus the need to analyze the causes for instability in tea exports is vital for policy decisions, which is lacking on Sri Lankan tea exports studies currently.

Exports Instability- Review

The results of studies supporting the hypothesis of unstable agricultural exports are primarily based on the analysis of export instability in product aggregates. Earlier studies, of individual commodities by Hazell (1982), Charette (1985), Habeck *et al* (1988), Mullor-Sebastian (1988) and Suresh Pal (1992) do not support the above findings. Since export instability is influenced by the nature of the product, it would be more appropriate to study export instability of specific commodities traded internationally by Developing Countries in the context of temporal behavior.

A variety of instability indices are available in the literature. The variance of export growth is the simplest measure of export instability. But owing to fluctuations in export volumes and values, deviations from trend in exports could be more ideal measure of export instability. Various corrections for trend are available in the literature, viz., moving averages, linear and exponential trends (Pinsuwana, 1991, Bhat and Nirmala, 2001, Devkota, 2004).

Many researchers had investigated the determinants of export instability [Lawson & Thanassoulas, 1981; Sheehey, 1977 and Knudson and Parnes, 1975] by studying inter-country variations in aggregate export earnings by capturing the structural characteristics of the export markets. Tegegne (1991) identified that the key determinants of export earnings fluctuations include not only commodity concentration, but also the relative importance of a country's major

commodity, world-demand conditions affecting that commodity, internal supply, and effectiveness of commodity agreements. Rohini (2001) in a study of the tea exports of South India found that the variation of export quantity of tea formed the major source of instability in export value of tea.

Wilson (1994) investigated the magnitude of export revenue instability of Singapore and the pattern of instability over time. He found that political and economic instability, as well as shocks from the international economy had significantly affected stability of export revenue. Sinha (1999) studied the growth of Sri Lankan economy and exports instability found that a negative relationship between export instability and economic growth existed. While Rashid *et al* (2012) in their study Sri Lankan exports identified an important policy implication that she should diversify her exports horizontally and liberalize her foreign exchange markets to control the instability in exports.

Earlier statistical evidences had concluded that instability index of exports are largely associated with the degree of commodity concentration of exports, per capita income and with the concentration of exports by geographical area of destination (Paudyal, 1988, Sinha, 1999, Tegegne, 2000). However, studies of Paudyal (1988) and Tegegne (2000) showed that these determinants do significantly affect export instability. Price instability within a country may also result from its foreign trade since domestic prices are bounded by the prices obtained on the international market (Galtier & Vindel, 2013). Effects of export instability on economic growth were extensively analyzed by Brempong (1991), Fosu (1992), Love (1992), Tariq and Qazi (1995), Ghirmaya *et.al.*, (1999), Sinha (1999) and Kaushik *et.al.*, (2008). The results invariably show a negative relationship between export instability and economic growth. Tariq and Qazi (1995) analyzed the causes of export instability in Pakistan and they attributed it to the concentration of exports on a few commodities, fluctuations in export quantities and limited number of export markets.

DESIGN OF STUDY

The study was done using secondary data of the Sri Lankan tea exports for the period 1961 to 2012. Tea Statistics was collected from the Annual Reports of the Central Bank of Sri Lanka- various issues, International Tea Commission-Statistics, International Trade Statistics, UNCTAD and the Sri Lanka Tea Board -Tea Statistics. Tea export earnings value was converted to local currency to take effect of the exchange rate fluctuations over time. Coppock's Instability Index was used to measure the level of instability, as it was more appropriate for the single commodity analysis (Coppock, 1962). Instability Indexes were constructed for quantity (IQ), export earnings (IE), tea export price (IP) and unit value (IU). Unit value was considered since this variable is a more accurate measure of per unit revenue at the domestic and export market level.

The Coppock's Instability Index is estimated as follows:

$$II = [(\text{Antilog } \sqrt{V \log} - 100) \times 100] \text{-----}(1)$$

Here:
$$V \log = \frac{1}{(T-1)} \sum (\log X_{T+1} - \log X_T - M)^2$$

$$M = \frac{1}{(T-1)} \sum (\log X_{T+1} - \log X_T)$$

Where: X_{t+1} = Next year tea exports
 X_t = Current year tea exports
 T = Number of years

The degree of commodity concentration can be measured using the Gini-Hirschman Index (GHI), which defines the degree of concentration in a country's exports.

$$GHI = \sqrt{\sum_{k=1}^n \left[\frac{X_{kt}}{X^t} \right]^2} \quad \text{----- (2)}$$

Where: X_{jt} = Value of exports of the j^{th} commodity in year t , and
 X_t = Total export earnings in year t .

In an earlier study, Charette (1985) used two models having the Instability Index as the dependent variable along with proportion of production exported, country's world share of exports, Geographical Concentration Index, and dummy variables to represent agricultural and raw material markets. In this study to measure the determinants of instability of exports, a modified Charette's (1985) model was used as follows:

$$II = b_0 + b_1 \text{LnPX} + b_2 \text{LnPWX} + b_3 \text{LnGHI} + b_4 \text{LIBDUM} + b_5 \text{LnExChRate} + b_6 \text{LnTeaProd} + e_i \quad \text{----- (3)}$$

Where:

PX = Price of tea exported- FOB (US dollars/kg)

PWX = World market price of tea (US dollars/kg)

GHI = Gini-Hirschman Index for degree of concentration in exports.

LIBDUM = Dummy for trade liberalization (1978 onwards = 1, otherwise = 0); ExChRate = Exchange rate per US dollar to the Sri Lankan Rupee,

TeaProd = Total annual tea production in Sri Lanka (kgs).

Trade liberalization could affect the level of stability of exports (Charette, 1985). Dummy variables were included to account for the impact of economic liberalization on the stability of tea export earnings, prices, export quantity and tea unit values.

RESULTS AND DISCUSSION

In order to measure the magnitude of the instability of tea exports, the respective instability indexes for tea quantity, tea export price, tea export earnings and unit prices were estimated. The mean value of the instability indexes for tea export earnings (II= 7.98) and unit value (II = 6.48) were higher than the others. This is as expected since within an export unit value index or export earnings index, individual market fluctuations will offset to some extent. But the variance of export quantity was highest due to domestic supply variations and world export competition. These findings are consistent with those of Hazell (1982), Habeck et al (1988), and Rohini (2001) study on individual commodities, while differing with that of Llyod and Proctor (1983). Tables 1 to 4 presents the OLS estimates of the parameters of the Log-Linear

models specified above for the Instability Indexes of Unit value, Export Quantity, Export Price, and Export Earnings as the dependent variable.

Table 1: Determinants of Instability of Unit Value of Tea Exports

Variables	Coefficient	Std. Error	t- Stat	P-value
Intercept	18.2660	24.5566	0.7438	0.4617
LnPWX	-4.5485	2.8418	-1.6006	0.1179
LnGHI	-6.3345	2.4755	-2.5589	0.0147
LIBDUM	0.3968	1.0516	0.3773	0.7080
LnExChgR	1.7820	1.0366	1.7192	0.0939
LnTeaProd	-4.6302	3.4342	-1.3483	0.1858
LnPX	3.0606	4.6040	0.6648	0.5103

Dependent variable: Instability Index of Unit Value of tea export (IIU)

Adj.R Sqd = 0.801, Std.Error = 0.936, N = 46, F = 71.683, (P<0.01)

The above model explained about 80% of the variations observed in the instability of unit value of tea exports. Only the GHI of exports was found to be significant (P<0.01). This implies that the instability in the unit value of export earnings was due mainly to diversified destinations of tea exports, and fluctuations in the exchange rate. Hence, unit value of tea exports would be more stable if the exports were concentrated to a few countries. These results do not differ from that of Rashid et al (2012) to diversify exports and liberalizing the exchange rate to reduce instability.

Table 2: Determinants of Instability of Tea Export Earnings

Variable	Coefficient	Std Error	t- Stat	P-value
Intercept	0.01538	26.0564	0.00059	0.9995
LnPWX	-2.10012	3.01533	-0.69648	0.4905
LnGHI	-7.63964	2.62669	-2.90846	0.0061
LIBDUM	-0.96427	1.11587	-0.86414	0.3931
LnExChgR	3.16497	1.09988	2.87756	0.0066
LnTeaProd	-2.20956	3.64395	-0.60637	0.5479
LnPX	1.77261	4.88521	0.36285	0.7188

Dependent variable: Instability Index of tea export earnings (IIEARN)

R Sqd = 0.93, Std.Error = 0.992, N = 46, F = 82.195 (P<0.01)

The instability in the export earnings of tea was well explained by the model (93%). The variables GHI and ExChgRate had significant (P<0.01) impact on the instability of tea export earnings. But the LIBDUM variable did not have a significant impact on export earnings. These findings are consistent with the observations of Tegegne (1999) and Habeck *et al* (1988) in their studies on export earnings instability. Also this findings confirm the study of Wilson

(1994) that shocks in the international economy such as exchange rate fluctuations would affect stability of export earnings.

Table 3: Determinants of Instability of Tea Export Quantity

Variables	Coefficient	Std. Error	t- Stat.	P-value
Intercept	-9.5006	21.9738	-0.4324	0.6679
LnPWX	3.6524	2.5429	1.4363	0.1593
LnGHI	-5.5948	2.2151	-2.5257	0.0159
LIBDUM	-2.5003	0.9410	-2.6570	0.0116
LnExChgR	2.8499	0.9276	3.0726	0.0039
LnTeaProd	-3.0872	3.0729	-1.0046	0.3216
LnPX	1.2586	4.1198	0.3055	0.7616

Dependent variable: Instability Index of quantity of tea exports (IIQTY)

Adj.R Sqd = 0.842, Std.Error = 0.8364, N = 46, F = 14.981, (P<0.01)

The instability of tea export quantity was quite well explained by the above model (84%), with only the variables GHI, LIBDUM and ExChgR being significant (P<0.01). GHI variable would indirectly reflect the demand variations at different destinations of tea exports. Since many variables have a significant impact on quantity variations, thus export earnings too would be affected, which was observed by Murray (1978). This is similar to the findings of Tariq & Qazi (1995) that export instability was affected by the fluctuations in the export quantity of a commodity.

Table 4: Determinants of Instability of Tea Export Prices (fob)

Variables	Coefficient	Std. Error	t- Stat.	P-value
Intercept	2.19277	21.96365	0.099836	0.9210
LnPWX	-3.12974	2.541698	-1.23136	0.2259
LnGHI	-3.27104	2.214108	-1.47736	0.1020
LIBDUM	1.13803	0.940593	1.209902	0.2339
LnExChgR	1.17265	0.927118	1.264837	0.2138
LnTeaProd	-1.76682	3.071575	-0.57521	0.5686
LnPX	3.21284	4.117873	0.780217	0.4402

Dependent variable: Instability Index of tea export price (IIPRIC)

R Sqd = 0.9055, Std.Error = 0.8359, N = 44, F = 59.0895 (P<0.01)

Although the above model explains about 91% of the variations in the export prices of tea, the variables of GHI and ExChgRate were not significant, which are supposed to have strong influence on export prices, implies that price variability was mainly affected by the diversified export markets of tea, greater the diversified markets less the instability, which was observed by Galtier & Vindel (2013) in a study on price instability and foreign trade.

CONCLUSIONS

Tea export earnings instability was significantly affected by the geographical concentration of exports and exchange rate. The instability in export earnings were reduced by greater diversification of tea exports to more markets. The instability of tea exports was influenced by total tea exported, share in world tea exports, total tea produced and exchange rate, which implies the need to revisit tea export policy. Instability in tea export quantity, export earnings, prices and unit value implies the need to take stabilization measures such as trade or commodity agreements. Export earnings and export quantity fluctuations can be mitigated by increasing the volume of exports to more export destinations. Export prices are influenced by international markets and thus Sri Lanka has to produce tea at competitive prices to reduce export earnings instability.

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