

EXPORT EARNINGS INSTABILITY AND POLICY MEASURES FOR STABILISATION IN TANZANIA: EMPIRICAL AND QUALITATIVE ANALYSES*

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Abstract

Concern over export earnings instability in developing countries is based on the fact that, such instability implies uncertain supply of the much needed foreign exchange to the developing countries and thus limiting the growth prospects and ability of the countries to make effective investment plans. This study employs an econometric model and qualitative analyses to examine determinants of export earnings instability and suggest possible policy measures for stabilising the earnings. The analyses suggest that export earnings instability in Tanzania is mainly determined by its own one lag, the openness of the economy, Tanzania's importance in world markets, and the country's real per capita gross domestic product. Contrary to the widely held view that commodity concentration is a major factor causing instability in export earnings, empirical analysis for the case of Tanzania revealed that commodity concentration was a statistically insignificant determinant factor. The empirical results also suggest that as Tanzania increases her participation in the global commodity markets, her export earnings become more unstable. The qualitative analysis and empirical literature suggest that International Commodity Agreements are not effective in stabilising export earnings. However, these findings should not prompt one to prescribe inward looking policy measures to Tanzania. The findings imply that in order to stabilise her export earnings, Tanzania should supplement her export drive with increased capacity to produce for exports and to participate in regional and global trade negotiations. Policy recommendations from the analyses underscore the need for the country's policy makers to make concerted efforts to provide farmers with the necessary infrastructure, research and development; and accessibility to information about sources of finance and the availability of new export products and markets.

1. Introduction

Concern about export earnings instability in less developed countries (LDCs) arises from the belief that the instability hinders the supply of foreign exchange that is needed to import capital goods. Export earnings instability thus limits the capacity of the LDCs to make effective investment plans and thus limiting growth prospects. However, empirical and analytical studies on the relationship between export earnings instability and economic growth have produced mixed results (Aiello 1999, Asheghian and Saidi 1999). While some studies like that by Gyimah-Brempong (1991) show a negative and statistically significant

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relationship between export earnings instability and economic growth, other studies such as those by Moran (1983) and Fosu (1992) tend to suggest that the relationship between the two variables is statistically insignificant. Moran (1983) found that export earning instability has negative effect on developing countries' economic growth but only in the short-run and not in the long-run. Using cross-section data from 34 sub-Saharan African countries for the years 1960-86, Gyimah-Brempong (1991) found that export earnings instability has a negative impact on economic growth. Fosu (1992) examined the relationship between export earnings instability and the gross domestic product (GDP) for 35 African countries (30 of which were sub-Saharan) and 38 non-African countries. His findings were that export earnings instability had a negative but statistically insignificant effect on economic growth for African countries. For the non-African countries, Fosu (1992) found that export earnings instability had a negative and statistically significant effect on GDP growth.

Since export earnings instability has the potential of impeding economic growth, it is important to analyse causes of the instability and policy implications from the analyses. From economic literature and political arena, commodity concentration is frequently mentioned as one of the main causes of export earnings instability. However, empirical evidence on the relationship between commodity concentration and export earnings instability appears to be inconclusive (Tegegne 1990). While some studies show a positive and statistically significant relationship between commodity concentration and export earnings instability (Love 1986), other studies show lack of a clear relationship between export earnings, instability and commodity concentration (MacBean and Nguyen 1980, 1981; and Turner and Lambert 1981).

Despite inconclusive evidence on the relationship between commodity concentration and export earnings instability, policy makers in most developing countries and in international forums still emphasise on diversification of exports as a major policy option for stabilisation of the export earnings (Tegegne 1990, and Adams and Berhman 1982). Other stabilisation policy measures have included the establishment of stabilisation funds (such as STABEX) and participation in International Commodity Agreements (ICAs). However, there is no concrete evidence that such policy measures are successful in reducing export earnings instability (Mtatifikolo 1983). In addition, attempts to institute stabilisation policies have involved the use of highly skilled managers but the policies were met with little success. This implies that the stabilisation policies are associated with huge opportunity costs in terms of the human resources or managers who could be better employed in other policy initiatives in which the pay-off is greater (Asheghian and Saidi 1999).

As is the case for many other developing countries, export earnings in Tanzania have been fluctuating quite substantially during 1967 through 2002.

Export Earnings Instability and Policy Measures for Stabilisation

As can be seen from table 1 and figure 1, annual export earnings in Tanzania were above their trend values during the late 1960s through the late 1970s and 1991-2002. The 1977-1990 period was characterized by negative export earning instability implying that export earnings in any given year were less than their trend values.

Table 1: *Export Earnings instability and Selected Explanatory Variables*

Year	Export Instability ¹ U _t (%)	Commodity Concentration ² H _t	Openness ³ W _t (%)	Importance ⁴ Z _t (%)	Per capita GDP Y _t (in 1992 TZS)	Overall GDP Q _t (in 1992 bil. TZS)	Agric. exports ⁵ G _t (%)
1967	17.81	14.08	54.09	0.09	40012.50	606.61	63.33
1968	13.61	14.42	54.64	0.08	39660.92	614.84	67.83
1969	9.67	13.91	52.00	0.08	39312.43	646.09	66.96
1970	7.14	14.63	53.01	0.08	38967.00	726.67	70.42
1971	4.62	13.49	41.55	0.08	38625.83	792.20	58.89
1972	2.95	14.31	39.68	0.08	38536.50	885.14	66.71
1973	3.42	17.88	37.34	0.07	39313.67	951.79	77.18
1974	2.39	15.32	43.42	0.05	39342.11	941.09	75.51
1975	-1.68	14.43	38.90	0.04	40250.18	1066.38	72.28
1976	2.15	21.89	31.07	0.05	39931.14	1046.01	79.71
1977	1.72	27.25	30.95	0.05	39244.09	995.98	82.69
1978	-2.88	21.70	33.11	0.04	38736.81	1036.57	77.19
1979	-3.87	19.88	31.21	0.03	38983.85	1096.88	67.04
1980	-7.11	20.49	29.47	0.03	37756.50	681.00	63.02
1981	-7.96	20.64	23.43	0.03	36385.44	735.51	78.40
1982	-11.40	20.76	22.08	0.02	37806.10	685.20	75.36
1983	-12.34	23.64	17.13	0.02	33092.18	696.49	78.15
1984	-12.71	26.60	15.54	0.02	32639.58	747.07	78.76
1985	-15.43	23.99	12.13	0.01	47498.60	749.44	76.34
1986	-7.36	33.23	20.37	0.02	47511.80	1297.72	82.25
1987	-4.45	22.82	30.95	0.01	47535.40	1153.27	72.68
1988	-4.28	22.55	27.10	0.01	49043.30	1198.94	74.90
1989	-1.12	23.03	41.12	0.01	48867.40	1249.51	73.01
1990	-1.10	22.27	40.12	0.01	48235.80	1332.94	84.39
1991	-0.18	17.34	40.65	0.01	47300.80	1362.78	64.45
1992	1.94	17.11	47.10	0.01	50431.00	1369.87	66.25
1993	4.25	16.74	54.15	0.01	49270.00	1387.87	63.27
1994	5.29	17.68	46.09	0.01	48650.00	1409.05	74.89
1995	6.12	18.15	42.95	0.01	48918.00	1458.90	69.94
1996	5.86	16.74	34.34	0.01	49530.00	1525.36	69.07
1997	4.14	15.97	27.60	0.01	49767.00	1578.82	71.53

1998	0.16	18.02	24.96	0.01	50194.00	1505.93	84.85
1999	-0.94	17.50	25.98	0.01	51045.00	1577.29	72.08
2000	-0.08	20.39	24.31	0.01	51860.00	1654.32	56.07
2001	0.30	31.97	24.87	0.01	53172.00	1749.36	37.03
2002	0.15	38.25	23.75	0.01	55273.00	1857.16	30.30

- Notes: 1. Percentage deviation of total export earnings from the trend value of the export earnings.
 2. Hirschman coefficient as defined in the text.
 3. The sum absolute values of total exports and imports expressed as percentage of the GDP.
 4. Tanzania's total exports expressed as percentage of world total exports.
 5. Share of agricultural exports in total merchandise exports in Tanzania.

Source: Computed using data from BOT(Various), IMF(Various) and URT(Various).

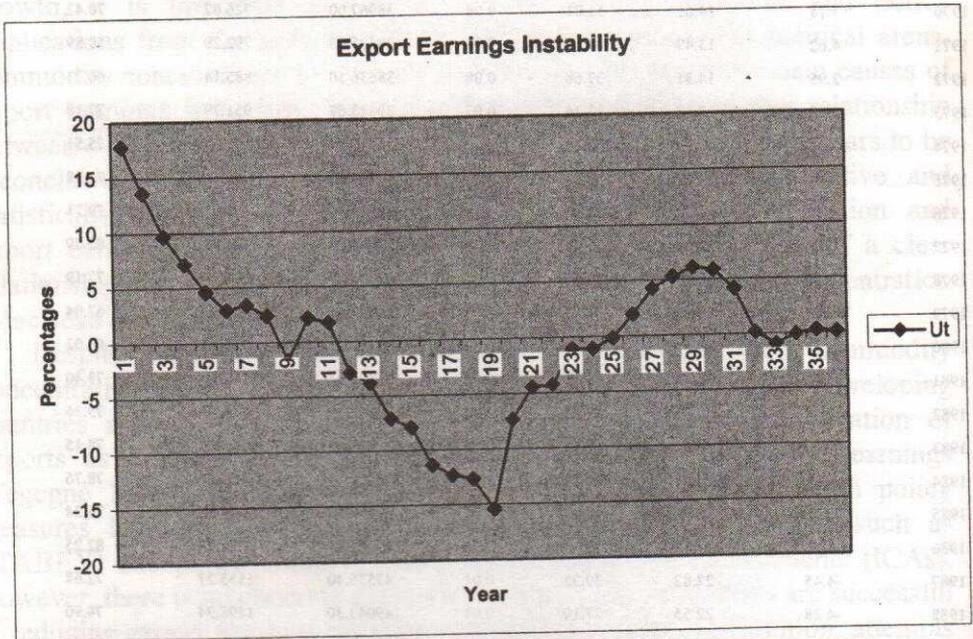


Figure 1: Export Earnings Instability in Tanzania During 1967- 2002

Instability in export earning is not good for any country since it may disrupt the nation's investment plans and may plunge it into unprecedented public and external debt. The private sector and entrepreneurs may be discouraged from investing in the domestic economy that experiences export earning instability and thus frustrating the country's efforts to promote or diversify exports. An understanding of the factors determining export earning instability is thus

important if one may have to have an input in designing or changing domestic economic and export policies.

Determinants of Export Earnings Instability

A number of authors have investigated the determinants of export instability. (See, for example, Asheghian and Saidi 1999, Love 1986, and MacBean and Nguyen 1980). The explanatory variables identified in the literature on export instability studies are concentration index, share of agricultural commodities in total export earnings, a measure of openness of the economy, the country's per capita gross domestic product and a measure of the country's importance in world markets (Love 1986). One measure of the country's importance in world markets which is also adopted in this study is the share of the country's total exports in world export. The explanatory variables have a direct relationship with export earnings instability.

Commodity concentration has been conventionally regarded as a major factor explaining export earnings instability in developing countries. The argument has been that fluctuations in export earnings from one commodity reduce the chance that such fluctuations will be offset by counter-fluctuations or stability in earnings from export of another commodity. However, empirical studies – most of which are cross-sectional – have failed to detect a significant positive relationship between commodity concentration and export earning instability. A time series analysis of export earnings for an individual country and the use of different measures of concentration may be one way to getting better empirical results.

The concept of concentration has two dimensions, namely, the relatively small number of commodities exported and the unequal distribution of commodity shares in total export earnings. A standard measure of trade concentration that captures these two dimensions is the Hirschman coefficient due to Hirschman (1964). The Herfindal H, coefficient, H, is defined as

$$H = 100 \left(\sum_{i=1}^m w_i^2 \right)$$

where m is number of commodities exported and w_i is the share of commodity i in total earnings.

Another index that also embodies the dimensions of inadequacy and inequality of shares is the entropy measure. The entropy measure, E , is defined

$$E = -\sum x_i \log_2 x_i$$

where lower (higher) values for E represent greater (less) concentration (Waterson 1984).

In this study, we used both of these indices to see the effect of a change of the indices on export earnings instability. There are, however, many other groups of concentration indices including the Rosenbluth or Hall-Tideman index and the Linda class of indices as discussed in Waterson (1984).

Agricultural commodities, especially from developing countries, are faced with uncertain prices due to changing demand and supply conditions. Thus, the higher the share of agricultural commodities in the country's total exports, the greater will be the export earnings instability. Also, since agriculture is the dominant sector in terms of exports and gross domestic product in most developing economies, increased openness of the economy, per capita incomes and importance of the economy in world markets will increase the country's export earnings instability.

Earlier studies on export earning instability used both time series and cross-section models to analyse the relationship between export earning instability and commodity concentration (Love, 1986). As discussed in Asheghian and Saidi (1999), regression models which have been used in many cross-country analyses have been of the following form:

$$S_i = \alpha_0 + \alpha_1 H_i + \alpha_2 G_i + \alpha_3 R_{ri} + \alpha_4 R_{ai} + \alpha_5 Y_i + \alpha_6 Z_i + \alpha_7 Q_i + \varepsilon_i \quad (1)$$

where S is a measure of export earnings instability, H is an index of commodity concentration, G is an index of geographical concentration, R_r is the ratio of raw materials (or agricultural inputs) to total exports, R_a is ratio of agricultural to total exports, Y is per capita income, Z is ratio of merchandise exports to GDP, Q is export market share coefficient, ε is the disturbance (error) term and i is country i .

The question as to whether commodity concentration will tend to increase or lower export earning instability is still a matter of debate (Tegegne 1990, Asheghian and Saidi 1999). Most economists agree that what is needed at this point in time is more empirical work before any valid theoretical conclusion can be made on the relationship between export earning instability and commodity concentration.

3. Empirical Analysis of Exports Earnings Instability

3.1 Model Specification

The empirical analysis employs econometric techniques based on a model by Asheghian and Saidi (1999) presented below.

$$U_{it} = b_0 + b_1 U_{it-1} + b_2 H_{it} + b_3 W_{it} + b_4 Z_{it} + b_5 Y_{it} + b_6 G_{it} + e_{it}$$

Accordingly, we model exports earnings instability (U) as a positive function of commodity concentration (H), the country's openness to the world economy (W), the country's importance in world commodity markets (Z), Tanzania's real per capita GDP (Y) and the share of Tanzania's agricultural exports in the country's total exports (G). The variable H is Hirschman index of concentration and ϵ is an error term.

3.2 Unit Root Test for the Regression Model Variables

In order to avoid spurious regression, we must test the variables for stationarity. A stationary time series has a finite variance, transitory innovations from the mean and a tendency to return to its mean value. In contrast, a non-stationary series has a variance that is asymptotic infinite, with permanent innovations to the series; moreover, the series rarely crossed the mean (in finite samples).

In table 2 we present the stationarity tests for the variables used in the regression analysis.

Table 2: Unit Root Tests for the Empirical Model Variables

		Sample: 1967-2002
		Critical value at
		5% level is -3.00.
		(See Barnejee <i>et al.</i> 1993)
		t-ADF*
U_t	=	Export earnings instability in the current year
		-2.322
U_{t-1}	=	Export earnings instability in previous year
		-2.250
H_t	=	Commodity concentration in the current year
		-1.174
H_{t-1}	=	Commodity concentration in the previous year
		-1.249
G_t	=	Share of agricultural exports in total export in Tanzania in the current year
		-1.024
G_{t-1}	=	Share of agricultural exports in total export in Tanzania in the previous year
		-1.170

Z_t	=	Tanzania's importance in world markets in the current year	-1.983
Z_{t-1}	=	Tanzania's importance in world markets in the previous year	-1.951
W_t	=	Openness of the Tanzanian economy in the current year	-1.953
W_{t-1}	=	Openness of the Tanzanian economy in the previous year	-2.056
Q_t	=	Tanzania's overall GDP in 1992 prices in the current year	-0.604
Q_{t-1}	=	Tanzania's overall GDP in 1992 prices in the previous year	-0.2858
Y_t	=	Tanzania per capita GDP in 1992 prices in year t	-0.805
Y_{t-1}	=	Tanzania per capita GDP in 1992 prices in the previous year	-0.7137

Notes: * Computed using Doornik, J.A. (2001) *PcGive Version 10.0*.

In unit root test, we are testing for the size of the coefficient ρ in the equation $y_t = \alpha + \rho y_{t-1} + \mu_t$

The null hypothesis is $H_0: \rho=1$, that is the series is non-stationary but becomes stationary after differentiating it once. We reject the null in favour of $\rho < 1$ (that is, the series is stationary) if the absolute value of the computed t-adf is less than the theoretical t-adf statistics.

The unit root test for the regression variables indicates that the absolute values of the computed augmented Dickey Fuller test statistics (t-adf) are less than their critical values at 5% critical level. We thus reject the null hypothesis of non-stationarity in favour of $\rho < 1$, that is the series are stationary.

3.3 Discussion of Regression Results

The empirical model which has already been specified was estimated using Ordinary Least Squares (OLS) estimation technique. In the process of

estimating the model, the variables commodity concentration (Hirschman H_t and entropy indices), share of agricultural commodities in total exports (G_t), contemporaneous measure of the country's importance in world markets (Z_t) and contemporaneous GDP per capita (Y_t) were found to be statistically insignificant and were therefore dropped from the model. The dropping of the variables did not affect the R^2 .

The regression results and diagnostic tests for the parsimonious exports earnings instability model are presented in Table 3. The maximum likelihood (LM) autocorrelation test indicates absence of autocorrelation since the AR(1-2) $F(2,28)$ statistic is less than its critical value (of 3.34) at the 5% significance level. The ARCH (1-1) test suggests the absence of auto regressive conditional heteroscedasticity as indicated by the low $F(1,28)$ statistics, which is lower than its critical value of 4.20 at the conventional significance level. The model also passes the normality χ^2 test since the computed $\chi^2(2)$ statistic is less than its critical value of 47.773 at 5% significance level. The $F(1,29)$ statistic for the regression specification test (RESET) – which is less than its 4.18 critical value of 5% significance level – suggests that our model is correctly specified in the sense that the values of the coefficients for omitted variables are zeros.

The regression results indicate that export earnings instability is positively related with its own one lag (U_{t-1}), the country's contemporaneous openness to the world commodity market (W_t), the one lag of the country's importance in world markets (Z_{t-1}) and per capita real incomes (Y_{t-1}).

The very small coefficient for per capita real incomes (Y_{t-1}) indicates that although the variable is statistically significant at conventional level, it is less important in influencing earnings instability compared to the other variables. Policy thrust should therefore be directed to other variables in order to stabilise export earnings.

Table 3: Modelling Exports Earnings Instability (U) in Tanzania

Estimation Sample: 1968-2002

Variable	Coefficient	Std. Error	t-value
Constant	-24.6906	4.628	-5.34
U_{t-1}	0.5272	0.077	6.84
W_t	0.1221	0.039	3.15
Y_{t-1}	0.0004	9.235e-005	4.53
Z_{t-1}	55.2124	23.43	2.36

$R^2 = 0.9442$; $F(4,30) = 126.8$; $RSS = 79.8846$.

Diagnostic Tests:

AR (1-2) test: $F(2, 28) = 0.4859$

ARCH (1-1) test:	F (1, 20) =	0.1178
Normality test:	Chi ² (2) =	5.5904
RESET test:	F (1, 29) =	0.5234

The large coefficient for the variable Z_{t-1} (the country's importance in world markets) implies that policy makers in Tanzania should pay more attention to this variable in the sense of not reducing its importance in world markets but in the sense of changing the structure of its exports. As noted earlier, Tanzania's exports are dominated by agricultural exports which have constituted, on average, 70% of her total export during 1967-2002. It is this dominance of agricultural exports that generate that strong positive influence on the country's export earnings instability.

Views on International Commodity Agreements and Price Stabilisation

In order to complement the analysis of export earnings instability, we made a field survey in four regions. The survey was conducted in Arusha, Dar es Salaam, Kilimanjaro, Mwanza and Tanga regions. Dar es Salaam region is the main port and commercial city of Tanzania and is the host of various agencies and institutions dealing with export trade. The choice of the other three regions was based on the fact of them being the main producers of cotton (Mwanza), coffee (Kilimanjaro) and sisal (Tanga).

A total of 496 respondents were interviewed. The list included smallholder and large-scale farmers, leaders of cooperative unions, managers of private corporations, leaders of local government authorities, and private business people dealing in agricultural commodity export trade. The interviews focussed on awareness of price stabilisation through International Commodity Agreements (ICAs), whether the ICAs could stabilise commodity prices and on the impact of the price or export earnings instability.

4.1 Choice of Commodities

The interviews were based on four traditional export crops, namely coffee, cotton, sisal and tea. The choice of these commodities was determined by the fact that over the years the prices of these commodities have been fluctuating widely in the international commodity markets.

Table 4: World Market Prices for Selected Commodities

Commodity	Unit Price	1995	1996	1997	1998	1999	2000	2001
Coffee	US \$/kg	3.29	2.65	4.10	2.90	2.3	1.9	1.7
Cotton	US \$/kg	2.16	1.77	1.74	1.44	1.2	1.1	1.0
Tea	US \$/kg	1.64	1.77	2.40	2.40	1.8	1.9	2.0
Sisal	US \$/ton	710.42	868.25	777.0	820.5	691.5	631.8	607.7

Source: BOT (2001), pg. 91.

Table 4 presents the trend of the selected commodity prices between 1995 and 2001. The table shows that while world prices of coffee, tea and sisal fluctuated up and down, the price of cotton was always declining.

4.2 Awareness of Stabilization of Prices Through International Commodity Agreements

In analysing the effectiveness of International Commodity Agreements (ICAs) in commodity price stabilisation, it is plausible to sub-divide the responses from the interviews into two groups, that is responses from institutions (like marketing boards, and private companies) and from individuals (peasants and large scale farmers).

Over 90 percent of the institutions interviewed in the four regions indicated that they were aware of the mechanisms of stabilizing commodity prices through ICAs. The response further showed that although most institutions were aware of the ICA arrangement, they believed that the ICAs were effective given the pace of competition and globalisation. Over 95 of the peasants interviewed were not aware of the ICAs. The peasants were however aware that there was a period (during the 1960s and early 1970s) when they used to sell their cash crops (tea, cotton and coffee) to their respective cooperative unions and get payments in two instalments. Apparently, peasants do not realize that this is exactly how the ICA arrangement worked; that is in order to control the fluctuations in prices, a fund was created out of which commodity prices would be determined.

Most of the officials of the cooperative unions and of the Ministry of Agriculture and Food Security appeared to be aware of the International Commodity Agreements and how the agreements could be used to stabilise commodity prices. The officials, however, were of the opinion that the ICAs were not and could not be made effective to stabilise prices. This was in line with Mtatifikolo (1983), who found no evidence that the ICAs had positive effects on reducing export earnings instability.

4.3 Actions Necessary to Stabilize Commodity Prices

Over 80 per cent of the farmers interviewed wanted their respective cooperatives and the government of Tanzania to initiate more actions aimed at stabilizing commodity prices. This was because the farmers' group believed that cooperatives and the government were in a better position to influence the process of commodity price stabilization in international markets. The farmers, however, believed that diversifying their sources of incomes away from the traditional export crops was a better alternative in an effort to stabilise their earnings. In Kilimanjaro region, for example, farmers have already started

diversifying into such activities as floriculture, the products of which can be sold in foreign markets like South Africa and the Netherlands.

The cooperative unions and the Ministry officials did not believe that their institutions could do much to stabilise commodity prices or export earnings. The officials were of the opinion that processing the export commodities to semi- or finished-products was a better means of increasing and stabilising the farmers' export earnings.

4.4 The Impact of Unstable Commodity Prices

All the groups of interviewees appeared to be well versed with the effects of unstable commodity prices. Concern by farmers on export earnings instability was on the fact that the instability would impair their ability to plan for increased production for exports, and reduce their capacities to invest in their children's education and acquisition of assets such as housing.

Ministry officials' concern over export earning instability was on the fact that the instability would impair the country's ability to plan for investment and meet her external debt obligations.

5. Conclusion

5.1 Summary of the Main Findings

Contrary to the widely held view that commodity concentration is one of the major factors causing instability in export earnings, the empirical analysis of the study revealed that commodity concentration was an insignificant determinant factor for the case of Tanzania. Export earnings instability in Tanzania was found to be mainly determined by its own one lag, the contemporaneous openness of the Tanzanian economy, Tanzania's importance in world markets in the previous year, and country's real per capita gross domestic product in the previous year.

Interviews with institutions in the four regions of Tanzania revealed that the institutions were aware of the International Commodity Agreements (ICAs) and how the agreements could be used to stabilise commodity prices. The institutions, however, did not believe that the ICAs were effective in stabilising commodity prices given the pace of competition in the global market. Interviews with the peasants, on the other hand, revealed that they were not aware of the ICAs. The results from interviews tend to suggest that both farmers and the officials dealing with production and exports of the selected traditional exports (tea, cotton, coffee and sisal) were aware of the negative impact of export earnings instability. They perceive the negative effect of export earnings instability mainly in terms of loss of income.

Farmers believed the government could intervene and stabilize commodity prices. Officials in the Ministry of Agriculture and those in the Cooperatives

and Marketing Boards believed that the Government was less capable of solving the problem of export earnings instability. The officials believed that stability in export earnings could better be achieved through semi-processing the commodity exports and through export diversification.

5.2 Policy Implications

From the empirical and qualitative analyses, we can draw a number of policy implications. The empirical results suggest that as Tanzania increases her participation in the global commodity markets through increased openness and share of exports in world total exports, her export earnings become more unstable. However, these findings should not prompt one to prescribe inward looking policy measures to Tanzania. The findings imply that in order to stabilise her export earnings, Tanzania should supplement her export drive with increased capacity to produce for exports and to participate in regional and global trade negotiations through such institutions and initiatives as the East African Community, the Southern African Development Community, the Cross Border Initiative, the Indian Ocean Rim Association for Regional Cooperation and the World Trade Organisation (Rutasitara 2002). The qualitative analysis suggests that international commodity agreements are not effective in stabilising export earnings and that diversification of exports is a better alternative in order to stabilise earnings to both small and large scale farmers. Tanzania's policy makers should thus make concerted efforts to provide the farmers with the necessary infrastructure, research and development; and accessibility to information about sources of finance and the availability of new export products and markets.

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