

# **Ethiopian Journal of Economics**

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# CONSUMPTION SMOOTHING AND VULNERABILITY IN FOUR RURAL VILLAGES OF ETHIOPIA<sup>1</sup>

Nigussie Tefera<sup>2</sup>

## *Abstract*

*Using year long intensive monitoring rural household survey, the study has shown that while covariant shocks lead to change in consumption patterns, idiosyncratic shocks appear to be fully insured using various coping strategies. However, households were less likely sell livestock to smooth income shock during survey periods. They seek for wage employments but are compelled to sell livestock in absence of such opportunities. Impact of changes in total household income on consumption with control for idiosyncratic shocks were also investigated and found that households are smoothing their consumption evenly across time. Further test of consumption smoothing indicated that there is a limit to insure against shocks through better-off households within communities. Disaggregating into asset poor and nonpoor, the study has also shown that asset poor households are more diversifying income sources than asset nonpoor. However, most of them have low returns; and hence they are more vulnerable than asset nonpoor households.*

**Keywords:** Consumption smoothing; Vulnerability; Assets poor and non-poor; Rural Ethiopia

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## 1. Introduction

Developing economies are widely characterized by low and volatile incomes and incomplete markets for most goods and services (Townsend, 1995). The former together with poor development of financial or risk-sharing institutions make consumption smoothing an important issue in low-income countries like Ethiopia. According to World Bank's (2000) report, these countries are vulnerable to shocks that lead to reduction in welfare of the poor. The Millennium Development Goals (MDGs) is intended to reduce the incidence of poverty by halve between 1990 and 2015.

The shocks may be idiosyncratic (household specific i.e., affecting individual household) and/or covariate (affecting groups of households, communities, regions, or nations). While idiosyncratic risks include shocks associated with income failure, illness, shortage of agricultural inputs, etc., covariate risks include uncertainties associated with nature, markets (both input and output), social unrest, and policy and institutional failures (Weinberger and Jütting, 2000).

The types of shocks experienced affect the extent to which consumption can be smoothed. If the risks experienced are idiosyncratic, it can be smoothen through mechanisms that allow households to rely on others to share the repercussions of such shocks. However, if the shocks are common across group members, then it is covariate and cannot be insured or smoothed out by those within group, because no household experienced gains that could be shared (see Townsend, 1995; Morduch, 1999 and Skoufias and Quisumbing, 2003). Understanding the natures of these vulnerabilities and informal as well as formal coping mechanisms that may mitigate shocks are a first step in establishing effective social protection programs or safety net systems (Skoufias and Quisumbing, 2003; Harrower and Hoddinott, 2004).

Households in low-income economies use various coping strategies to reduce or mitigate both income and consumption risks (Morduch, 1999) though incomplete markets or poor development of risk-sharing institutions make a distinction of their economies (Townsend, 1995). Households in a community, for instance, may informally agree to insure each other or provide state contingent transfers and remittances to friends and neighbors (Rosenzweig, 1988; Besley, 1995 and Morduch, 1999), use their savings (Paxson, 1992), take loans from the formal financial sectors during difficult times (Udry, 1994), sell assets (Deaton, 1992), send their children to work instead of school to supplement income (Jacoby and Skoufias, 1998), enter into new-income generating activities (Harrower and Hoddinot, 2004) or undertake ex-

ante income smoothing strategies and adopt low-return, low-risky crop and asset portfolios (Rosenzweig and Binswanger, 1993).

While, on aggregate, a community may have developed sufficient mechanisms, and effectively smoothing consumption, there may be segments of the community excluded from participating, and they may, therefore, be vulnerable. Thus, exploring differences in household characteristics and characteristics of particular coping mechanisms employed helps to reveal the nature and extent of consumption smoothing of villages (Harrower and Hoddinot, 2004). Discovering who is the most vulnerable within a community by examining the abilities of groups to smoothen their consumption relative to each other could help governments and donors to ensure that adequate coverage within the community occurs.

This study explores strategies used by rural households in Ethiopia to mitigate consumption shortfalls caused by shocks. This is not the first lesson on this topic. For instance, using panel data of three/four rounds<sup>3</sup> and relying on recall of household total consumption and income for "*last four months*" before survey, Dercon and Krishnan (2000) and Skoufias and Quisumbing (2003) have conducted a similar analysis on Ethiopian rural households. However, to my knowledge, a year long intensive monitoring panel data nature has never been conducted so far. This study tries to bridge research gaps by investigating character of such types of data collected at fortnight day's interval for at least one year during the course of entire survey period. In section 2, the theoretical framework is briefly described. Section 3 describes the source of data and basic descriptive statistics. While section 4 discusses basic findings, section 5 summarizes and concludes.

## 2. Theoretical framework

The model for consumption smoothing is developed based on the theory of full insurance initiated by Arrow (1964) and others (see Townsend, 1995). The theory of full insurance states that if households are risk averse, markets are complete, or if there are second best institutions that pool risks to achieve Pareto-optimal allocation, marginal utility of consumption across households will be equalized. This implies that the growth in household consumption will respond to the growth in village level (aggregate) consumption but not to idiosyncratic shocks or variation in income. Technically, this means that the functioning of risk sharing institutions will mitigate idiosyncratic shocks and equalize the marginal utility of consumption across

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<sup>3</sup> This included two survey rounds in 1994 (1994a and 1994b) and; a round of data collection in 1995 and 1997.

households within a village (see Deaton, 1992; Morduch, 1995 and Gertler and Gruber, 1997).

Imagine that a central planner of a village with  $N$  number of households tries to maximize the sum of life time utilities of members subject to the village level resource constraints, uncertainty, and predetermined social weight. Let via central planner, each household  $j$  get Pareto-share  $\omega_j$  of aggregate income, with  $\omega_j > 0$ ,  $\forall j$  and  $\sum \omega_j = 1$ . And also let  $C_{jt}$  be consumption of household  $j$  at time  $t$  and  $\lambda_t$  the Lagrange multiplier associated with aggregate resource constraint at time  $t$ . If we assume twice continuously differentiable utility functions with  $U' > 0$  and  $U'' < 0$ , then, following Mace (1991), Cochrane (1991), Altonji et al. (1992), Townsend (1994) and Dercon and De Weerd (2002), we can write the first order condition of this problem as

$$U'(C_{jt}) = \frac{\lambda_t}{\omega_j} \quad (1)$$

The differenced logarithmic equivalent is given by:

$$\Delta \ln(C_{jt}) = \Delta \ln \lambda_t \quad (2)$$

Equation (2) states that if optimal insurance is attained, then the growth of marginal utility of consumption in a given period should be equal for all households. For any two households  $i$  and  $j$  in a village, we can substitute away  $\lambda_t$  in (1) and write the first order condition as:

$$\frac{U'(C_{jt})}{U'(C_{it})} = \frac{\omega_i}{\omega_j} \quad (3)$$

Equation (3) shows that the marginal utility of each household's consumption reflects its Pareto weight in the village. Following Deaton (1997) and Gertler and Gruber (2002), assume that within-period preferences are of the constant relative risk aversion type and can be represent by

$$U(C_{jt}) = (1 - \rho)^{-1} \pi_{jt} n_{jt} \left( \frac{C_{jt}}{n_{jt}} \right)^{1-\rho} \quad (4)$$

$\pi_{jt}$  accounts of inter-temporal needs of households which are not already captured by household size,  $n_{jt}$ . Plugging (4) into (3), taking logarithms and rearranging terms give

$$\ln \left( \frac{C_{jt}}{n_{jt}} \right) = \ln \left( \frac{C_{it}}{n_{it}} \right) - \rho^{-1} (\ln \pi_{it} - \ln \pi_{jt}) - \rho^{-1} (\ln \omega_i - \ln \omega_j) \quad (5)$$

Equation (5) holds across all the N-1 community that household j belongs. Adding up these N-1 equations yields the following (Bardhan and Udry, 1999):

$$\ln \left( \frac{C_{jt}}{n_{jt}} \right) = \bar{C}_{Nwt} - \rho^{-1} \left( \frac{1}{N-1} \sum_{i=1}^{N-1} \ln \pi_{it} - \ln \pi_{jt} \right) - \rho^{-1} \left( \frac{1}{N-1} \sum_{i=1}^{N-1} \ln \omega_i - \ln \omega_j \right) \quad (6)$$

where  $\bar{C}_{Nwt} = \frac{1}{N-1} \sum_{i=1}^{N-1} \ln \frac{C_{it}}{n_{it}}$  or average (logarithm of) village consumption at time  $t$ . Note that the final term in equation (6) is a time invariant fixed effects that can be purged out by taking first difference.

$$\Delta \ln \left( \frac{C_{jt}}{n_{jt}} \right) = \Delta \bar{C}_{Nwt} - \rho^{-1} \Delta \left( \frac{1}{N-1} \sum_{i=1}^{N-1} \ln \pi_{it} - \ln \pi_{jt} \right) \quad (7)$$

Equation (7) implies that under full insurance risk sharing hypothesis, household resources are uncorrelated with shifts in preferences, and this does not affect consumption growth once aggregate resources are controlled for. Numerous studies have made use of equation (7) to test the full insurance hypothesis at village level.

The version of equation (7) that is more commonly encountered in the empirical literature (e.g., see Ravallion and Chaudhuri, 1997 and Jacoby and Skoufias, 1998) is of the form:

$$\Delta \ln C_{jtv} = \sum_{tv} \theta_{tv} (VD_{tv}) + \beta \Delta \ln Y_{jtv} + \varphi \Delta X_{jtv} + \Delta \varepsilon_{jtv} \quad (8)$$

where  $\Delta \ln C_{jtv}$  and  $\Delta \ln Y_{jtv}$  denote changes in log per capita consumption and change in log per capita income of household  $j$  at time  $t$  in community  $v$ , respectively;  $VD_{tv}$  is a vector of village dummies interacted by survey period to capture all common shocks at village level;  $X_{jtv}$  is a vector of time varying household characteristics;  $\theta_{tv}$ ,  $\beta$

and  $\varphi$  are parameters to be estimated; and  $\Delta\varepsilon_{jtv}$  is household specific error terms capturing changes in unobservable components of household preferences. This specification is used to test the extent of consumption smoothing achieved within a community by regressing changes in individual household income against changes in individual consumption, while controlling for the effects of covariate shocks.

Following the same general approaches, Dercon and Krishnan (2000), Skoufias and Quisumbing (2003) and Harrower and Hoddinott (2004) used shocks instead of income. Their measure of vulnerability is basically determined by the coefficient of shock variables estimated from a regression equation such as:

$$\Delta \ln C_{jtv} = \sum_{tv} \theta_{tv} (VD_{tv}) + \phi \Delta S_{jtv} + \varphi \Delta X_{jtv} + \Delta \varepsilon_{jtv} \quad (9)$$

where  $S$  is a set of dummy variables indicating the occurrence of idiosyncratic household shocks;  $\phi$  is parameter to be estimated, and all other variables and parameters retain definitions given in equation (8). In equation (9), parameter  $\phi$  provides an estimate of the extent to which idiosyncratic income shocks plays a role in explaining household specific consumption smoothing<sup>4</sup>. The expected value of  $\phi$  is zero when the shock has no explanatory power in explaining household consumption.

Moreover, the effect of changes in household and village average income against household consumption is estimated by:

$$\Delta \ln C_{jtv} = \beta \Delta \ln Y_{jtv} + \gamma \Delta (\overline{\ln Y_{tv}}) + \varphi \Delta X_{jtv} + \Delta \varepsilon_{jtv} \quad (10)$$

where  $\Delta (\overline{\ln Y_{tv}})$  denotes change or growth rate in average village income at period  $t$  of village  $v$ ,  $\gamma$  is a parameter to be estimated and all other variables are as previously defined. This specification allows the growth rate in household consumption to be determined by the growth rate in household income as well as the growth rate in average income, denoted by  $\Delta (\overline{\ln Y_{tv}})$ .

<sup>4</sup> This is equivalent to imposing the restriction that  $\theta_{tv}$  and  $\varphi$  equal zero

If specific idiosyncratic income shocks appear to have little effect on consumption, the way in which households react to such shocks can be explored by using a similar specification as indicated in equation (9). In such cases, the effect that income shock has on the probability that a household will engage in particular coping strategy is tested. A series of binary variables can be used to signify whether household reported, or has been undertaken a particular coping strategy during a given period. Whether experiencing an income shock increased the likelihood that households pursued specified strategies is estimated using a fixed effects logit model of the form:

$$prob(CS_{jiv} = 1) = \frac{\exp(\mu_j + \phi S_{jiv} + \varphi x_{jiv})}{1 - (\mu_j + \phi S_{jiv} + \varphi x_{jiv})} \quad (11)$$

The equation in (11) takes into account the role of household-specific, time invariant observed and unobserved factors ( $\mu_j$ ). Here,  $CS_{jiv}$  denotes the use of any variety of coping strategies related to activities such as livestock sales, food/crop received through food for work, credit, remittance, food/crop received from friends or relatives within communities. Using equation (11), separate fixed-effects regressions can be employed for each of the dependent variables. Households whose value of  $CS_{jiv}$  does not vary across rounds (visits) are dropped from the estimation. And where the shock has no explanatory power for households that adopted the coping strategy, the expected value of  $\phi$  is zero.

Finally, whether certain groups of communities within villages are better able to smooth consumption relative to their reference groups in the face of idiosyncratic income shocks are estimated by:

$$\Delta \ln C_{jiv} = \sum_{iv} \theta_{iv}(D_{iv}) + \beta \Delta \ln y_{jiv} + \psi Z + \delta(Z * \Delta \ln y_{jiv}) + \varphi \Delta x_{jiv} + \Delta \varepsilon_{jiv} \quad (12)$$

where  $Z$  is a binary variable to identify those households possessing the characteristics of examination. The magnitude and sign of the  $\delta$  coefficients indicate whether there is higher or lower covariation between income and consumption changes in the group of examination relative to its reference group.

### 3. Data source and basic descriptive statistics

The database for this study has come from Year-Long Intensive Monitoring survey (second part of 5<sup>th</sup> round Ethiopian Rural Household Panel data Survey) conducted in

1999/00-2000/01 by Economics Department of Addis Ababa University (AAU) in collaboration with USAID/Ethiopia. While the first part of 5<sup>th</sup> round covers a one-shot household surveys in 18 villages and covered 1,685 households, the second part was designed to record transactions and activities as they occur instead of recall as in the first part. In that regard 4 villages namely, D/Brehan, Yetmen, Eteya and Azedebo out of 18 were purposely selected to be representative of teff (Yetmen), wheat (Eteya), and perennials (Azedebo) crops production and animal husbandry as major integral to their farming systems (D/Brehan). From each village 62 households were considered (as they were in the original panel data survey) that yields a total sample size of 247 households<sup>5</sup>. The first visit (survey) was conducted in April, just at the beginning of first plough. So as to make the data more reliable, each household was re-visited 25 times during the course of the entire survey periods, or once every two weeks for a period of one year (see Annex I).

The survey provides information on consumption income, land and labor use, asset ownership and numerous demographic characteristics. Furthermore, information on shocks<sup>6</sup> (exogenous) events such as rainfall shock<sup>7</sup> and crop shock<sup>8</sup>, loss of productive time related to religions, funeral and feasts ceremonies, and illness is included. Table 1 shows, along with some basic descriptive data for the sample, that such shock are common. Approximately, more than 40 percent of sample households, except Azedebo, faced rainfall shock and loss of productive time due to religions, funerals, feast, etc., ceremonies. Reported crop shock ranges between 11 percent in D/Brehan to 64 percent in Yetmen. For almost more than a quarter of sample households at least one economically active member loss productive time due to illness for more than 7 working days. Lack access to extra employment opportunities<sup>9</sup> were reported by 70 percent of the sample households and it became remarkable in Yetmen and Azedebo where more than 80 percent of sample households have no such opportunities (Table 1).

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<sup>5</sup> One household is dropped due to incomplete information.

<sup>6</sup> All data on shocks are self-reported.

<sup>7</sup> It is a shock for either too much, quite a lot, not enough, far too little etc., rain for crop involved or no rain when it should have to rain.

<sup>8</sup> It is a shock when crops were affected either by frost/low temperature, wind/storm, water logging/flooding, parasites/plant diseases, insects, livestock trampling/eating and birds/other animals/or weeds problems and resulted in either noticeable damage to crops, significant loss to crops, major loss of crops and/or causes total crop failure.

<sup>9</sup> Interested in working extra, but no casual wage employment or food-for-work program, credit needed but not acquired from relatives or government and/or fertilizer, chemicals and improved seed needed but not available to buy on time etc. However, only interested in working extra but no wage employment or food-for-work program shocks are used in the regression analysis.

On average, household heads aged over mid-forty with regular family sizes ranges between 5 and 8 (Table 1). Household members are less practicing migrating-out/in for possible jobs opportunities during surveys period as changes in family size between surveys (visits) indicate only very slight change. Females are heads for 17 percent of sample households, which account for 16 percent in D/Brehan, Yetmen and Eteya and 23 percent in Azedebo. Majority of sample households (about 60 percent) are asset poor<sup>10</sup>, as measured by livestock holding<sup>11</sup>. The figures account for more than 90 percent in Azedebo and 70 percent in Yetmen in contrast to only 20 percent in D/Brehan (Table 1).

As a means of income diversification, households usually diversify to non-crop incomes. These income generating schemes were mostly concentrated (45 to 65 percent) to food gifts from families and/or friends; and livestock/livestock product sales (see annex II). Petty trade, agricultural and nonagricultural wage labor and services accounted for less than 20 percent of non-crop income. The returns from noncrop income are very low, however. For instance, the net income from sale of livestock was only averaged 1000 Birr per year in D/Brehan, where it was the second important line of activity. It was less than 800 Birr in other villages; and even gets worse in Yetmen. Other non-crop income such as loan, remittances/transfers received are limited to less than, on average, 300 Birr per a year (Table 1).

Food and nonfood consumption in the villages were also very small, with biweekly total real per capita consumption<sup>12</sup> floating between 20 and 35 Birr (i.e., 1.50 to 2.50 Birr per capita per day). The largest share was per capita food consumption, over 70 percent, followed by nonfood consumption and others (gifts, remittances and transfers) (see annex IV). Furthermore, food consumption across visits varies by less than 10 percent while nonfood consumption is considerably more volatile (see Fig. 1). Thus, this seems to suggest that households try to smooth food consumption across time.

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<sup>10</sup> Asset nonpoor households have livestock holdings in the top two quintiles and asset poor households have livestock holding in the bottom three quintiles (see Annex III).

<sup>11</sup> Equivalently measuring land holding can also be used.

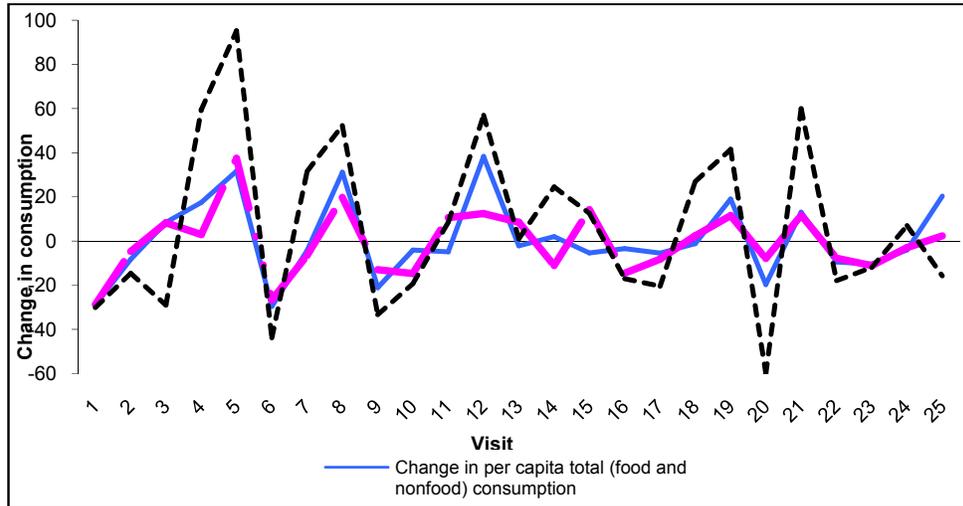
<sup>12</sup> All consumption and income data are deflated using fixed basket indices approach at May 2000 D/Brehan market prices

Table 1: Means and standard deviations of household characteristics

|  | Whole sample        | Villages             |                    |                    |                    |
|--|---------------------|----------------------|--------------------|--------------------|--------------------|
|  |                     | Deberebrehan         | Yetmen             | Eteya              | Azedebo            |
| <b>Household characteristics</b>   |                     |                      |                    |                    |                    |
| Age of household head (in years)   | 47.53<br>(14.45)    | 52.21<br>(15.24)     | 47.02<br>(16.00)   | 45.69<br>(13.12)   | 45.21<br>(12.41)   |
| Household size, Visit (1- 5)   | 6.79<br>(2.79)      | 6.08<br>(1.57)       | 5.28<br>(2.34)     | 8.18<br>(3.33)     | 7.61<br>(2.63)     |
| Change in household size between visits  | -0.19<br>(0.97)     | -0.16<br>(0.75)      | -0.07<br>(0.54)    | -0.60<br>(1.26)    | 0.05<br>(1.06)     |
| Household head dummy: 1 if female household head; 0 otherwise  | 0.17<br>(0.38)      | 0.16<br>(0.37)       | 0.16<br>(0.37)     | 0.15<br>(0.36)     | 0.23<br>(0.42)     |
| Education of head  | 0.38<br>(0.49)      | 0.18<br>(0.39)       | 0.25<br>(0.43)     | 0.53<br>(0.50)     | 0.58<br>(0.50)     |
| Asset nonpoor dummy: 1 if households have livestock holding in the top two quintiles; 0 otherwise                    | 0.40<br>(0.49)      | 0.80<br>(0.41)       | 0.25<br>(0.44)     | 0.48<br>(0.50)     | 0.05<br>(0.21)     |
| Asset poor dummy: 1 if household have livestock holding in bottom three quintiles; 0 otherwise                       | 0.60<br>(0.49)      | 0.20<br>(0.41)       | 0.75<br>(0.44)     | 0.52<br>(0.50)     | 0.95<br>(0.21)     |
| <b>Income shock to household</b>   |                     |                      |                    |                    |                    |
| Rainfall shock dummy: 1 if unbalanced rainfall on plots; 0 otherwise   | 0.38<br>(0.24)      | 0.49<br>(0.16)       | 0.41<br>(0.24)     | 0.42<br>(0.30)     | 0.20<br>(0.12)     |
| Crop shock index dummy: 1 if shock index is >=25%; 0 otherwise   | 0.34<br>(0.34)      | 0.11<br>(0.16)       | 0.64<br>(0.30)     | 0.40<br>(0.39)     | 0.21<br>(0.20)     |
| Loss of productive time due to religions, funerals etc., ceremonies dummy: 1 if loss; 0 otherwise                    | 0.41<br>(0.24)      | 0.69<br>(0.08)       | 0.42<br>(0.10)     | 0.47<br>(0.10)     | 0.07<br>(0.05)     |
| At least one active member of household loss productive time due to illness dummy: 1 if loss; 0 otherwise            | 0.32<br>(0.28)      | 0.33<br>(0.25)       | 0.24<br>(0.34)     | 0.31<br>(0.28)     | 0.40<br>(0.26)     |
| Lack of market opportunities dummy: 1 if Interested in working but no wage employment opportunities etc; 0 otherwise | 0.70<br>(0.46)      | 0.47<br>(0.50)       | 0.92<br>(0.27)     | 0.54<br>(0.50)     | 0.85<br>(0.35)     |
| <b>Income from sales, loan, remittances, transfer payments, gift etc</b>   |                     |                      |                    |                    |                    |
| Net income from sales of livestock/livestock products (in Birr)  | 757.21<br>(1017.14) | 1038.06<br>(1001.83) | 493.02<br>(518.49) | 788.70<br>(1492.1) | 618.99<br>(698.41) |
| Loan (in Birr)   | 153.36<br>(404.87)  | 192.42<br>(664.12)   | 72.46<br>(196.62)  | 126.64<br>(248.96) | 220.63<br>(326.44) |
| Remittances, transfer or gift received (in Birr)   | 257.93<br>(243.07)  | 309.61<br>(192.99)   | 138.76<br>(103.85) | 381.31<br>(309.65) | 200.14<br>(242.37) |

Source: Own calculation from survey data

Note: Values in the parentheses are standard deviations

**Figure 1: Change in per capita food, nonfood and total consumption per visit**

Source: own calculation from survey data

#### 4. Consumption smoothing and vulnerability: discussion of basic findings

In this section, we first examine whether the incidence of self-reported idiosyncratic shocks have a significant impact on household consumption. It is followed by investigating how households protect consumption against idiosyncratic shocks through examining the coping strategies they employ and then explore whether all idiosyncratic shocks as represented by changes in total income affect consumption. Finally, it examines which groups are relatively more vulnerable as a result of changes in income.

Empirical results of estimating equation (9) are presented in Table 2<sup>1</sup>. Five proxy variables are used for income shock<sup>2</sup>: rainfall and crop shocks, extra wage employment opportunities including food-for-work at least one members of household loss productive time due to illness and own labor use for productive activities (in person days).

<sup>1</sup> Outline of Huber (1967) and White (1980) methods are used to correct standard error for heteroskedasticity

<sup>2</sup> There is statistically significant difference between mean of real log total expenditure for all shocks reported (see Annex III).

When only these idiosyncratic income shocks regressed against change in real total consumption (see column 1 of Table 2), only changes in log of own labor use for productive activities (in person days) appears to have a positive effect on consumption. It indicates that an increase in own labor use increases total real household expenditure by 13 percent. However, when progressively controlling for the representation of village common shocks (covariate shocks), the significance of the coefficient (including the coefficient of other idiosyncratic shocks) is not everlasting (see columns 2 and 3).

The coefficients of covariate shocks are statistically significant (as shown by F-statistic) implying that covariate shocks explain variations in consumption over time (see columns 2 and 3). The key finding of this paper is that the specified idiosyncratic shocks have little significant impact on consumption in the study settings. By contrast, covariate shocks appear to be very important in explaining fluctuations in consumption (see column 2). For instance, loss of productive time due to religions, feast, funerals etc., and other ceremonies affect total consumption at 10% of level of significance<sup>3</sup>. Similar results are obtained by including other socioeconomic characteristics (see Table 2 column 3).

When household fixed-effect regression is employed, lack of market opportunities for wage employment decreases real per capita total consumption by 10 percent, but change in log of own labor input for productive activities (in person days) has the effect of increasing real consumption per capita by about 3 percent (see Table 2 column 4). In addition, the regression is controlled for age-sex compositions (only significant one are reported). For instance, family size of households, female headed household, male and female household members aged 11- 15 and male household members aged 16-64 are among controlled variables influencing consumption expenditure significantly (see Table 2 column 3).

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<sup>3</sup> Households' labor endowment is controlled by including own labor used (in person days) in the regression.

Table 2: Least squares determinants of change in real total per capita consumption

|  | (1)                | (2)                                     | (3)  | (4)                                |
|--|--------------------|---|--|------------------------------------|
|  | Income shocks      | Idiosyncratic and village common shocks | Idiosyncratic, common shocks and socioeconomic characteristics | Household fixed effects regression |
| <b>Income shocks</b>   |                    |   |  |                                    |
| Rainfall shock dummy: 1 if rainfall shock (unbalanced rainfall per plot) is reported; 0 otherwise                  | 0.074<br>(0.49)    | 0.150<br>(1.01)                         | -0.195<br>(1.49)   | 0.014<br>(0.46)                    |
| Crop shock dummy: 1 if severity of crop affected shock index per plot is >=25%; 0 otherwise                        | 0.130<br>(0.53)    | -0.085<br>(0.35)                        | 0.018<br>(0.08)  | 0.047<br>(0.81)                    |
| Illness shock dummy: 1 if at least one active member of household loss productive time due to illness; 0 otherwise | -0.128<br>(1.16)   | -0.117<br>(1.10)                        | 0.024<br>(0.25)  | 0.028<br>(1.13)                    |
| Lack of market dummy: 1 if interested in working but no wage employment opportunities; 0 otherwise                 | -0.045<br>(0.42)   | -0.147<br>(1.37)                        | -0.050<br>(0.48)   | -0.110<br>(3.36)***                |
| Change in log of own labor input in person days  | 0.131<br>(2.37)**  | 0.003<br>(0.05)                         | 0.047<br>(0.83)  | 0.034<br>(2.90)**                  |
| <b>Villages dummies interacted with round (F-test)</b>   |                    |   |  |                                    |
| Change in log share of number of days not worked due to religious etc ceremonies                                   |                    | 1.68*                                   | 1.89*  |                                    |
| Autumn (Fall) season (Sep. - Nov.)   |                    | 0.99                                    | 4.08***  |                                    |
| Winter season (Dec. - Feb.)  |                    | 2.99***                                 | 1.42   |                                    |
| Spring (Vernal) (March- May)   |                    | 3.33***                                 | 2.90**   |                                    |
| <b>Socioeconomic characteristics</b>   |                    |   |  |                                    |
| Age of household head (in years)   |                    |   | -0.000<br>(0.12)   | -                                  |
| Education level of household head  |                    |   | 0.001<br>(0.38)  | -                                  |
| Family size of households  |                    |   | 0.003<br>(2.26)**  | 0.021<br>(1.27)                    |
| Household head sex dummy: 1 if female headed   |                    |   | 0.027<br>(3.77)***   | -                                  |
| Total number of male hh member aged between 11 and 15 years  |                    |   | -0.005<br>(2.73)***  | 0.006<br>(0.48)                    |
| Total number of female hh member aged between 11 and 15 years  |                    |   | -0.004<br>(1.93)*  | -0.008<br>(0.51)                   |
| Total number of male hh member aged between 16 and 64 years  |                    |   | -0.001<br>(1.62)   | -0.001<br>(0.21)                   |
| Constant   | 0.009<br>(3.21)*** | 0.192<br>(3.61)***                      | 0.135<br>(2.70)***   | -0.130<br>(1.15)                   |
| Number of observations   | 6175               | 6175                                    | 6175   | 6175                               |
| Number of groups (sample size)   | 247                | 247                                     | 247  | 247                                |
| F-statistic  | 1.88               | 4.00***                                 | 3.41***  | 2.28**                             |

Note: Dependent variable is change in log real per capita consumption (food, nonfood and value of gifts received) between rounds (visits). Absolute value of t-statistics is in parentheses. \* = significant at 10%; \*\* = significant at 5% and \*\*\* = significant at 1%. Standard errors are corrected for heteroscedasticity using Huber-White methods.

#### 4.1 Income risk and household coping mechanisms

As specific idiosyncratic shocks have little impact on consumption, exploring the coping strategies used by households are essential. There is no single coping strategy used by households in response to idiosyncratic income shocks; rather a portfolio of strategies is employed. Table 3 reports the effect of a shock on the likelihood of a household adopting a response to an idiosyncratic shock for the full sample and for a disaggregated sample of asset-poor and asset non-poor households using equation (11). The result reported has shown that rainfall and illness shocks increase the probability that the household reports food/crop received through food-for-work and credit as survival strategy. When examining these shocks across wealth classification, while both groups were significantly more likely used these strategies for rainfall shock, only asset poor household use such coping strategies for illness shock.

Likewise, while crop shock increases the likelihood that households engaged in food/crop received through food-for-work, lack of market for wage employment increases the opportunities that households use credit as endurance strategies. Further examination of these shocks across asset non-poor and asset poor households shows that while both groups are more likely to have food/crop received through food-for-work for a crop shock, only asset poor households are more likely to have credit for lack of wage market shock. On the other hand, households that experience idiosyncratic income shocks related to crop failures are less likely to use credit for whole sample, asset poor and asset non-poor households.

Table 3 has also shown that households are less likely to sell livestock/livestock products to smooth rainfall and crop shocks for sample as whole, asset poor and non-poor households during the surveys period. However, they sell livestock/livestock products if the shock is due to lack of wage employment opportunities. This implies that at incidence of such shocks, households tend to seek for wage employment opportunities but are compelled to sell livestock/livestock product only in the absence of such opportunities. More likely smoothing of rainfall and crop shocks through food-for-work program further strengthened the evidence. Moreover, since food-for-work program is also part of wage employment, its absence is less likely used to smooth income shock of wage employment for the sample as a whole and for asset poor households.

Remittance and food aids from relatives or friends within community are other coping strategies. Asset poor households are more likely to receive remittance for rainfall shock and food aids for crop shock. In contrast, asset poor and non-poor households are less likely to receive food aids and remittance as a result of lack of market opportunities,

respectively. In general, asset poor households are looking for different coping strategies to income shocks observed as compared to asset non-poor households. Thus, asset poor households are more vulnerable to consumption expenditure.

**Table 3: Household fixed effects Logit estimates of household coping responses to idiosyncratic shocks.**

|   | Income shocks           |   |   |  |  | Number of groups |
|---|-------------------------|---|---|--|--|------------------|
|   | Rainfall shock on plots | Crop shock index dummy (1 if >25%) <sup>1</sup> | Interested in working, but no wage employment etc | At least one member of the household lost productive time due to |  |                  |
| Sales of Livestock  |                         |   |   |  |  |                  |
| Household had livestock sales dummy: 1 if yes; 0 otherwise                                  | -0.961**<br>(10.87)     | -0.797**<br>(7.69)                              | 1.041**<br>(9.16)                                 | 0.025<br>(0.26)  |  | 221              |
| Asset poor  | -0.760**<br>(6.01)      | -0.753**<br>(5.41)                              | 0.781**<br>(5.15)                                 | 0.021<br>(0.17)  |  | 131              |
| Asset nonpoor   | -1.137**<br>(9.31)      | -0.852**<br>(5.49)                              | 1.353**<br>(7.88)                                 | 0.032<br>(0.21)  |  | 90               |
| Food/crop received through food for work  |                         |   |   |  |  |                  |
| Household had food/crop through food for work programs: 1 if yes:                           | 1.026**<br>(5.86)       | 0.595**<br>(2.70)                               | -0.403*<br>(1.63)                                 | 0.402**<br>(1.95)  |  | 80               |
| Asset poor  | 1.254**<br>(5.52)       | 0.527**<br>(1.89)                               | -0.556*<br>(1.80)                                 | 0.404**<br>(1.99)  |  | 63               |
| Asset nonpoor   | 0.706**<br>(2.60)       | 0.711**<br>(1.97)                               | -0.143<br>(0.37)                                  | 0.204<br>(0.54)  |  | 27               |
| Credit  |                         |   |   |  |  |                  |
| Household had credit received for consumption: 1 if yes                                     | 0.506**<br>(4.92)       | -0.634**<br>(4.92)                              | 0.539**<br>(3.90)                                 | 0.434**<br>(3.97)  |  | 112              |
| Asset poor  | 0.507**<br>(4.14)       | -0.690**<br>(4.57)                              | 0.687**<br>(4.19)                                 | 0.549**<br>(4.46)  |  | 83               |
| Asset nonpoor   | 0.503**<br>(2.66)       | -0.473**<br>(1.94)                              | 0.131<br>(0.48)                                   | -0.006<br>(0.03)   |  | 29               |
| Remittance  |                         |   |   |  |  |                  |
| Household had remittance since last visit: 1 if yes   | -0.083<br>(1.10)        | -0.099<br>(1.15)                                | -0.103<br>(1.03)                                  | -0.082<br>(0.93)   |  | 247              |
| Asset poor  | 0.348**<br>(3.23)       | -0.151<br>(1.34)                                | 0.064<br>(0.50)                                   | -0.031<br>(0.29)   |  | 151              |
| Asset nonpoor   | -0.198*<br>(1.85)       | -0.024<br>(0.18)                                | -0.349**<br>(2.18)                                | -0.172<br>(1.15)   |  | 96               |
| Food/crop gift received within community  |                         |   |   |  |  |                  |
| Household had food/crop received as gifts from relatives/friends within community: 1 if yes | -0.384<br>(1.39)        | 0.427<br>(1.55)                                 | -0.688*<br>(1.81)                                 | 0.316<br>(1.18)  |  | 66               |
| Asset poor  | -0.445<br>(1.16)        | 0.948**<br>(2.84)                               | -1.625**<br>(3.23)                                | 0.483<br>(1.50)  |  | 40               |
| Asset nonpoor   | -0.313<br>(0.78)        | -0.787<br>(1.25)                                | 0.477<br>(0.99)                                   | -0.049<br>(0.10)   |  | 26               |

<sup>1</sup> Statistical significant test for cut points and all self reporting shocks are reported (see Annex III).

Notes: Household size, age-sex compositions are included in the regression but insignificant. Z-values reported in brackets. \*= Significant at 10%; \*\*= Significant at 5%. I estimated 60 separate logit equations i.e., three separate logit equations for each shock versus coping mechanisms by whole sample, asset poor and asset nonpoor.

## 4.2 Household non-crop income diversification

This section is intended to explore whether shocks induced households enter into non-crop activities and this is done by disaggregating the sample into poor and non-poor households. Although virtually all households are farmers and have access to land, they do also participate in other non-crop income diversification activities in responses to shocks (this does not, of course, necessary mean that the decision of households to diversify income is after the occurrence of crop failure). These include agricultural and non-agricultural wage employment, livestock and petty trade, crafting, etc., (see Table 4).

Table 4 has shown that crop failure shock increases the likelihood that poor households reported income from agricultural and non-agricultural wage laborer. Moreover, asset poor households were more likely to undertake petty trade activity as a result of rainfall and illness shocks. Meanwhile, the likelihood of earning through livestock trade increased for wage employment shock, but decreased for rainfall and crop shocks at all levels.

Lack of wage employment opportunities increases the likelihood of households to undertake crafting, making and selling of charcoal activities. These activities are less likely undertaken for rainfall shock (see Table 4). This implies that when there is rainfall shock, households first seek for wage employment and if it is unavailable they would look for crafting activities. This is probably due to culturally abused prerogatives given to craftsmen, and it is also less profitable.

Generally, asset poor households are more likely to enter into different activities as responses to income shocks. However, most of them have low returns and are remedies for only short period. This consecutively implies that asset poor households are more vulnerable than asset non-poor households.

Table 4: Household fixed effects logit estimates of household income diversification

|  | Income shocks           |  |   |  | Number of groups |
|--|-------------------------|--|---|--|------------------|
|  | Rainfall shock on plots | Crop shock index dummy (1 if $\geq 25\%$ ) | Interested in working, but no wage employment etc | At least one member of the household lost productive time due to illness |                  |
| Agricultural wage laborer                | -0.100<br>(0.23)        | 0.189<br>(0.46)                            | -0.269<br>(0.48)                                  | -0.367<br>(0.70)   | 18               |
| Asset poor                               | -1.094<br>(1.56)        | 1.527**<br>(1.91)                          | 0.683<br>(0.90)                                   | -0.592<br>(0.90)   | 13               |
| Asset nonpoor                            | 0.937<br>(1.45)         | -0.366<br>(0.69)                           | -0.125<br>(0.20)                                  | 0.055<br>(0.07)  | 5                |
| Non-agricultural wage laborer            | 0.244<br>(1.46)         | 0.591**<br>(3.32)                          | 0.319<br>(1.53)                                   | -0.008<br>(0.04)   | 71               |
| Asset poor                               | 0.226<br>(1.11)         | 0.618**<br>(2.95)                          | 0.300<br>(1.26)                                   | 0.014<br>(0.07)  | 48               |
| Asset nonpoor                            | 0.282<br>(0.96)         | 0.518<br>(1.54)                            | 0.381<br>(0.88)                                   | -0.070<br>(0.19)   | 23               |
| Livestock trade                          | -0.961**<br>(10.88)     | -0.797**<br>(7.69)                         | 1.041**<br>(9.16)                                 | 0.022<br>(0.23)  | 221              |
| Asset poor                               | -0.762**<br>(6.02)      | -0.753**<br>(5.42)                         | 0.781**<br>(5.15)                                 | 0.012<br>(0.12)  | 131              |
| Asset nonpoor                            | -1.137**<br>(9.31)      | -0.852**<br>(5.49)                         | 1.353**<br>(7.88)                                 | 0.033<br>(0.21)  | 90               |
| Petty trade (e.g. grain etc)             | 0.237<br>(1.54)         | -0.115<br>(0.69)                           | -0.316<br>(0.15)                                  | 0.256*<br>(1.69)   | 84               |
| Asset poor                               | 0.294*<br>(1.69)        | -0.205<br>(1.08)                           | -0.383<br>(0.17)                                  | 0.393**<br>(2.32)  | 65               |
| Asset nonpoor                            | 0.033<br>(0.10)         | 0.198<br>(0.57)                            | 0.013<br>(0.02)                                   | -0.312<br>(0.86)   | 19               |
| Crafting, making and selling of charcoal | -0.209<br>(1.19)        | 0.207<br>(1.08)                            | 1.124**<br>(5.56)                                 | -0.195<br>(1.03)   | 92               |
| Asset poor                               | -0.428*<br>(1.85)       | 0.299<br>(1.32)                            | 2.449**<br>(7.18)                                 | -0.773<br>(0.35)   | 46               |
| Asset nonpoor                            | 0.101<br>(0.38)         | -0.328<br>(0.09)                           | -0.428<br>(1.16)                                  | -0.531<br>(1.34)   | 46               |
| Food gift from families, friends etc     | -0.012<br>(0.16)        | -0.217<br>(0.26)                           | -0.171*<br>(1.79)                                 | 0.023<br>(0.30)  | 247              |
| Asset poor                               | -0.161<br>(1.60)        | -0.573<br>(0.53)                           | -0.078<br>(0.63)                                  | 0.083<br>(0.78)  | 151              |
| Asset nonpoor                            | 0.145<br>(1.41)         | 0.022<br>(0.18)                            | -0.296**<br>(1.97)                                | -0.115<br>(0.83)   | 96               |

Notes: Household size, sex-age compositions are included in the regression but insignificant. Z-values reported in brackets. \* = Significant at 10%. \*\* = Significant at 5%. I estimated 72 separate logit equations i.e., three logit equations are estimated for each shock versus income diversification by whole sample, asset poor and asset non-poor).

### 4.3 Further tests of consumption smoothing

In the regression analysis, we have shown that households whose consumption experienced idiosyncratic shocks are insured against through different coping strategies. This section investigates how income changes are transmitted to consumption changes. It complements the previous section by investigating further the nature of consumption smoothing by examining household attributes associated with such vulnerability.

Equation (8) treats the stronger version of consumption smoothing and the impact of changes in total household income on changes in consumption with controls for covariant shocks term. Specification (1) reported in Table 5 shows that the coefficient of changes in income given income shocks is statistically not significant for all sample, asset poor and non-poor households. Thus, households attempt to spread resources to smooth consumption evenly across time through the use of mechanisms that reduce or mitigate income shocks, or those that help them cope with the effects of such shocks. In other words, a household allocates proportionally equal budget every period as insurance, through different coping strategies.

**Table 5: The impact of changes in log household per capita income on log household per capita consumption**  
(Dependent variable: change in log per capita household consumption)

| Sample                  | Parameters estimate  |                                  |                                  | Sample size |
|-------------------------|----------------------|----------------------------------|----------------------------------|-------------|
|                         | (1)                  | (2)                              |                                  |             |
|                         | $\Delta \ln y_{itv}$ | Positive<br>$\Delta \ln y_{itv}$ | Negative<br>$\Delta \ln y_{itv}$ |             |
| Full sample             | 0.020<br>(0.43)      | 0.059*<br>(1.62)                 | 0.118**<br>(3.54)                | 247         |
| Asset poor household    | 0.031<br>(0.50)      | 0.014<br>(0.30)                  | 0.136**<br>(3.08)                | 151         |
| Asset nonpoor household | 0.022<br>(0.31)      | 0.104*<br>(1.83)                 | 0.076<br>(1.42)                  | 96          |
| <b>F-test</b>           |                      |                                  |                                  |             |
| Test 1: full sample     |                      |                                  | 0.67 (p=0.41)                    |             |
| Test 2: Asset poor      |                      |                                  | 0.17 (p=0.67)                    |             |
| Test 3: Asset nonpoor   |                      |                                  | 1.36 (p=0.28)                    |             |

Notes: \* = significant at 10%. \*\* = Significant at 5%. Absolute value of t-statistics is in the parentheses. Standard errors are corrected for heteroscedasticity using Huber-white methods. Treating positive and negative shocks symmetrically further strengthens the finding by assuming that positive and negative shocks have the same impacts. Specification

(2) takes this into account, including positive and negative shocks as separate regressions. While the coefficients on negative shocks are large in magnitude for full sample and asset poor households, the hypothesis that positive and negative income shocks have statistically different impacts on changes in consumption is rejected, indicating positive and negative shocks have equal effects in all cases<sup>1</sup>.

#### 4.4 Partial consumption insurance

Partial consumption insurance tests the effects of growth rate in average income on household expenditure. Using equation (10), the top panel of Table 6 provides regression estimates of average income against household consumption for all households and disaggregation based on wealth. Neither for the sample as a whole nor based on wealth disaggregation is the coefficients of average incomes significantly different from zero in explaining consumption expenditure. The findings, therefore, signify that although rural households of Ethiopia have traditions of informal mutual insurance scheme with better-off neighboring households within communities, the shock is not completely insured through such mechanisms i.e., there is a limit to which households can insure against consumption through better-off neighboring households.

Table 6 also examines whether positive and negative representation of covariate shocks has different impacts. These are reported in the lower panel of Table 6. As in the case of Table 5, while the coefficients on negative income shocks of all households and asset poor households are larger in magnitude and seem significant, the F-test that positive and negative income shocks have statistically different impacts on changes in consumption do not reject the null hypothesis. Thus, it reveals that positive and negative covariate shocks have equal effects<sup>2</sup>.

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<sup>1</sup> The regression is controlled for other variables such as female household head, age-sex categories, household head age and age squared etc. In most of the cases, some specific variable like age and age-squared are statistically significant at 5% levels of significance. Also change in log per capita of household consumption was regressed against only change in log per capita household incomes but there are no significant changes on the parameters estimated.

<sup>2</sup> Additional regressors included but not reported are female household head, age and age square of household head, and a full set of round (visit) dummy variables.

**Table 6: Impact of change in log income on change in log consumption, controlling for change in mean log village income**

|                          | Specification (1)                                       |  |  |  | Sample size |
|--------------------------|---|--|--|--|-------------|
|                          | $\gamma$ estimates ( $\Delta(\overline{\ln y_{itv}})$ ) |  | $\beta$ estimates ( $\Delta \ln y_{itv}$ ) |  |             |
|                          |   |  |  |  |             |
| All households           | -0.146<br>(1.15)  |  | 0.041<br>(0.83)                            |  | 247         |
| Asset poor households    | -0.184<br>(0.99)  |  | 0.052<br>(0.81)                            |  | 151         |
| Asset nonpoor households | 0.004<br>(0.03)   |  | 0.021<br>(0.27)                            |  | 96          |

|                          | Specification (2)                            |  |                                  |                                  | Sample size |
|--------------------------|--|--|----------------------------------|----------------------------------|-------------|
|                          | $\gamma$ estimates                           |  | $\beta$ estimates                |                                  |             |
|                          | Positive<br>$\Delta(\overline{\ln y_{itv}})$ | Negative<br>$\Delta(\overline{\ln y_{itv}})$ | Positive<br>$\Delta \ln y_{itv}$ | Negative<br>$\Delta \ln y_{itv}$ |             |
| All households           | 0.272<br>(1.57)                              | 1.027**<br>(4.82)                            | 0.058<br>(1.55)                  | 0.110**<br>(3.28)                | 247         |
| Asset poor households    | 0.323<br>(1.38)                              | 1.828**<br>(5.48)                            | 0.017<br>(0.36)                  | 0.130**<br>(2.95)                | 151         |
| Asset nonpoor households | 0.147<br>(0.57)                              | 0.335<br>(1.25)                              | 0.08<br>(1.38)                   | 0.0522<br>(0.92)                 | 96          |
| <b>F-test</b>            |  |  |                                  |                                  |             |
| Test 1: full sample      | 1.19 (p= 0.27)                               |  |                                  |                                  |             |
| Test 2: Asset poor       | 0.11 (p= 0.73)                               |  |                                  |                                  |             |
| Test 3: Asset nonpoor    | 2.47 (p= 0.12)                               |  |                                  |                                  |             |

Note: \*\* = significant at the 5 percent level of significance. Absolute value of t-statistics is in the parentheses. Standard deviation errors are corrected for heteroscedasticity using Huber-White methods.

#### 4.5 Household vulnerability by socioeconomic characteristic

Table 7 reports the estimation results whether certain groups of communities within villages are better able to smooth consumption relative to their reference groups in the face of idiosyncratic income shocks. It has shown that neither asset poor households, female-headed households, households with young and old household heads nor households with young children experienced greater variation in consumption, given income changes, than their respective reference groups (only households with four or fewer members have greater variation in consumption with respect to its reference group). However, when separate regression was run for each village, asset poor households, female-headed households and households with

young heads experience greater variation in consumption with respect to reference groups in Yetmen. While asset poor household and household with four or fewer members have experienced variation in consumption with respect to reference groups in Azedebo, only households with four or fewer members (in Eteya) and none of the household (in Debrebrehan) experienced variation in consumption with respect to reference groups.

**Table 7: The effect of idiosyncratic income shocks on consumption, by household characteristics**

(Dependent variable: change in log consumption)

|  | Full sample        | Debre-Brehan     | Yetmen             | Eteya            | Azedebo            |
|--|--------------------|------------------|--------------------|------------------|--------------------|
| Asset non-poor households (reference group)              | -0.007<br>(0.67)   | 0.007<br>(0.54)  | 0.003<br>(0.18)    | 0.000<br>(0.03)  | -0.014<br>(0.29)   |
| Asset poor household                                     | 0.138<br>(1.38)    | 0.272<br>(1.58)  | -0.859**<br>(2.23) | 0.085<br>(0.29)  | 0.339**<br>(1.99)  |
| Male-headed households (reference group)                 | -0.005<br>(0.43)   | 0.016<br>(1.14)  | -0.091**<br>(3.19) | 0.033<br>(1.58)  | -0.013<br>(0.41)   |
| Female-headed household                                  | -0.114<br>(0.87)   | 0.156<br>(0.93)  | 0.882**<br>(2.33)  | -0.121<br>(0.32) | 0.177<br>(0.64)    |
| Households with no members ages 0-6 (reference group)    | -0.012<br>(1.04)   | 0.006<br>(0.08)  | 0.002<br>(0.09)    | -0.013<br>(0.73) | 0.000<br>(0.03)    |
| Household with members ages 0-6                          | -0.087<br>(0.94)   | 0.104<br>(1.17)  | 0.454<br>(1.23)    | 0.256<br>(1.09)  | -0.155<br>(0.75)   |
| Households whose head is over age 40 (reference group)   | -0.006<br>(0.52)   | 0.002<br>(0.22)  | -0.001<br>(0.08)   | 0.002<br>(0.15)  | -0.022<br>(0.84)   |
| Households whose head is age 40 or less                  | -0.017<br>(0.17)   | 0.045<br>(0.35)  | 0.747**<br>(2.47)  | -0.058<br>(0.24) | -0.133<br>(0.72)   |
| Households whose head is under age 60 (reference group)  | 0.004<br>(0.37)    | -0.006<br>(0.66) | 0.040<br>(1.43)    | 0.024<br>(1.13)  | -0.039<br>(1.07)   |
| Households whose head is 60 or older                     | 0.098<br>(0.83)    | -0.019<br>(0.15) | -0.365<br>(0.76)   | -0.349<br>(1.25) | -0.035<br>(0.17)   |
| Households with more than four members (reference group) | -0.001<br>(0.11)   | 0.000<br>(0.02)  | 0.000<br>(0.03)    | -0.020<br>(1.08) | 0.099<br>(1.35)    |
| Households with four or fewer members                    | -0.275**<br>(2.31) | -0.033<br>(0.25) | -0.157<br>(0.36)   | 0.323*<br>(1.66) | -1.205**<br>(2.92) |

Notes: \* = Significant at the 10 percent level, \*\*= significant at the 5 percent level. Absolute value of t-statistics is in parentheses. Standard errors are corrected for heteroscedasticity using Huber-White methods. A value for F test is 2.25 (prob value =0.0057). Variables included in the regression but not

reported are log share of productive time lost due to religions, feasts etc; loss of productive time due to health problems and change in family size.

## 5. Conclusion and recommendation

Using a unique panel data of a year long intensive monitoring survey of rural households in Ethiopia, the paper explores vulnerability issues through the lens of consumption smoothing. It asks which groups or individuals are unable to fully insure or smooth their consumption in the face of shocks to their income. Drawing on data from four villages of Ethiopia, the study has shown that in all cases, while covariant shocks lead to changes in consumption, specific idiosyncratic shocks appear to be fully insured. To fully insure idiosyncratic shocks, households have used different coping strategies. However, during the survey periods, households were less likely to sell livestock/livestock products to smooth shocks caused by rainfall and crop shocks. For these shocks they are seeking for wage employments first but are compelled to sell livestock in absence of wage employments opportunities

The impact of changes in total household income on consumption with controls for idiosyncratic shocks were also investigated and found that households are smoothing their consumption evenly across time through different coping mechanisms. Further test of consumption smoothing using average village income with control for idiosyncratic shocks indicated that there is a limit to which households insure against shocks through better-off households within the communities, i.e., the hypothesis of complete insurance is rejected.

As covariate shocks are stronger in explaining consumption smoothing, community or group based intervention is crucial. In doing so, governmental organizations or NGOs' have to engage in stipulation of modern farming systems and intend to produce more than once through irrigation, water harvesting, etc., schemes. The organizations need to engage in commencement of environmentally sound, economically viable and socially acceptable activities such as protection of acute and distress land through terracing and afforestation. Strengthening of such scheme can help, particularly the poor farming society to both provide job opportunities (in the form of food-for-work or conditional cash transfers systems) and improve fertility of cultivable land. Improving fertility of cultivable land brings sustainable development by improving agricultural productivity and profitability. This further would improve the extent of consumption smoothing.

Provision of community/group based opportunities alone may not guarantee consumption smoothing as agricultural activities are vulnerable to different shocks that might affect the community. Thus, community/group based insurance scheme is important. A provision of

insurance will guarantee household in cases of bad shocks and will also motivate the poor to participate in risky but profitable income generating ventures.

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**Annex I: Duration of visits\***

- Visit 1 24 April 1992 - 08 May 1992 E.C
- Visit 2 09 May 1992 - 23 May 1992 E.C
- Visit 3 24 May 1992 - 08 June 1992 E.C
- Visit 4 09 June 1992 - 23 June 1992 E.C
- Visit 5 24 June 1992 - 15 July 1992 E.C
- Visit 6 16 July 1992 - 15 August 1992 E.C
- Visit 7 11 August 1992 - 01 September 1993 E.C
- Visit 8 26 August 1992 - 12 September 1993 E.C
- Visit 9 16 September 1993 - 27 September 1993 E.C
- Visit 10 21 September 1993 - 12 October 1993 E.C
- Visit 11 16 October 1993 - 27 October 1993 E.C
- Visit 12 21 October 1993 - 12 November 1993 E.C
- Visit 13 13 November 1993 - 01 December 1993 E.C
- Visit 14 28 November 1993 - 05 December 1993 E.C, for few it extends to 09, Jan. 1993.
- Visit 15 13 December 1993 - 30 December 1993 E.C, for few it extends up to 24, Jan 1993
- Visit 16 28 December 1993 - 15 January 1993 E.C, for few it extends up to 21 Feb, 1993
- Visit 17 13 January 1993 - 30 January 1993 E.C
- Visit 18 28 January 1993 - 15 February 1993 E.C
- Visit 19 13 February 1993 - 17 March 1993 E.C
- Visit 20 28 February 1993 - 08 April 1993 E.C
- Visit 21 13 March 1993 - 24 April 1993 E.C
- Visit 22 28 March 1993 - 04 May 1993 E.C
- Visit 23 11 April 1993 - 23 April 1993 E.C
- Visit 24 23 April 1993 - 03 May 1993 E.C
- Visit 25 05 May 1993 - 17 May 1993 E.C
- Visit 26 17 May 1993 - 30 May 1993 E.C, for few it extends to 09 July 1993 E.C.

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\* Some up to 3% of the households were not interviewed within time ranges justified. Moreover, when it extends to some 6% to 7%, it was indicated by an extension just in front of the specified period.

**Annex II: Household income diversification: Percentage of households reporting non-crop incomes**

|   | Visit 1 | Visit 2 | Visit 3 | Visit 4 | Visit 5 | Visit 6 | Visit 7 | Visit 8 | Visit 9 | Visit 10 | Visit 11 | Visit 12 | Visit 13 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| Agricultural wage labor                   | 0.00    | 0.00    | 0.40    | 0.40    | 0.40    | 0.81    | 2.02    | 1.21    | 1.21    | 0.81     | 0.81     | 0.81     | 1.21     |
| Livestock/livestock product trade         | 7.69    | 19.03   | 13.36   | 12.96   | 16.60   | 4.45    | 16.19   | 19.03   | 19.03   | 6.07     | 13.36    | 12.55    | 42.11    |
| Petty trade (e.g. grain trade etc.)       | 12.96   | 10.53   | 10.53   | 10.53   | 11.34   | 10.93   | 6.88    | 8.50    | 6.07    | 8.10     | 7.69     | 6.07     | 9.72     |
| Nonagricultural wage labor                | 8.10    | 6.88    | 8.10    | 6.07    | 6.88    | 6.88    | 4.05    | 5.26    | 5.67    | 8.10     | 4.45     | 4.45     | 4.86     |
| Services                                  | 3.64    | 4.05    | 4.05    | 4.05    | 5.26    | 6.07    | 6.07    | 6.88    | 6.48    | 4.86     | 5.26     | 4.86     | 5.26     |
| Food gifts from family, friends etc       | 15.79   | 10.53   | 11.74   | 29.55   | 65.59   | 27.13   | 22.27   | 21.86   | 23.48   | 22.67    | 49.39    | 22.67    | 69.23    |
| Crafting, making and selling charcoal etc | 5.67    | 9.31    | 7.69    | 5.26    | 4.86    | 5.67    | 5.67    | 5.67    | 5.26    | 5.67     | 4.45     | 3.64     | 6.48     |

|   | Visit 14 | Visit 15 | Visit 16 | Visit 17 | Visit 18 | Visit 19 | Visit 20 | Visit 21 | Visit 22 | Visit 23 | Visit 24 | Visit 25 | Visit 26 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Agricultural wage labor                   | 1.21     | 1.21     | 0.40     | 1.21     | 0.81     | 1.21     | 1.62     | 0.40     | 1.21     | 0.81     | 1.21     | 1.21     | 1.62     |
| Livestock/livestock product trade         | 43.72    | 40.89    | 42.91    | 45.75    | 43.72    | 42.11    | 48.99    | 48.18    | 47.77    | 46.96    | 44.53    | 45.34    | 42.51    |
| Petty trade (e.g. grain trade etc.)       | 11.74    | 13.36    | 13.36    | 11.74    | 11.34    | 9.31     | 10.93    | 10.93    | 9.31     | 10.12    | 8.50     | 10.12    | 8.10     |
| Nonagricultural wage labor                | 5.26     | 5.26     | 7.29     | 6.07     | 4.45     | 4.86     | 8.10     | 5.67     | 9.72     | 5.26     | 7.29     | 6.88     | 7.29     |
| Services                                  | 3.64     | 5.26     | 4.45     | 3.24     | 2.83     | 4.05     | 4.05     | 4.05     | 3.64     | 3.24     | 3.64     | 2.83     | 2.43     |
| Food gifts from family, friends etc       | 19.03    | 25.51    | 22.27    | 19.03    | 34.41    | 34.82    | 61.54    | 28.74    | 35.63    | 24.70    | 26.32    | 22.67    | 73.68    |
| Crafting, making and selling charcoal etc | 6.48     | 6.48     | 6.07     | 6.07     | 8.10     | 5.67     | 7.69     | 8.10     | 7.69     | 5.67     | 7.69     | 5.26     | 6.07     |

Source: own calculation from survey data.

**Annex III: Mean difference test for real log of total expenditure per capita**

| Income shock variables   | Groups | N    | Mean (Sd)   | t-value | p-value |
|--|--------|------|-------------|---------|---------|
| Rainfall shock dummy: 1 if rainfall shock (unbalanced rainfall) reported per plot; 0 otherwise                     | 0      | 5626 | 3.21(0.93)  | 2.514   | 0.006   |
|  | 1      | 796  | 3.12(0.84)  |         |         |
| Crop shock index dummy: 1 if crop damage shock index is >=25%; 0 otherwise   | 0      | 6269 | 3.20(0.92)  | 2.476   | 0.006   |
|  | 1      | 153  | 3.01(0.92)  |         |         |
| Illness shock dummy: 1 if at least one active member of household loss productive time due to illness, 0 otherwise | 0      | 5474 | 3.21(0.91)  | 3.409   | 0.0003  |
|  | 1      | 948  | 3.10(0.94)  |         |         |
| Market unavailability dummy: 1 if interested in working but no wage employment opportunities etc; 0 otherwise      | 0      | 1951 | 3.29(0.94)  | 5.32    | 0.000   |
|  | 1      | 4471 | 3.16(0.90)  |         |         |
| Asset poor households dummy: 1 if households have livestock holding in the bottom three quintiles; 0 otherwise     | 0      | 2496 | 3.54(0.64)  | 25.07   | 0.000   |
|  | 1      | 3926 | 2.97 (0.99) |         |         |

## Annex IV: Mean and median per capita consumption, by survey visits

|  | Mean     | Median | Mean    | Median |
|--|----------|--------|----------|--------|----------|--------|----------|--------|----------|--------|----------|--------|---------|--------|
|  | Visit 1  |        | Visit 2  |        | Visit 3  |        | Visit 4  |        | Visit 5  |        | Visit 6  |        | Visit7  |        |
| Per capita total consumption           | 49.48    | 32.31  | 75.25    | 23.01  | 31.03    | 21.12  | 58.38    | 22.90  | 33.83    | 26.89  | 47.12    | 35.41  | 35.39   | 24.92  |
| Per capita food consumption            | 35.01    | 27.13  | 45.00    | 19.34  | 22.11    | 18.43  | 26.91    | 19.96  | 27.28    | 20.55  | 37.06    | 28.26  | 29.74   | 20.75  |
|  | (69.87)  |        | (59.55)  |        | (71.27)  |        | (45.71)  |        | (80.62)  |        | (78.65)  |        | (83.70) |        |
| Per capita nonfood consumption         | 14.03    | 2.53   | 31.88    | 1.77   | 9.06     | 1.51   | 30.11    | 1.07   | 3.82     | 1.71   | 6.63     | 3.34   | 5.14    | 1.88   |
|  | (26.33)  |        | (38.81)  |        | (27.23)  |        | (49.85)  |        | (10.92)  |        | (13.89)  |        | (14.28) |        |
| Per capita gift, transfer etc received | 16.00    | 4.78   | 15.41    | 9.36   | 6.92     | 4.74   | 9.39     | 4.62   | 4.25     | 3.66   | 15.97    | 5.49   | 3.84    | 1.05   |
|  | (3.80)   |        | (1.63)   |        | (1.51)   |        | (4.44)   |        | (8.46)   |        | (7.45)   |        | (2.02)  |        |
|  | Visit 10 |        | Visit 11 |        | Visit 12 |        | Visit 13 |        | Visit 14 |        | Visit 15 |        | Visit16 |        |
| Per capita total consumption           | 43.08    | 24.68  | 29.09    | 23.66  | 35.05    | 22.51  | 38.72    | 31.12  | 43.34    | 30.46  | 39.86    | 31.06  | 49.21   | 29.38  |
| Per capita food consumption            | 35.52    | 20.23  | 23.19    | 17.26  | 29.90    | 19.09  | 28.91    | 21.47  | 31.52    | 23.29  | 25.64    | 20.72  | 37.33   | 23.68  |
|  | (82.47)  |        | (79.07)  |        | (85.29)  |        | (73.74)  |        | (71.82)  |        | (64.07)  |        | (75.55) |        |
| Per capita nonfood consumption         | 5.93     | 2.51   | 3.57     | 2.02   | 3.21     | 2.20   | 6.82     | 3.45   | 11.90    | 3.48   | 12.77    | 4.34   | 11.33   | 4.88   |
|  | (13.55)  |        | (11.91)  |        | (8.96)   |        | (17.02)  |        | (26.33)  |        | (31.10)  |        | (22.17) |        |
| Per capita gift, transfer etc received | 8.80     | 7.88   | 5.54     | 3.86   | 9.35     | 5.01   | 5.11     | 3.77   | 11.44    | 7.16   | 16.11    | 13.67  | 9.39    | 6.61   |
|  | (3.99)   |        | (9.02)   |        | (5.75)   |        | (9.24)   |        | (1.85)   |        | (4.82)   |        | (2.28)  |        |
|  | Visit 19 |        | Visit 20 |        | Visit 21 |        | Visit 22 |        | Visit 23 |        | Visit 24 |        |         |        |
| Per capita total consumption           | 34.55    | 26.51  | 45.62    | 31.54  | 36.49    | 25.34  | 39.04    | 28.65  | 34.95    | 25.94  | 31.13    | 23.24  | 30.00   | 20.00  |
| Per capita food consumption            | 23.12    | 19.02  | 28.55    | 21.22  | 26.51    | 19.54  | 27.64    | 21.83  | 25.70    | 20.13  | 22.66    | 17.88  | 20.00   | 20.00  |
|  | (66.66)  |        | (62.31)  |        | (72.35)  |        | (70.51)  |        | (73.23)  |        | (72.48)  |        | (66.66) |        |
| Per capita nonfood consumption         | 9.35     | 4.09   | 13.58    | 5.79   | 8.02     | 2.31   | 9.45     | 3.70   | 7.12     | 3.04   | 6.62     | 2.68   | 8.00    | 8.00   |
|  | (26.27)  |        | (29.39)  |        | (21.62)  |        | (23.79)  |        | (20.03)  |        | (20.93)  |        | (26.27) |        |
| Per capita gift, transfer etc received | 7.29     | 4.12   | 6.44     | 3.82   | 9.61     | 3.68   | 7.32     | 3.22   | 11.53    | 5.22   | 8.35     | 5.56   | 13.00   | 13.00  |
|  | (7.07)   |        | (8.30)   |        | (6.04)   |        | (5.70)   |        | (6.74)   |        | (6.59)   |        | (8.00)  |        |

Source: own calculation from survey data.

Note: All figures are biweekly per capital consumption in Birr. Percentages of total consumptions are denoted by parentheses.



# MEASURING THE REAL EXCHANGE RATE MISALIGNMENT OF ETHIOPIA: A DYNAMIC OLS APPROACH

Teferi Mequaninte Tensay<sup>19</sup>

## *Abstract*

*The paper tries to develop a model for the real exchange rate misalignment of Ethiopia. More specifically, the study attempts to examine whether Ethiopia's real exchange rate is misaligned with respect to its long run equilibrium level and answers such question as: (1) what are the constituent parts of the long run equilibrium RER? (2) Which variables set the movement of the equilibrium real exchange rate? (3) Based on the findings calculate the degree of misalignment and (4) what policy measures could be taken to realign the real exchange rate with its equilibrium level. The empirical estimation results conclude that, terms of trade (TOT), external aid inflows (ODA), commercial policy stance (CPS) and investment to GDP ratio were found to influence the long-run real exchange rate in the case of Ethiopia. However, variables such as nominal devaluation and real money supply found to have no effect on the real exchange rate.*

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## 1. Introduction

The Ethiopian economy, with support from the World Bank and International Monetary Fund (IMF), has since October, 1992 witnessed the introduction of adjustment program to halt the down turn of the economy and to move the economy on the path of sustained growth and development. The real exchange rate (RER), by virtue of its impact on the international competitiveness of an economy, assumed an overriding importance among the cohort of policy variables (Haile Kibret, 1994). Evidences from Latin America, Asia and African countries revealed that the link between real exchange rate behavior and economic performance is strong (Elbadawi and Soto, 1995). According to the evidences, sustained RER misalignment usually generates sever macroeconomic disequilibrium (Edwards, 1989). The equilibrium exchange rate, according to Elbadawi (1994) is a path upon which an economy maintains both internal and external balance.

Real exchange rate misalignment as defined by Edwards (1989) refers to a situation where the real exchange rate diverges from its long-run equilibrium, though the equilibrium rate is not actually observed. Ethiopia's real exchange rate has been noted for being misaligned through out its development history (see Tewodros, 2004; Melesse, 2001 and Equar, 2001). This misalignment has contributed to the deterioration of the trade balance, domestic inflationary pressure and the weak competitive position of the country (Asmerom Kidane, 1997).

**The main objective of this paper is therefore, to develop an empirical model for the real exchange rate in Ethiopia. More specifically, the study attempts to examine whether Ethiopia's real exchange rate is misaligned with respect to its long run equilibrium level and answers such question as: (1) what are the constituent parts of the long run equilibrium RER? (2) Which variables set the movement of the equilibrium real exchange rate? (3) Based on the findings calculate the degree of misalignment and (4) what policy measures could be taken to realign the real exchange rate with its equilibrium level.**

Following this introductory part, section two reviews the literature and section three deals with model specification. The data and methodology, Empirical results and the computation of the real exchange misalignment will be done in section four, five and six respectively. Finally section seven gives the concluding remark and policy implications.

## 2. Literature survey

Broadly speaking, there are three competing literatures on the real exchange rate for developing countries; a measure based on purchasing power parity (PPP) (Balassa, 1990), a measure based on using the black market premium (Quirk et al., 1987), and a model based approach (Edwards, 1988, 1994; Elbadawi 1994). The discussion of the Orthodox Purchasing Power Parity - PPP theory defines the real exchange rate as  $e = E P^*/P$ , where E is the nominal exchange rate, P\* and P are foreign and domestic price indices, respectively. This approach assumes an unchanged equilibrium exchange rate throughout the period and calculates the misalignment by deducting the actual real RER from some base year in which case the RER is believed to be in equilibrium.

Edwards (1989) has criticized the application of the PPP theory on the ground that it gives inadequate consideration to changes in the equilibrium RER caused by fundamentals.

The second approach measures the misalignment using the black market exchange rate. This approach is also criticized by Montiel and Ostry (1994) as the informational content of the parallel market is limited in terms of capturing various shocks along the adjustment path. According to Aron (1994a) the parallel market is seen as a thinly traded market solely used for illicit activities.

In the modern theory the real exchange rate, RER is defined as the relative price of tradable goods ( $P_T$ ) to non-tradable goods ( $P_N$ ) i.e.,  $E P_T^* / P_N$  and uses a formal model for determining the RER. Its principal advantage is the capability of incorporating changes in the equilibrium real exchange rate and involves the calculation of the Fundamental Equilibrium Exchange Rate (Williamson 1994). Despite its advantages, however, there is no direct measure for the prices of tradable and non-tradable goods in this approach. Therefore, whether to use consumer price index (CPI) or world wholesale price index (WPI) to substitute price of non-tradable and tradable respectively or what such choice represents has been unsettled issues. Elbadawi (1994) and Edwards (1989) for instance, argued WPI is a good proxy for the price of tradable and the CPI for that of non-tradable. Their reasoning is that WPI contains mainly tradable and CPI mainly non-tradable. This study will also use WPI as a measure of tradable and CPI as a proxy for non-tradable.

Another dilemma in using the modern theory of real exchange rate is that on the choice of nominal exchange rate. Whether to use bilateral exchange rate with respect to the strong US Dollar or the multilateral exchange rate of the trading partners and what weights and which country's currencies should be included in the multilateral exchange rate is still an unresolved issue. This study, in congruent with other empirical studies, will use the multilateral real exchange rate and trade weights will be used in the selection of trading partners.

Various studies on the determinants of the real exchange rate and the effects of real exchange rate misalignment have been undertaken. Edwards (1989) for example, developed a theoretical model of real exchange rate behavior and devised an empirical equation of how to estimate the real exchange rate dynamics using pooled data for a group of twelve developing countries. According to him, the important fundamentals that determine the real exchange rate are; the terms of trade, level and composition of government consumption, controls on capital flows, exchange and trade controls, technological progress, and capital accumulation. The study found that in the short-run, real exchange rate movements are affected by both real and nominal factors. In the long run however, only real factors affect the sustainable equilibrium real exchange rate. Edwards (1989) further investigated whether there was any link between real exchange misalignment and economic performance. His conclusion was that the countries whose real exchange rates were closer to equilibrium out-performed those with misaligned real exchange rates. Similarly Cottani et al (1990) also argued that in parts of Latin America, unstable real exchange rates inhibited export growth, while in Asia, export expansion was fostered by stable exchange rates. On the other, in Africa, the wide spread poor performance of the agricultural sector and economic growth in general could be attributed to persistently misaligned real exchange rates.

Cottani et al's argument was authenticated by other empirical findings. Ghura and Grennes (1993), for example, investigated the impact of real exchange rate misalignment on economic performance using a panel data for sub-Saharan countries. They too found that real exchange rate misalignment negatively affected income growth, export and imports, and investment and savings. In all the above studies, the most common determinants of real exchange rate were found to be terms of trade, openness, capital inflows and nominal devaluation. Other studies employing cointegration analysis in the empirical analysis of the real exchange rate as stated in Mkenda (2001), includes; Baffes et al (1999) for Cote d'Ivoire and Burkina Faso, Elbadawi and Soto (1997) for seven developing countries, Kadenge (1998) for Zimbabwe, Gelband and Nagayasu (1999) for Angola, and Aron et al (1997) for South Africa.

With in the context of Ethiopia, empirical studies on the determination of the equilibrium exchange rate have been undertaken. Tewodros (2004), in his annually based construction of Equilibrium Real Exchange Rate for Ethiopia, for the periods 1970/71-2003/04, noted that both the actual REER and equilibrium exchange rate seemed to appreciate until the end of the Derg regime and depreciate there after. Melesse (2001), using quarterly data for the period's 1985/86 - 1990/00, also observed the real exchange rate of the Birr had been over valued from 1986/87 - 1990/91 and then fluctuates between under valuation and convergence to the equilibrium after wards. Equar (2001), in his Master's thesis and using quarterly data for the periods between 1985 and 2000 found that ERER is above the actually observed real exchange rate (i.e., the Birr was overvalued). According to him, after the introduction of the economic reform, however, the misalignment is gradually narrowed.

**This study adds to the existing works on the real exchange rate for Ethiopia in a unique way. In all empirical studies above (by Melesse, Equar and Tewodrose, for instance) important variable such as real money supply was skipped from the regression analysis despite its relevance in the real exchange rate specification and hence the mission of the National Bank of Ethiopia (NBE). In addition to this, the present study replaces capital control by Official Development Assistance (ODA) as the later constitutes major capital inflow to the country.**

### 3. Model specification

In the Behavioral equilibrium exchange rate model, the real exchange rate ( $REER$ ) is defined as the domestic relative price of tradable goods ( $P_T$ ) to non-tradable goods ( $P_{NT}$ ), that is,  $REER = (eP_T/P_{NT})$  compatible with the attainment of internal and external equilibrium, and  $e$  is the nominal exchange rate. Internal equilibrium presupposes that the market for non-tradable clears in the current period and is expected to be so in the future. External equilibrium implies that the current account balances both in the current and future periods are compatible with long-run sustainable capital flows (Elbadawi, 1994). Thus, using equations below, the hypothesized relationships can be specified.

Based on the works of Melesse (2001) and Equar (2001), and as observed by Edwards (1989), the dynamics of the behavior of the real exchange rate are given by equation as follows:

$$\text{LogRER}_t = [\beta(\text{LogRER}_t^* - \text{LogRER}_{t-1}) - \lambda(\text{MAC}_t - \text{MAC}^*_t) + \alpha(\text{LogNER}_t - \text{LogNER}_{t-1})] \quad (1)$$

Where

$(\text{LogRER}_t^* - \text{LogRER}_{t-1})$  = Deviations of the actual real exchange rate from its equilibrium level

$(\text{MAC}_t - \text{MAC}^*_{t-1})$  = Inconsistency in the macroeconomic policy framework

$(\text{LogNER}_t - \text{LogNER}_{t-1})$  = Nominal exchange rate devaluation

$\beta, \lambda, \alpha$  = Positive parameters capturing vital aspects of the adjustment process

**Equation (2) gives an indication of the main fundamentals that influence the behavior of the equilibrium real exchange rate:**

$$\text{LogRER}_t^* = \beta_0 + \beta_1 \text{Log}(TOT)_t + \beta_2 \text{Log}(AID) + \beta_3 \text{Log}(GCN)_t + \beta_4 \text{Log}(CPS)_t + \beta_5 \text{Log}(GRGDP)_t + \beta_6 \text{Log}(INVGDP)_t + U_t \quad (2)$$

Where

$\text{RER}_t^*$  = The equilibrium real exchange rate

$TOT$  = External terms of trade

$AID$  = External aid inflows (defined as real net ODA to Ethiopia)

$GCN$  = Government consumption of non-tradable (measured by the share of government consumption in GDP)

$CPS$  = Commercial policy stance (measured by the black market premium)

$GRGDP$  = Growth rate of real GDP (used as a measure of technological progress)

$INVGDP$  = Investment to GDP ratio.

Edwards (1989) stressed that this equation of equilibrium RER does not provide an explicit distinction between permanent and temporary movements in the fundamentals. Thus, it would be necessary to breakdown the fundamentals in to these components as the long-run equilibrium exchange rate is determined by the permanent components.

Equation (2) puts the equilibrium real exchange rate as a function of real fundamentals. But the actual real exchange rate, as given in equation (1), responds to both real fundamentals and macroeconomic policies represented by  $-\lambda(\text{MAC}_t - \text{MAC}^*_t)$ . Thus, Aron et al (1997) and Mkenda (2001) included central bank reserve (CBR) and real money supply (M2) to the model of

the real exchange rate to capture the role of macroeconomic policies. Finally, some measures of nominal devaluation should also be introduced to real exchange rate model to capture the impact of nominal devaluation.

**Incorporating all the above, the model for the real exchange rate (RER) that is used for estimation can be formulated as:**

$$\begin{aligned} \text{LogRER}_t = & \beta_0 + \beta_1 \log(\text{TOT})_t + \beta_2 \log(\text{AID})_t + \beta_3 \log(\text{GCN})_t + \beta_4 \log(\text{CPS})_t + \beta_5 \log(\text{GRGDB})_t + \\ & \beta_6 \log(\text{INVGD})_t + \lambda \log(\text{CBR})_t + \log \hat{c}(M2) + \alpha(\log \text{NER}_t - \log \text{NER}_{t-1}) + \eta \log \text{RER}_{t-1} + U_t \end{aligned} \quad (3)$$

$(\log \text{NER}_t - \log \text{NER}_{t-1})$  Stands for nominal devaluation and  $U_t$  for the error term.

The expected theoretical impacts of the respective fundamentals are as follows:

*TOT* (?) -Since terms of trade is defined as the relative price of exports to imports, its impact on the RER is theoretically ambiguous and depends on the relative strengths of the direct income effect operating through the demand for non-tradable and the indirect substitution effects that operates through the supply of non-tradable. To illustrate the impact of the direct income effect, let the price of exports increase (improvement in TOT), and the price of imports stay constant. The increases in the price of exports increases income and then raises the demand for both imports and non-tradable domestic goods. Since the price of imports is given, the higher demand would only affect the price of non-tradable goods and hence a real exchange appreciation will occur. If a deterioration in the terms of trade occur, it may lead to the opposite effect (reducing income and the demand for all goods and hence resulting in a depreciation in the RER). Sometimes, the indirect substitution effect may dominate the direct income effect. For example, an improvement in terms of trade may provide sufficient foreign exchange resources to producer of non-tradable goods in the economy. The increased resources may then enable the producers to increase their production of non-tradable goods, hence lowering its price and to a depreciation in the RER. If a deterioration in terms of trade occurred, it may lead to the opposite effect (an appreciation of the RER). In Elbadawi and Soto's (1997) study of seven developing countries, in three cases, an improvement in the term of trade appreciated the real exchange rate, while in four cases; an improvement in the terms of trade depreciated the real exchange rate.

*AID* (-) -By increasing real incomes and consequently the demand for both traded and non-traded goods, it tends to cause the RER to appreciate. In his study of twelve developing countries, Edwards (1989) found that an increase in capital inflows appreciated the real exchange rate, as expected.

*GCN* (?) -Increases in government expenditure on non-tradable appreciates the RER, while those on tradable causes the RER to depreciate. Edwards (1989) found that an increase in government consumption appreciated the real exchange rate in four of the equations he estimated for a group of twelve developing countries, while in the other two equations, an increase in government consumption depreciated the real exchange rate.

*CPS* (+) -A reduction, for instance, in an import tariff can decrease the domestic price of imports, which are a part of tradable goods. This can in turn decrease the local currency price of tradable goods, leading to an appreciation in the real exchange rate. An increase in import tariffs can have the opposite effect. That is, it can raise the domestic price of imports, thereby depreciating the real exchange rate. However, the demand for imports and consequently for foreign exchange will increase, leading to a depreciation in the real exchange rate. In their study of Cote d'Ivoire and Burkina Faso, Baffes et al (1999) found results consistent with the theory; reforms that are aimed at liberalizing trade are consistent with a depreciated real exchange rate.

*GRGDP* (?) -Technological progress appreciates the RER if gains emanating from productivity enhancement in the tradable Sector override those in the non-tradable sector. Edwards (1989) found that an increase in technological progress depreciated the real exchange rate in all his regressions. Aron et al (1997), on the other hand, found that an increase in technological progress appreciated South Africa's real exchange rate.

*CBR* (?) -Central Bank reserve intervention indicates the capacity of the Bank to defend the currency (Aron et al, 1997). An increase in reserve has the effect of appreciating the real exchange rate, while a decrease in reserves depreciates the real exchange rate. In their study of the determinants of the real exchange rate for South Africa, Aron et al (1997) found results consistent with the theory; an increase in reserves appreciated the real exchange rate.

$NER_t$  (+) -Nominal devaluation tends to depreciate the RER.

$M_2$  (-) -Increase in real money supply depreciates the real exchange rate

*INVGD*P (?) -Its impact on the real exchange rate depends on whether an increase in investment changes the composition of spending on traded and non-traded goods. If an increase in the share of investment in GDP changes the composition of spending towards traded goods, it will lead to depreciation in the real exchange rate (Baffes et al.; Edwards, 1989). On the other hand, a change towards non-traded goods appreciates the real exchange rate. For example, Baffes et al (1999) found that an increase in the share of investment in GDP depreciated the real exchange rate in Cote d'Ivoire. Edwards (1989) also found that increases in the share of investment in GDP resulted in depreciation in the real exchange rate in his study of twelve developing countries.

Following the definition of the real exchange rate, a negative sign (i.e.,-) represents an appreciation of the real exchange rate. This is because the real exchange rate is inversely related to spending (consumption) on non-tradable goods. This happens so because if we start from a position of internal balance, a rise in spending creates an excess demand for non-tradable goods at the original real exchange rate. In order to restore equilibrium, a real appreciation is required, which would switch supply toward non-tradable goods, and demand toward tradable goods.

#### 4. Data and methodology

All data used in this study relate to the period 1970/71 to 2003/04 and was obtained from the Macro econometric team of the National Bank of Ethiopia (NBE) and the Organization for Economic Cooperation and Development (OECD) website for the ODA. The data used is annual and the variables are in logs.

The paper employs the Stock Watson Dynamic OLS estimation procedure in determining the presence of relationship between the real exchange rate and its determinants. DOLS approach has certain advantages over both OLS and the Johansen maximum likelihood procedures. The OLS a priori categorizes variables as endogenous and exogenous with implication of endogeneity problem and also the error term is not normally distributed (auto-correlation). The Johansen method, being a full information technique is exposed to the problem of misspecification and small data observation. However, the Stock Watson method is a robust single equation approach, which corrects the problem of endogeneity by inclusion of leads and lags of the first difference of the regressors and for serially correlated errors by a GLS procedure. In addition DOLS has the same good property as the OLS for small sample size and it has the same asymptotic optimality property as the Johansen distribution.

## 5. The Stock-Watson (DOLS) empirical results

The Stock-Watson DOLS estimates for the equilibrium exchange rate in Ethiopia appears in Table 1 below. The behavioral exchange rate model is estimated including up to  $j=\pm 2$  leads and lags; insignificant lags and leads were dropped. By the rule of DOLS since the short-run model is the adjustment period where the leads and lags net out their effects, its analysis and interpretation is not included (Stock et al, 1993). Given the fact that a substantial amount of government consumption contains foreign aid and that there is no disaggregated data for government consumption of non-tradable, GCN is excluded from the empirical estimation. Similarly, since technological progress can be captured by investment to GDP ratio (see Jing Xu, 2003) and our economy is mainly agrarian, GRGDP has been also excluded from the empirical model. By the same logic as net foreign asset (NFA) is the component of broad money (M2) in Central Bank's asset specification; CBR is out of the empirical estimation. Finally dummy war (DWAR) is included in the empirical estimation.

**Table 1: The Stock-Watson (DOLS) Empirical Results**

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | 7.540841    | 0.937051   | 8.047414    | 0.0000 |
| LOG(TOT) | -0.250354   | 0.097467   | -2.568600   | 0.0199 |
| LOG(AID) | -0.356436   | 0.082791   | -4.305254   | 0.0005 |
| LOG(CPS) | 0.636917    | 0.098133   | 6.490342    | 0.0000 |

|                    |           |                       |           |        |
|--------------------|-----------|-----------------------|-----------|--------|
| LOG(INVGDP)        | 0.558694  | 0.270346              | 2.066587  | 0.0544 |
| DLOG(TOT)          | 0.189792  | 0.114774              | 1.653621  | 0.1166 |
| DLOG(AID)          | 0.251486  | 0.111842              | 2.248581  | 0.0381 |
| DLOG(M2)           | -0.031646 | 0.361526              | -0.087536 | 0.9313 |
| DLOG(TOT(-1))      | 0.175415  | 0.107297              | 1.634849  | 0.1205 |
| DLOG(AID(-1))      | 0.234128  | 0.153819              | 1.522103  | 0.1464 |
| DLOG(CPS(+1))      | 0.169086  | 0.131477              | 1.286057  | 0.2157 |
| DLOG(INVGDP(+1))   | 0.597379  | 0.251350              | 2.376687  | 0.0295 |
| D(NOMDEVAL(1))     | -0.260052 | 0.142871              | -1.820192 | 0.0864 |
| DWAR               | 0.149712  | 0.098011              | 1.527501  | 0.1450 |
| R-squared          | 0.878032  | Mean dependent var    | 4.945367  |        |
| Adjusted R-squared | 0.784762  | S.D. dependent var    | 0.290335  |        |
| S.E. of regression | 0.134697  | Akaike info criterion | -0.869122 |        |
| Sum squared resid  | 0.308437  | Schwarz criterion     | -0.221514 |        |
| Log likelihood     | 27.47138  | F-statistic           | 9.413903  |        |
| Durbin-Watson stat | 1.313360  | Prob(F-statistic)     | 0.000023  |        |

Variables qualified for the long-run model are TOT, AID, CPS and INVGDP and their respective coefficients are; -0.250, -0.356, 0.637, and 0.559. Except for M2 and Nominal devaluation, all the variables are significant and the results show that taken together, these fundamentals explain 78 percent of the variation in the real exchange rate. The negative parameters on terms of trade and foreign aid variables imply a tendency towards real exchange rate appreciation. However, commercial policy stance and investment to GDP ratio variables exhibit positive coefficients and, therefore, tend to depreciate the real exchange rate.

The negative and significant effect of the terms of trade on the real exchange rate implies that the indirect substitution effect dominates the direct income effect in the case of Ethiopia. The substitution effect may have been on the supply side, in which case deterioration in terms of trade (adverse terms of trade and drought) may not provide sufficient foreign exchange resources to producers of non-tradable goods in the economy. The decreased resources may then not enable the producers to increase their production of non-tradable goods, hence increasing its price and to appreciation of the real exchange rate.

The coefficient on external aid is also negative and significant. This result suggests that a large percentage of foreign aid may have probably been invested in the non-tradable goods and services such as wages, services and recurrent expenditure. As has been evidenced in Yohans (1996) "the growth in Ethiopia's net foreign asset (NFA) including official loans and grants caused monetary expansion". The same results have been obtained from studies on many developing countries (See for example, Elbadawi and Soto, 1997 and Edwards, 1989).

The positive coefficient on commercial policy stance implies a tendency towards real exchange rate depreciation. The result suggests that a relaxation of the extent of impediments to international trade (openness) resulted in equilibrium exchange rate depreciation. This result supports the view that liberalization allows more goods and services in to a country, with the impact of bringing in more competition for domestic goods. The competition could have exerted some downward pressure on the price of non-tradable causing the RER to depreciate. Similar to

this result, Baffes et al (1999), in their study of Cote d'Ivoire and Burkina Faso, found results consistent with the theory.

The coefficient on investment to GDP ratio is also significant with the expected positive sign. It is to be expected that at the early stage of development and an increase in investment to GDP ratio lead to an increase in demand for imports, which in turn bring about reduction in the price of non-tradable and hence real exchange rate depreciation.

**From the results of test on residuals shown in appendixes 1, 3 and 4 (ARCH test, serial correlation and normality test), model specification (i.e., RESET test or appendix 2), it is evident that the DOLS single equation model provided in Table 1 passes the various diagnostic tests. The Breusch-Godfrey LM test statistics is given by the product of the number of observations and the coefficient of determination (i.e., Obs\*R-squared) and is asymptotically distributed as chi-squared. The serial correlation test suggests the absence of second order serial correlation as evidenced in LM test statistics of 3.07 being less than its critical value of 5.99 (at the 5% level). In other words, the null hypothesis of no serial correlation is accepted. There are no ARCH effects in the residuals since the computed statistics of 0.92 is relatively lower than the critical F-value of about 4.17. Apart from these tests, there is an implication of appropriate specification in the sense that the Ramsey RESET test provides credence for this.**

## 6. Real exchange rate misalignment

As has been well mention in the introductory part, one of the reasons for finding the determinants of the equilibrium real exchange rate is to be able to estimate the degree of misalignment in the real exchange rate. In order to estimate the degree of misalignment, the long-run estimates of the fundamentals have been used to obtain the fitted values of the equilibrium real exchange rates. The misalignment in the real exchange rate is then calculated as,

$$e_{mis} = (RER - EREER) / EREER$$

Where, *RER* is the actual real exchange rate, and *ERER* is the equilibrium real exchange rate. The calculated percentage of misalignment for the real exchange rate is given in Table 2, and Figure1 and Appendix 5 plots the misalignment.

The computed indices of misalignment indicate that the real exchange rates were overvalued and undervalued in a number of episodes. The most notable period is the overvaluation of the exchange rate between 1973/74-1975/76, 1991, 1993/94-1995/96 and 2000-2001. The overvaluation of the exchange rate during 1973/74-1975/76 and 1991 could be due to change in governments and the particularly prolonged appreciation of the exchange rate during 1973/74-1975/76 was on account of the international oil price crises of the 1973/74.

Though the introduction of devaluation and the auctioning system initially resulted in the depreciation of the exchange rate during 1992, the real exchange rate appreciated in the following four years (between 1993 and 1996).

**Table 2: Computed Real Exchange Rate Misalignment (percentage)**

| Year | Misalignment |
|------|--------------|
|------|--------------|

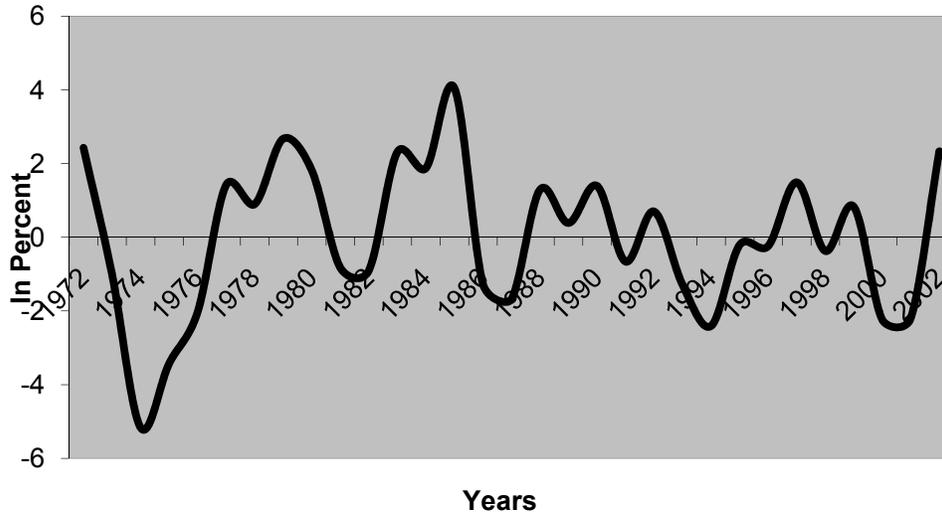
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|      |          |
|------|----------|
| 1972 | 12.48379 |
| 1973 | -4.86368 |
| 1974 | -22.9648 |
| 1975 | -16.0113 |
| 1976 | -9.86221 |
| 1977 | 7.341946 |
| 1978 | 4.597044 |
| 1979 | 14.06048 |
| 1980 | 9.283527 |
| 1981 | -4.09735 |
| 1982 | -4.57942 |
| 1983 | 12.3613  |
| 1984 | 10.37971 |
| 1985 | 23.32531 |
| 1986 | -6.44944 |
| 1987 | -8.36207 |
| 1988 | 6.715578 |
| 1989 | 2.022269 |
| 1990 | 7.594074 |
| 1991 | -3.60069 |
| 1992 | 3.552866 |
| 1993 | -5.9614  |
| 1994 | -10.7156 |
| 1995 | -0.95319 |
| 1996 | -1.09436 |
| 1997 | 7.238411 |
| 1998 | -1.72824 |
| 1999 | 3.806392 |
| 2000 | -9.73367 |
| 2001 | -9.48958 |
| 2002 | 10.99346 |

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**This could be due to the inflationary impact of the international coffee price boom and the composition of foreign exchange inflows has shifted from official to private sources during these periods. As clearly indicated in Yohans (1996) money supply registered a 20.9 percent growth at the end of June 1995 as against the targeted growth rate of 12.6 percent and also lending to the private sector as a percentage of GDP by the commercial bank of Ethiopia increased dramatically from 19.8 percent in 1993/94 to 22.1 percent in 1994/95.**

Figure 1: Misalignment of the Real Exchange Rate



The auctioning system was abandoned in October 2001 and also the Ethio-Eritrea war was ended at the beginning of 2001 and these may have been the causes for the severe depreciation of the real exchange rate in 2002. The appreciation of the real exchange rate in 2000 and 2001 can also be explained by the Ethio-Eritrea war. There were also episodes of undervaluation in the periods 1977 to 80, 1983 to 1985, 1988 to 1990, in 1997, in 1992, and in 2002. As one can see from Figure 1 and appendix 5, the resulting EREER is consistent with Edwards (1989) and Elbadawi (1994) in that the EREER shows some variability and calculating the misalignment based on the PPP will be misleading. However, as one would expect, whether these episodes of over-valuation and undervaluation trace adequately the actual trend in Ethiopia will of course depend on the reliability of the data used. It is well known that there were substantial price controls for commodities particularly in the period prior to 1990. This may make the official consumer price index suspect. It is also true that tracking the long-run equilibrium is quite tricky, and the method employed here can at best only provide a crude estimate.

## 7. Conclusion and policy implication

The purpose of this study was to find the main determinants of the real exchange rate in Ethiopia, and to estimate the degree of misalignment of the actual real exchange rate from its long run equilibrium level. In doing so, the paper reviewed various literatures to emphasize the importance of the real exchange rate.

In the process of identifying and estimating the long-run determinants (fundamentals) of the real exchange rate in Ethiopia, the paper employed Dynamic OLS single equation estimation technique. The empirical estimation results conclude that, terms of trade (TOT), external aid inflows (ODA), commercial policy stance (CPS) and investment to GDP ratio were found to influence the long-run real exchange rate in the case of Ethiopia. However, variables such as nominal devaluation and real money supply found to have no effect on the real exchange rate.

Terms of trade have an appreciating effect on the real exchange rate. This finding has a theoretical underpinning and it implies that the substitution effect dominates the income effect in the case of Ethiopia. The finding that aid inflows have an appreciating effect on the real exchange rate has implications for using aid to infrastructural development and other development activities.

The significance of commercial policy stance (openness) with positive impact is also in support of a popularly held view that if a country increases its import tariffs, then this will increase the domestic price of imports, which are part of tradable goods. This can in turn increase the local currency price of tradable goods, thereby leading to a depreciation of the real exchange rate. One implication for the macroeconomic management is that trade reforms should be undertaken with maximum care. This is because complete liberalization of trade requires a stable and flexible exchange rate with appropriate timing and sequencing of the reform program. For instance, complete liberalization of the current account has a paramount importance before trying to liberalize the capital account. The depreciation impact of investment to GDP ratio on the real exchange rate also calls for strengthening the meager foreign direct investment (FDI) by relaxing some of the restrictive policies that prevented FDI flowing in to the country.

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## Appendices

### Appendix 1

| ARCH Test:    |          |             |          |
|---------------|----------|-------------|----------|
| F-statistic   | 0.924087 | Probability | 0.344633 |
| Obs*R-squared | 0.958461 | Probability | 0.327575 |

Test Equation:

Dependent Variable: RESID<sup>2</sup>

Method: Least Squares

Date: 03/07/06 Time: 11:34

Sample(adjusted): 1973 2002

Included observations: 30 after adjusting endpoints

White Heteroskedasticity-Consistent Standard Errors & Covariance

| Variable                | Coefficient | Std. Error            | t-Statistic | Prob.     |
|-------------------------|-------------|-----------------------|-------------|-----------|
| C                       | 0.008049    | 0.003378              | 2.382679    | 0.0242    |
| RESID <sup>2</sup> (-1) | 0.178525    | 0.146815              | 1.215986    | 0.2341    |
| R-squared               | 0.031949    | Mean dependent var    |             | 0.009820  |
| Adjusted R-squared      | -0.002625   | S.D. dependent var    |             | 0.014457  |
| S.E. of regression      | 0.014476    | Akaike info criterion |             | -5.568306 |
| Sum squared resid       | 0.005868    | Schwarz criterion     |             | -5.474893 |
| Log likelihood          | 85.52459    | F-statistic           |             | 0.924087  |
| Durbin-Watson stat      | 1.991150    | Prob(F-statistic)     |             | 0.344633  |

## Appendix 2

| Ramsey RESET Test:   |          |             |          |
|----------------------|----------|-------------|----------|
| F-statistic          | 0.171171 | Probability | 0.684566 |
| Log likelihood ratio | 0.329879 | Probability | 0.565730 |

Test Equation:

Dependent Variable: LOG(REER)

Method: Least Squares

Date: 03/07/06 Time: 11:30

Sample: 1972 2002

Included observations: 31

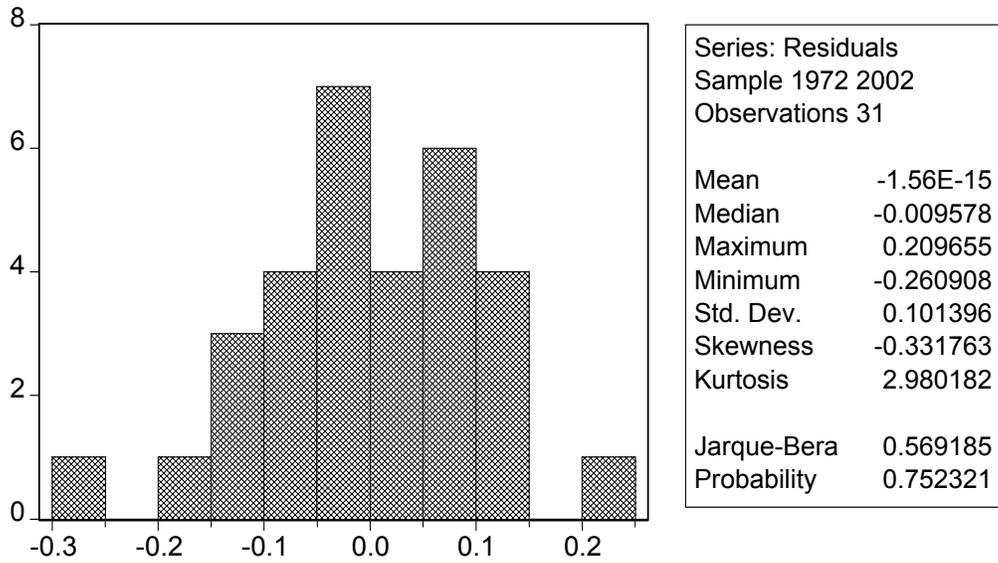
White Heteroskedasticity-Consistent Standard Errors & Covariance

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.     |
|--------------------|-------------|-----------------------|-------------|-----------|
| C                  | 19.43904    | 25.60707              | 0.759128    | 0.4588    |
| LOG(TOT)           | -0.832243   | 1.251703              | -0.664889   | 0.5156    |
| LOG(AID)           | -1.177223   | 1.770622              | -0.664864   | 0.5156    |
| LOG(CPS)           | 2.147144    | 3.267734              | 0.657074    | 0.5205    |
| LOG(INVGDP)        | 1.862012    | 2.817339              | 0.660912    | 0.5181    |
| DLOG(TOT)          | 0.632047    | 0.950743              | 0.664792    | 0.5157    |
| DLOG(AID)          | 0.822291    | 1.187704              | 0.692337    | 0.4987    |
| DLOG(M2)           | -0.075581   | 0.365069              | -0.207031   | 0.8386    |
| DLOG(TOT(-1))      | 0.595718    | 0.917790              | 0.649079    | 0.5255    |
| DLOG(AID(-1))      | 0.783262    | 1.224021              | 0.639909    | 0.5313    |
| DLOG(CPS(+1))      | 0.563777    | 0.848523              | 0.664422    | 0.5159    |
| DLOG(INVGDP(+1))   | 2.034130    | 3.152385              | 0.645267    | 0.5279    |
| D(NOMDEVAL(1))     | -0.937893   | 1.489958              | -0.629476   | 0.5379    |
| DWAR               | 0.496807    | 0.749130              | 0.663179    | 0.5167    |
| FITTED^2           | -0.240018   | 0.516688              | -0.464531   | 0.6485    |
| R-squared          | 0.879323    | Mean dependent var    |             | 4.945367  |
| Adjusted R-squared | 0.773731    | S.D. dependent var    |             | 0.290335  |
| S.E. of regression | 0.138106    | Akaike info criterion |             | -0.815247 |
| Sum squared resid  | 0.305172    | Schwarz criterion     |             | -0.121382 |
| Log likelihood     | 27.63632    | F-statistic           |             | 8.327520  |
| Durbin-Watson stat | 1.306084    | Prob(F-statistic)     |             | 0.000069  |

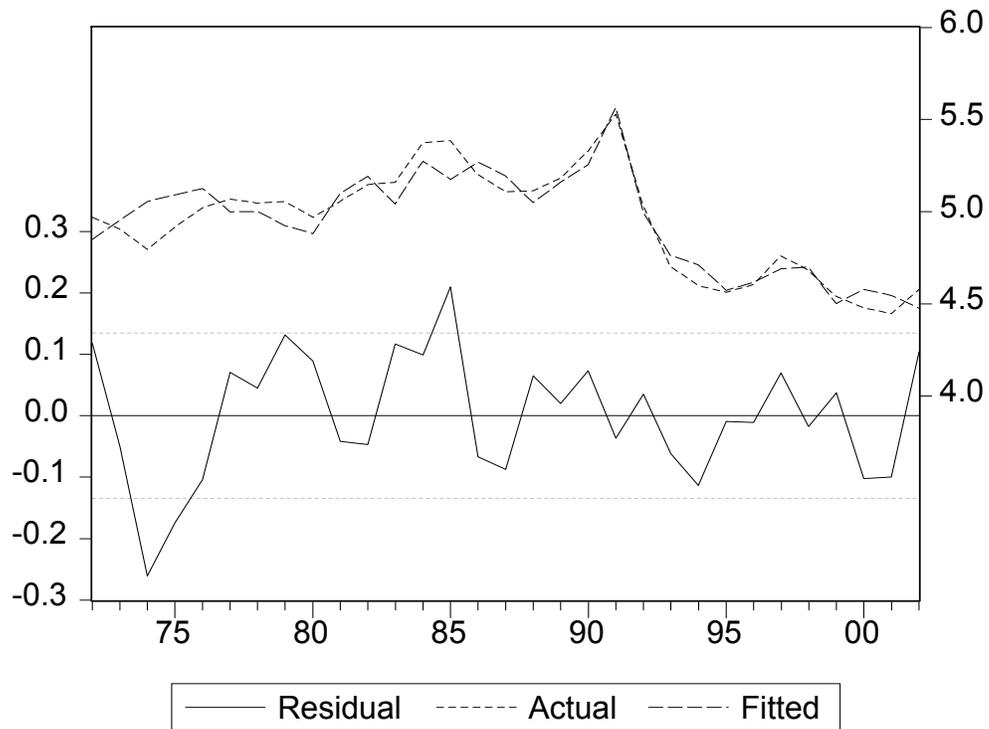
## Appendix 3

| Breusch-Godfrey Serial Correlation LM Test:           |             |                       |             |        |
|---|-------------|-----------------------|-------------|--------|
| F-statistic   | 3.071500    | Probability           | 0.076196    |        |
| Obs*R-squared   | 9.006905    | Probability           | 0.011071    |        |
| Test Equation:  |             |                       |             |        |
| Dependent Variable: RESID                             |             |                       |             |        |
| Method: Least Squares                                 |             |                       |             |        |
| Date: 03/07/06 Time: 11:39                            |             |                       |             |        |
| Presample missing value lagged residuals set to zero. |             |                       |             |        |
| Variable  | Coefficient | Std. Error            | t-Statistic | Prob.  |
| C   | -0.239299   | 1.125748              | -0.212569   | 0.8345 |
| LOG(TOT)  | 0.017352    | 0.108010              | 0.160651    | 0.8745 |
| LOG(AID)  | 0.044836    | 0.097710              | 0.458871    | 0.6529 |
| LOG(CPS)  | -0.060279   | 0.107969              | -0.558295   | 0.5849 |
| LOG(INVGDP)   | -0.069821   | 0.328869              | -0.212307   | 0.8347 |
| DLOG(TOT)   | -0.034038   | 0.130236              | -0.261353   | 0.7974 |
| DLOG(AID)   | -0.022697   | 0.125457              | -0.180919   | 0.8589 |
| DLOG(M2)  | -0.393661   | 0.370632              | -1.062134   | 0.3050 |
| DLOG(TOT(-1))   | -0.135757   | 0.125250              | -1.083888   | 0.2955 |
| DLOG(AID(-1))   | -0.127136   | 0.142736              | -0.890707   | 0.3872 |
| DLOG(CPS(+1))   | -0.037538   | 0.140296              | -0.267564   | 0.7927 |
| DLOG(INVGDP(+1))                                      | -0.435938   | 0.323350              | -1.348191   | 0.1976 |
| D(NOMDEVAL(1))  | -0.061671   | 0.167816              | -0.367492   | 0.7184 |
| DWAR  | -0.154303   | 0.113779              | -1.356164   | 0.1951 |
| RESID(-1)   | 0.855923    | 0.361560              | 2.367306    | 0.0318 |
| RESID(-2)   | -0.340048   | 0.381869              | -0.890485   | 0.3873 |
| R-squared   | 0.290545    | Mean dependent var    | -1.56E-15   |        |
| Adjusted R-squared                                    | -0.418909   | S.D. dependent var    | 0.101396    |        |
| S.E. of regression                                    | 0.120781    | Akaike info criterion | -1.083348   |        |
| Sum squared resid                                     | 0.218822    | Schwarz criterion     | -0.343225   |        |
| Log likelihood  | 32.79189    | F-statistic           | 0.409533    |        |
| Durbin-Watson stat                                    | 1.988124    | Prob(F-statistic)     | 0.952901    |        |

## Appendix 4



Appendix 5





## SOME THOUGHTS ON SOCIO-ECONOMIC ENGINEERING IN FRAGILE STATES IN AFRICA: THE CASE OF UGANDA

Tenkir Bongor<sup>20</sup>

### *Abstract*

*The variable(s) explaining the poverty or otherwise of nations has successively moved from that held for a very long time - access to natural resources, physical capital, the acquisition and sustainability of technology, the development of human capital, the generation and implementation of sound policies and more recently to institutions.*

*With respect to governance institutions, in pre-colonial sub-Saharan Africa [SSA], with the possible exception of Ethiopia and Eritrea, shifting cultivation and pastoralism precluded the emergence of formed sedentary agrarian social classes and states based on the production, exchange, and distribution of agricultural surplus in the mould of the other two developing regions of the world, Asia and Latin America. While the SSA governance institutions may have been adequate given their respective traditional mode(s) of production, given their dis-organization by colonialism in the transition to modernity and multi-ethnic polity, they have given rise to more fragile states with serious shortcomings to serve as a locus for economic development.*

*Emerging from the chaotic years of the rule of Idi Amin, when the fragility of the state had attained its maximum expression, Uganda has been in the process of building institutions for economic development within the framework of structural adjustment and liberalization of the economy. These have been anchored around three policy areas enunciated by the Ugandan Government vis. Agricultural Modernization, Poverty Eradication and Universal Primary Education (UPE) in relation to agricultural and rural development*

*The field observations on which this paper has built on were garnered in the course of poverty study in seven districts of Uganda - Apac, Lira, Soroti, Iganga, Ntungamo, Bushenyi and Mpigi. The mainly anecdotal observations are discussed around five main themes - **Access to Land and Livelihoods, UPE & Poor Households, Poverty & Life Cycles, Three Hours as a Working Day and A Very Poor Village in a Rich District.** The paper interfaces the observed institutional realities on the ground with the demands of sustainable economic development. It is hoped that the issues raised will stimulate further discussion in tandem with the above policy pronouncement of the Ugandan Government.*

*Towards this end, the paper suggests that for creative institutions and policies situated in the African social space, policy analysts need to disentangle the economic, political, social and cultural roots of existing institutions and mould them to nurture and sustain policies and instruments chosen by society. In doing so, such institutions need to be socio-culturally comprehensible but also sufficiently reformist and modernist; inclusive of all stakeholders but attuned to the task environment; endowed with predictable behavior without being inflexible; durable but also*

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*adaptable in process and finally transparent and accountable enough to justify their autonomy from undue political interference in their operations.*

**Traditional institutions must be understood as the diverse mechanisms by which Africans regulated social and economic affairs, exercised and controlled political power. They included, for example, village councils which promulgated and enforced access rules that regulated the balance between livestock, water, and forage, assuring that overgrazing was minimized; local councils which required livestock owners to regulate their animals, protect crops and complex rules of access and use that assured young men over most of Africa access to fallow land, rules of organization, financial obligation and authority which were used to organize vast markets which sustained trade over thousands of miles...[Wunsch.S. & D. Olwu. 1990. The Failure of the Centralized State: Institutions and Self Governance in Africa. Westview Press, San Francisco and Oxford, p62].**

## 1. General context<sup>21</sup>

Among late developing regions, the sedenterization of the populace in Latin America and Asia gave rise to social formations embedded in agrarian social relations forged over a long period of time. The *conquistador* system based on the *minifundia* and *latifundia* was respectively counterpoised on races embracing Native Americans and white settlers from Europe – Spain, Portugal, Italy and others (see Berry, A. & William Cline. 1979; Janvry, A. 1981; Kay, C. 1974.). In the last fifty years or so, the white political class consisting of the *conquistadors* and the dependent bourgeoisie with core bases in the military, contested state power with white led leftists, sometimes in the open and at other times underground.

Since democratization in the 1980s, Latin America has been on a speedy march to social democracy, this time largely led by the Native Indians and other democratic grass root based social organizations. Unlike Europe where social democracy gradually emerged on the throes of the capitalist nation state, in Latin America, it appears to have preceded the European social formations which had formed the bedrocks for social democracy. The potential fragility of the Latin American state has been countered by formed social classes, albeit to the detriment of Native Americans and the not so far successful agrarian transition which otherwise could have ushered in the path towards industrial capitalism.

The dominant pre-industrial national land-lords in Asia have been swept away by revolutions [China, Vietnam, Laos], transited to agrarian bourgeoisie on the path to industrial capital in Japan and is still an important fraction of the dominant political class in India (see Paines, S. 1976;

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<sup>21</sup> Originally prepared for the National Workshop on the 10<sup>th</sup> anniversary of the Development Network of Indigenous Voluntary Associations of Uganda [DENIVA], while the author was a Senior Research Fellow [1996-99] at the Economic Policy Research Centre [EPRC], Kampala, Uganda. The writer wishes to acknowledge the homely environment of the EPRC and the financial contributions of Action Aid Uganda [AAU] which funded the EPRC/AAU Poverty and Structural Adjustment study from which the observations herein are culled from. The results of the wider study can be found in 2007. "Rural Human Resources and Relative Poverty in Ethiopia and Uganda", proceedings of the 4th International Conference, Ethiopian Economic Association; 2000. "Resources, Poverty & Human Development in Rural Uganda", Africa Development, CODESRIA, 25 (3 & 4) pp 31-76; 1999a. "Structural Adjustment & Rural Poverty in Uganda", Journal of Development Economics for Southern Africa, 1(1), pp39-83; 1999b. "The Quest for Adaptive Institutions: Observations from Rural Uganda" Occasional paper No 2, DENIVA, [Development Network of Voluntary Association of Uganda] 33p.

Bhaduri, A. 1976)<sup>22</sup>. In both Latin America and Asia, the land lord social class and a formed peasantry established an antagonistic but a relatively solid social structure both for revolutionary and reformist social changes.

By contrast, in pre-colonial sub-Saharan African [SSA] countries, with the possible exception of Ethiopia and Eritrea, shifting cultivation and pastoralist mode of production precluded the emergence of formed agrarian social classes and states based on the production, exchange and distribution of agricultural surplus in the mould of the other two developing regions above. The colonial state overlaid itself on mostly loosely inter-connected social structures and states. The SSA governance institutions may have been adequate given their respective traditional mode(s) of production. However, given the colonial disruptions and the demands of transition to modernity and multi-ethnic polity, they have given rise to more fragility states with serious shortcomings to serve as locus for economic development.

In the post-independence period, the fragility of the state has been manifested in military *coup de etats* espousing ethnic hegemony, socialism, Marxism, democracy and other political discourses. However, with the exception of some, most failed to establish a stable polity for economic development. (Sandbrook, Richard. 1986; Roth, G. 1968; Clapham, Christopher 1985; Bromley, Daniel 1989)<sup>23</sup> The worst expression of the fragility of the modern state and its negative consequences have been manifested in no other countries than in Uganda (Twaddle, M. 1988, 1991; Mamdani, M. 1983)<sup>24</sup> under Idi Amin and currently in Somalia.

When Uganda attained independence in 1962, it was one of the most promising former British colonies. It had acquired considerable skilled manpower. Secondly, a well managed and serviced agricultural sector enabled it to become one of the leading producers of *robusta* coffee in the world. Tea and coffee mainly cultivated in the western and central parts of the country respectively ushered in a potentially regional equity of incomes. The northern and eastern regions had begun to benefit from increased commercial cotton and cattle production.

Backed by sound macro-economic policies, in 1964-71, before the ascendance of Idi Amin, the economy registered an annual growth rate of over 5% (World Bank.1998. World Development Report). The country's flourishing smallholder agriculture had backward and forward linkages with industry, including manufacturing – laying the foundation for a home market paving the way for an auto-centric mode of industrialization. A concomitant vibrant service sector was expanding rapidly. As foreign exchange earner, tourism ranked third only to coffee and cotton.

<sup>22</sup> For the specificities in the two giants of Asia, China and India respectively, see Paines, S. 1976. "Development with Growth: A Quarter Century of Socialist Transformation in China". **Political and Economic Weekly**, Special Vol 2, pp 30-33; Bhaduri, A. 1976. "The Evolution of land Relations in Eastern India under British Rule" **Indian Economic and Social History Review**, 13(1), pp43-53.

<sup>23</sup> The specificity of the African state and its implication for economic development is found in Sandbrook, Richard. 1986. "The State and economic Stagnation in Tropical Africa" **World Development**, Vol. 13, No 4 pp; Roth, G. 1968. "Personal Rulership, Patrimonialism and Empire Building in the New States" **World Politics**, Vol 8, No 2 pp 194-206; Clapham, Christopher. 1985. **Third World Politics**; Bromley, Daniel 1989. "Property Relations and Economic Development", **World Development**, 17(6).

<sup>24</sup> For more on the political economy of Uganda under Amin and the current economic and institutional construction efforts, see Twaddle, M. 1988. **Uganda Now: Between Decay and Development**; Twaddle, M. 1991. **Changing Uganda**; World Bank. 1993. **Uganda: Growing out of Poverty** and Mamdani, M. 1983. **Imperialism and Fascism in Uganda**.

Unlike Latin America and Asia, most of the growth in agricultural output came from small holders as opposed to tenanted peasantry [Asia] and plantations agriculture [Latin America]. The industrial and commercial sectors, however were dominated by Asians and to some extent by Europeans. This fuelled chaos when Amin seized the property of Asians and expelled the owners.

In resource endowments, per capita income and the profile of its exports, Uganda at independence favourably compared with Malaysia. However, when Malaysia transitioned to be one of the so-called 'Asian Tigers', the Ugandan polity degenerated into political turmoil and economic chaos leading to massive violence unleashed by state and quasi state armed groups. Today, Malaysia's per capita income is over 16 times that of Uganda. The rapacious direct and indirect taxes from coffee, tea and cotton led to massive decline with the first two perennial crops being uprooted in many areas.

Hence, for over twenty years, with population growing at 3%, per capita income declined by about 2.2%. - a fate shared by only two countries – Congo [DR] and Niger. The economic consequence of the period was unmitigated disaster for industry. Manufacturing output declined by 3.7% and 0.3% in 1965-1980 and 1980-1986 respectively, decimating the nascent industrial base. In the conflict period of 1965-1986, the Ugandan state atrophied with a bulk of political and economic transactions reduced to personal and informal levels (see Tenkir Bongor 2004)<sup>25</sup>.

Emerging from the chaotic years of the rule of Idi Amin when the fragility of the state had attained its maximum expression, Uganda has been in the process of building institutions for economic development within the framework of structural adjustment and liberalization of the economy. These have been anchored around three policy areas enunciated by the Ugandan Government vis. Agricultural Modernization, Poverty Eradication and Universal Primary Education (UPE) in relation to agricultural and rural development

Historical and cross-section experiences from other countries suggest that if agricultural modernization is not carefully managed around clearly delineated political choices, articulated under defined policy objectives, instruments and institutions, the end result could actually aggravate rural poverty. If education, particularly primary and secondary education, are not interfaced with the demands of economic development, the prevailing socioeconomic reality and institution arrangements on the ground, the return from investment in education will be much less than optimal. Equity and gender policies could also be endangered.

Even when the aims of development programmes are obvious, clear, and enjoy wide and popular support in society as a whole, their cost effectiveness and institutional framework require a careful synthesis of the current position, the process and procedures of implementation and ultimate goals. In other words, as much as the state puts in place reforms and/or builds institutions, it must not shy away to learn from the existing socio-economic base and the

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<sup>25</sup> For a more comprehensive review of the economy in the period, see Tenkir Bongor. 2004. "Uganda: Strategic Trade and Industry Policy Making" in **The Politics of Trade and Industrial Policy in Africa**. Soludo, C., Osita Ogbu and Ha-Joon Chang, eds, IDRC and Africa World Press, pp253-270.

institutions thereof. When and where this is not the case, the history of development programmes is littered with many perverse outcomes.

This paper attempts to bring into focus some of the operating institutions in the process of the social reconstruction of the country and derive implications for policy. It interfaces the observed institutional realities with the demands of sustainable economic development with far reaching implications for institution building.

The field observations on which this paper has built on were garnered in the course of poverty study in seven districts of Uganda - Apac, Lira, Soroti, Iganga, Ntungamo, Bushenyi and Mpigi. They are meant to portray some observed phenomena on the ground. It is hoped that they will stimulate further discussion in tandem with the above policy pronouncement of the government. In doing so, the paper seeks to explore the implications of the observations for institutional reforms in such areas as land tenure, education, social security, labour markets and regional policy. The aim is that the issues raised will contribute towards the illumination of strategies for rural development on the path of evolving further policies and fine-tuning of instruments.

The mainly anecdotal observations are discussed around five main themes -**Access to Land and Livelihoods, UPE & Poor Households, Poverty & Life Cycles, Three Hours as a Working Day and A Very Poor Village in a Rich District**. Before we delve into each of the implicit and explicit policy implications for institution building, the following section situates the observations within a broader context of institutions and economic development.

## 2. Institutions<sup>26</sup> and economic development

The role of institutions in the development process has varied according to the prevailing paradigm(s) of the period. In the tradition of classical political economy, the organization of society in terms of its structures and functions, the distribution of power, the formation and dynamics of the social/cultural values and their political & economic relations with nations beyond its shores<sup>27</sup> were important components of economic discourse. In such analytical frameworks, the nature of the state, the social foundations on which it was erected, in summary its institutions and their policy were of paramount importance.

The ascendance of Neo-classical economics, first as a competing paradigm, albeit as a dominant one, in the post War period and as a singular orthodoxy in the last decade has shifted the terrain of the focus of the development debate from state to market institutions. In the latter's analytical domain, since the social/institutional framework is given under its *ceteris paribus* assumption, physical and in its latest version also human capital & technology are binding constraints on the path of growth.

<sup>26</sup> For institutions in the context of economic development and their various strands, see North, D. 1990. **Institutions, Institutional Change and Economic Performance**. UK, Cambridge University Press; Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press.

Adelman, Irma. 2002. "Fallacies in Development Theory and Their Implications for Policy" in **Frontiers of Development Economics, The Future in Perspective**. Meier, G, Joseph E. Stiglitz, eds. Oxford University Press; Dejene Aredo. "Institutions, and Economic Development: A Survey of Aspects of the New Institutional Economics". **Ethiopian Journal of Economics**, 6(2) pp51-79. Elleni Gebr Medhin. 1998. "Transaction Costs, Institutions and Contractual Choices in the Ethiopian Grain Market" PhD Dissertation, Stanford University.

<sup>27</sup> The early developers such as England and Holland were all maritime powers.

Given the rightly overriding concern of Neo-classical economics with efficiency and the dismal record of states in this regard, it is no wonder that the current orthodoxy of development has quite often dismissed the state as a rent seeking, price distorting, protectionist, inherently corrupt and therefore an inefficient enterprise. According to this perception, in the state's counterproductive intervention, its otherwise critical, potentially useful and pro-poor development functions - the provision of privately under supplied goods and services infrastructure, health, education etc. have been impaired. The catalogue of the failure of governments in economic management under varying political systems blurred the need to appraise the opportunities and constraints of the state in the context of its specificity. The baby might have been thrown away with the bath water.

More recently, there has been a resurgence of interest in institutions, including the state, in the context of their critical roles in the development process. This has arisen from the apparent weaknesses of earlier theories to explain the empirical evidence from late industrializing countries. The variable(s) explaining the poverty or otherwise of nations has thus successively moved from that held for a very long time - access to natural resources to physical capital<sup>28</sup>, the acquisition and sustainability of technology, the development of human capital, generation of sound policies and more recently to institutions.

When examined in the light of this perspective, compared to others, the most successful economies in Africa, Mauritius and Botswana, are devoid of easily accessible natural resources, save diamond in the latter. On the other hand, many oil rich middle Eastern countries command ample capital to buy sophisticated technology. Although vast oil revenue and small population groups them among those with high per capita incomes, they are far behind in the measurement of sustainable development. They have yet to develop institutions and a human capital base to indigenize the management of their development. The Indian states of Bengal and Kerela have, under elected socialist governance, attained literacy rates similar with many industrial economies. However, being sub-sets of the previously highly regulated Indian national economy, their admirable achievement in the development of human capital has not lifted them out of poverty. Policies and institutions appear to have had critical roles in shaping the development experiences of many countries.

The trend towards "bringing back" (World Bank 1997)<sup>29</sup> the state to lay down the basic institutional framework in the development process is now articulated by none other than the World Bank. According to its annual report on the bill of health of the global economy, the Bank observes that interest in the state as a partner institution in the development of policy and implementation has been promoted both by negative and positives experiences to its role across differing economic systems *inter alia*;

1. The collapse of control-and-command economies,
2. The fiscal crises of the welfare state in most of the established industrial economies
3. The important role of the state in the East and South East Asian miracle economies
4. The collapse of states<sup>30</sup> and the explosion of human emergencies

<sup>28</sup> The approach was popular in the immediate post-War period informing many of the planning models adopted by the then newly independent countries of the Third World.

<sup>29</sup> World Bank. 1997. "The State in a Changing World". **World Development Report**.

<sup>30</sup> A case in point is Somalia, where the collapse of the state has reached its highest manifestation. Paradoxically, telecommunication and banking are now more efficiently run and there is a boom in the export of livestock. Was the

In such a historical conjecture, it is essential that the construction of novel/reformed institutional/governance systems in Africa make the social, cultural and economic specificities of their respective stake holders as points of departure<sup>31</sup>. Premising African development from the social trajectories of other societies and planting them on African soils have so far been fraught with many problems<sup>32</sup>. This has been accentuated by the popular cultures of dominant ideologies which portray non-capitalist and non-state socialist societies as “primitive” and their institutions unable to transcend their current economic and political predicaments<sup>33</sup>.

Consciously or unconsciously, most future elite of the developing countries assimilated these values in their education. Among those who made it to the saddle of power in the post colonial state, with few exceptions of creative innovations, the state has been used as an instrument for disorganizing the institutions of the popular social classes. This has been largely forged through the medium of ethnicization and the wholesale import of foreign, mostly European institutions.

Irrespective of the political color of imported ideological dispositions, post-colonial governance systems effectively disabled the population from reclaiming their centuries old legitimated traditional governance systems. Instead of patiently and delicately building a stable interface between tradition on the one hand and institutions associated with hard and soft modern technology on the path towards economic development, the post-colonial governing elite in Africa wasted opportunities for development seized by many countries in other continents.

As the more recent experience of East Asian countries has brought to the fore, ***the construction of such an interface and a negotiating space between traditional institutions and modernization are prerequisites for any sustainable growth and development.*** It could be cogently argued that socially comprehensible, functional, durable, and predictable but also adaptable institutions derived from such as interface are the *sine quo non* requirements of the process of development.

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collapse in any case that of an ‘unformed state’ or the state itself was an operating constraint? An interesting arena of research approaching a laboratory type controlled experiment on the theory of the state and the operating parameters of the opportunities and constraints for students of political economy.

<sup>31</sup> The promulgation of qualifications for membership in Parliament and the organization of representative organs at different levels in the Ugandan constitution is a very good example of institution building. Rather than aping the substance and style of early industrialized countries whose starting positions were fundamentally different, the major premises of the Ugandan constitution reflects an understanding of African social formations in general and the Ugandan one in particular. One may add that owing to the changing global mode of production, when Uganda industrializes in the 21<sup>st</sup> century, due to varying structure of its society, even in its post-industrial phase, its political organization need not be identical to those of Europe and America.

<sup>32</sup> It is pertinent to note that, mainly driven by economic imperatives, the European governance systems which serve as model(s) for many African states, have been modified at varying degrees by socio-economic interventions. The pressures to do so emanated both from below and above over a period of sustained struggle between capital, state and civil society.

<sup>33</sup> Despite such ideological premises which unfortunately are also internalized by many African elites, it is said that one of the reasons accounting for political stability, sustainable growth and development by Botswana is the successful interfacing of traditional and modern institutions blended in the person of the first President, Sir Tseretse Khama, - a paramount chief of the Tswana people, educated at Oxford and married to an English lady. While Zimbabwe is still languishing in its predicaments following the 29 March 2008 elections, the following day [March 30, 2008], the 4<sup>th</sup> President of Botswana was ushered in into power in a way befitting a country of advanced political culture partly grafted from its traditional institutions. Admittedly, its small population and comparative homogeneity among the ethnic groups, institutional adaptation to other larger and more heterogeneous polities will require a more fundamental social engineering framework.

It is against this background that this article invites a discussion of the options for institutional reform in the context of the issues raised along the following observations in rural Uganda.

### 3. Access to land and livelihoods

Our study group was holding participatory Rural Appraisal (PRA) with a group of villagers in Western Uganda first in a plenary session and then in small groups. My Group dealt with agriculture. In the course of the discussion, it was revealed that crossbred heifers were being distributed to transform the farming system. We asked the peasants as to whether they were taking advantage of this. None did. The reason according to them was that they had very small plots of land and hence could not afford the feed for zero grazing.

In front of us, about 2 kms away, was a majestic mountain. Recognizing that in most traditional African societies such lands are communal, we asked the group about using the mountain which appeared to be uncultivated and uninhabited. They pointed to a three years old girl in front of us whose grand father they said owned it. That happened about 29 years ago when the said person was a "Big man" in government. How that land came to be individually owned is anybody's guess. Although agricultural undertaking by the landlord was not apparent, since use by the villagers will symbolize its traditional communal ownership, the new owner did not allow its use. In the circumstance, the peasants suggested that the heifer project be changed to one based on the rearing of chicken.

If the above village is a proto-type of many areas in rural Uganda, it appears that the hitherto customary land system is being commoditized with far reaching implications for the strategy of agrarian development and with it growth, development and the government's twin policies of modernization and the eradication of poverty. Where there is unused land, the peasants are hampered from increasing the national product, improving their welfare and adopting a more productive agricultural technology.

The issue raises the pros and cons of the institutional frame of structuring agricultural development via small holder agriculture versus large holdings resulting from land concentration. The above observation is at the heart of the genesis of the commoditization of land and labour, their transfer to those who are able and willing to introduce modern technology, the organization of agrarian development via large holdings, economies of scale, ease of the mechanism of resource transfer, enhancement of the size and utilization of the marketed surplus - in short the acceleration of agricultural development and with it the basis for industrialization.

This has had its antecedents in the closing years of the nineteenth century when large holdings in America were enjoying unprecedented growth. Agrarian experts on the Left and Right of the political spectrum were unanimous that this was the right way forward. Both positions considered the mode of operation of small subsistence farmers as obsolete and primitive which had to be done away with swiftly. The creation of alienated land and peasantry was said to be necessary conditions for the transition towards modernization. Although their political motivations and goals were different, the development of large capitalist farming and the collectivization of agriculture following socialist revolutions obtained their cues and logic about the organization of agriculture from the above premises. Hundred years later, African modernizers of different shades of political

colour carry this political and ideological baggage derived from the experience of late 19<sup>th</sup> century Europe and America. (Brenner, R. 1976; Kautsky, K. 1976)<sup>34</sup>.

In the context of developing countries and the so-called green Revolution Technology in Asia<sup>35</sup>, Latin America and to a limited extent in Africa, there is now sufficient evidence to appraise the effect of such agricultural technologies and gauge their effects on poverty and agricultural modernization which are the avowed policies of the Ugandan government.

In South Asia and Latin America, the spread of agricultural technology was predicated on a much skewed distribution of holdings. When owners of the land resorted to commercial farming and/or hired out their holdings in large chunks to capitalist farmers, following the substitution of capital by labour, the process led to massive unemployment and underemployment in agriculture. The imports of the critical factors of production such as machinery, fuel and fertilizers led to a drain on foreign exchange reserves. The low level and inequitable distribution of income limited the purchasing power of the majority of the rural households putting a break on the expansion of the home market for industrial expansion. In the case of Latin America, this brought to a halt the import substitution industrialization drive of the post war period.

The relative rise in the price of food purchased by the rural and urban low-income groups raised the terms of trade against the poor. The fragmentation and dispersal of the agricultural labour class meant that they were at a disadvantage to organize unions and obtain better conditions from their employers. On the production side, comparative studies of factor use and productivity have shown that at best gains from economy of scale from large farms was spurious<sup>36</sup>. In other cases, the results demonstrated the inverse relation between farm size and factor productivity. This was partly because both the biological and chemical component of the technology are divisible and therefore scale neutral while large scale farming absorbed required much higher supervision cost.

Given profitability and ensuing adoption, the agricultural technology packages can increase productivity in equal measures irrespective of size. While there might be a positive scale effect with respect to the mechanical components of agricultural technology, small holders can organize hiring of such services or rent them from efficiently run enterprises such as ones currently run by private firm in some parts of rural Uganda.

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<sup>34</sup> For the early debate with regard to Europe and America, see Brenner, R. 1976. "Agrarian Class Structure and Economic Development in Pre-industrial Europe" **Past and Present**, No 70, pp30-75; Kautsky, K. 1976. "Summary of Selected Parts of Kautsky's The Agrarian Question" **Economy and Society**, 15(1), pp2-49. Translated and summarized by Jairus Banaji.

<sup>35</sup> The term refers to the increasing use of a package of bio-chemical inputs [new seeds, fertilizer, insecticides etc] and associated mechanization in some areas of the poor countries with favourable ecological endowment and infrastructural settings. The interested reader can go the Indian famous Political and Economic Weekly which discussed the subject extensively from many ideological and political angles which at times and places was reminiscent of late 19<sup>th</sup> century debates on the subject including about the fate of the then Russian peasantry. In the context of CADU/ARDU and EPID in Ethiopia, see Tenkir Bongor. 1987. **Agrarian structure, Agricultural Technology and Peasant Differentiation with Special Reference to the Arsi Region**, .PhD Thesis, London University.

<sup>36</sup> This issue has also been widely debated in the context of agricultural technology and land reform both in India [including by A.K. Sen] and Ethiopia in the sources cited under 14 & 15.

A small holder strategy begins by using abundant factors at disposal. It distributes income more equitably alleviating rural poverty in the process. More importantly, by providing a massive market for less sophisticated inputs and consumer goods, small holders become the bedrock for the demand of industrial goods especially in the early stages of development. By increasing employment and reducing unemployment and underemployment, such a strategy assists the retention of agricultural labour force before industry is able to absorb it.

In the special conditions of rural Africa, it is also a social security network serving as a livelihood of final resort. In this period of structural adjustment, thousands have gone with skill to their villages becoming agents of change. A quick visit to some of the rich villages of Uganda will provide ample proof to substantiate this.

Uganda can draw from the adverse lessons of contemporary South Asia<sup>37</sup> and Latin America on the one hand and from the positive historical experience of Meiji Japan, East Asia in the sixties and post-revolutionary but especially post Maoist China. In the latter cases, agricultural technology, under very small plots (handkerchief size as some refer to them) but equitable land entitlement regimes, has become a bulwark of the modernization of agriculture and industry. These took place without sacrificing the welfare of the peasantry as was during collectivization in the Eastern European countries or large-scale eviction and alienation of the peasantry in early European industrialization.

Unlike other land constrained Asian countries such as today's China. Japan under similar stage of development and other East Asian successful economies, Uganda has vast cultivable but uncultivated land. It can hence pursue a bi-modal agrarian strategy which combines small holder based agrarian development with large scale commercial farming to meet macro-economic objectives such as growth, export and employment<sup>38</sup>.

However, in the context of a bi-modal strategy, careful thinking will be required to retain the customary right of the peasantry and structuring policies and institutions such that the trade offs between rapid growth and some level of inequity are at a minimum. Furthermore, such a strategy should enable the local people to directly and indirectly benefit from the modernization of agriculture by investors. The contours of agrarian transition of today's Uganda can be mapped by taking into account its own specificity but learning from the success and problems of contemporary developing economies which have combined high growth rates and human development under a predominantly small holder based farming systems.

#### 4. UPE, poor households, allocative efficiency & equitable distribution of primary education

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<sup>37</sup> It is worth noting that a large country like India has become self sufficient in food to the extent of exporting rice even to Uganda. However, India's record of growth without much redistribution is exceeded both in terms of growth and development measures by China both in the pre and more significantly in the post-Maoist era. By contrast, with the exception of white farms in Zimbabwe and South Africa, the green revolution technology has yet to make sustained presence in Africa south of the Sahara.

<sup>38</sup> It is vital that the momentum of rapid growth of agriculture along this path is not slowed down due to legal and institutional constraints towards access to land and other supporting measures.

A casual observation of most primary schools in rural Uganda reveals a community of cute, curious and adequately fed children. This is the result of the private part of their provision. The physical state of the schools are in dire contrast to the students. It is paradoxical why most schools have no windows and concrete floors let alone desks in Primary 1 and Primary 2. Given the humid climate and continuous rain, dust-bred insects and mud in the classrooms are inimical to the health of students and a less than congenial atmosphere for lesson delivery. On the positive side, one rarely comes across a household head, male or female, without some level of formal education.

The team came across two educated rural Ugandans, male and female, using their education in two different ways. The female, a young teacher in lower secondary is married to a farmer cum shopkeeper in a rich village. As the team had met her before, her first question upon our second arrival was “where is the new bean seed? We hit a conversation with the young male rural dweller, who had completed secondary school [S6] a few years earlier, in a poor village, through his role as a commission agent negotiating with our driver who was buying a chicken. Judging from the similarity of their ages, both ex-students must have been contemporaries.

The educated female was combining the role of mother, farmer, teacher and shop manager. If Uganda is going to industrialize in the coming few decades, unlike the early industrializers, where the proletariat concentrated in large urban centers, engagement in multiple jobs while residing in semi-urban areas is bound to be one of the defining characteristics of the development process. This is bound to have profound implications for many aspects of life. The role being played by the young lady, the nature of her jobs as ‘peasantariat’ cum rural intelligentsia is akin to what is taking place in today’s China and East Asia. The forces leading to this social formation need not detain us. The point here is to draw implications for the required structuring of the educational system for adults who will be operating in the kind of economy described above.

The enthusiasm for the new bean seed is one of the positive externalities from the young lady’s education. If complementary policies are right and she becomes a successful farmer, other peasants are bound to follow her in adopting this income enhancing technology. Her empowerment in the process will go some way in closing the gender gap. Where more than 95% of the households interviewed had no extension contact, the teacher’s request for new seed was a ***path breaking demand led agricultural technology dissemination strategy***. This is bound to be less expensive and more effective than the current supply led extension system.

By contrast, one cannot help wondering about the value of the resources spent on the S6 graduate. If he is to remain a commission agent in the village, this brings some food for thought as to the allocation of investment in education between primary and secondary education on the one hand and the nature of the curricula in both. Such issues are of immediate relevance in the context of the current Universal Primary Education (UPE) programme.

UPE is one of the great educational landmarks in contemporary Africa. Its outcomes will be of monumental significance to the country and a lesson for others. While even today’s Uganda is by no means behind many African countries by educational attainment, the further casting of the educational net to enclose more children in the primary school system has dramatically increased attendance. Part of the implication is that many were forced to stay outside before the abolition of

fees under UPE. From among rural youth benefiting from UPE, the country is bound to gain future scientists, etc.

When one considers the total cost of education and allocations within, the competing demand for the same resources from other sectors of the economy and the nature of work in the years to come, it could be argued that subsidized primary education be sequenced by a succession of demand driven secondary education. One really does not need advanced secondary education to be a village chicken commission agent.

This implies that among its other roles, primary education be integrated with the needs of adult life of the current children while simultaneously laying the foundation for life long demand driven learning. This brings us to the issues of what is taught, how much of it and how. As it stands now, primary education appears to have been structured as the first step in a long and torturous academic road for admission to Makerere University. This may have been appropriate when primary attendant rates were very low and the country needed to substitute expatriates at various levels. Under those circumstances, the production and the reproduction of such elites was critical.

But today, for those who are about there but not quite as the A Level graduate, and will have to subsist from village jobs like many other millions, it could be contended that a lot of what was spent on him at the secondary level could have been better reallocated by expanding and improving the quality of primary education. Beyond primary, such ones as him could have navigated further through an adult education programme which provided skills and liberal education dictated by the nature of ones job and the inclination of the potential learner respectively. On the other hand, there is not much evidence to suggest that the primary or even secondary education had prepared him to become a better fisherman, farmer or other trades undertaken in the village.

What about the content of the current of primary education? A lot of primary school curriculum, at least from the empirical evidence of delivery at the grassroots, is academic. When about only 30% of P1 entrants proceed to secondary and less than 1% to university, one wonders about the value of a shilling spent on academic lessons in primary education vis-à-vis the return to the individual and the society at large now and in the future. One could suggest that it might be more appropriate to scale down the academic content (such as sophisticated algebra and geometry in primary grade 6 [P6] and introduce practical agriculture, home economics, forestry, environmental management etc. If more than 80% of today's rural youth are going to operate in the rural economy, should not the curriculum reflect this fact and structure itself accordingly? Or continue with the demands of middle class children for urban types of jobs?

Children at all levels are important source of labour in the rural households. The vast majority of them will operate in similar areas as their centres of education but hopefully at higher levels of income and development in the years to come. In contrast to middle class households, where the necessities of life are purchased, those in the rural areas produce them within the village and the household. Children's contribution in this process is vital<sup>39</sup>. With the usual 8a.m-5p.m lesson

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<sup>39</sup> This is notwithstanding the discourse about the "problem of child labour" espoused by urban middle class bureaucrats and the ILO. It must be noted that given the institutional framework and the deficiency of capital, such labour input at least

delivery, those with few children or not yet in the life cycle to have many, are confronted with the choice of losing their children altogether for education.

If parents take out their children from school, thereby raising the dropout rate, it is because they are faced with a win or lose situation<sup>40</sup>. The scaling down of what goes into the primary school curriculum may be considered in conjunction with reduced contact hours. This way, the same resources can provide access to education, practical experience and children could avail themselves for a continued support of the household economy. Could the school calendar be adjusted to suite that of agricultural and domestic tasks?

Reducing direct contact hours could save classroom space. Given the current poor state of schools and the shortage of instructional materials, might it not be better to rehabilitate and re-equip the current schools rather than their lateral expansion through the construction of more of less equipped classrooms? When there are many vital social services and infrastructure required for development, it is surely pertinent to revisit the strategy of delivery so that it becomes more cost effective and attract sustained attendance from the poorer segments of society. The structural difference in the system of production and consumption between urban and rural areas, poor and better off households and regions where education is not yet 'felt need' imply varied modes of delivery and institutional arrangements. The case for national homogeneity in educational institution building needs to be balanced by varying felt needs and current capacities and capabilities.

##### 5. Poverty and life cycles: The lives of two *Wazees* [Plural of elderly persons in Swahili]

This observation revolves around the lives two *Wazee*. One was a subject of our case study series. We first glanced through a poorly dressed elderly person of about 70, chopping wood near his *shamba* [farm near the homestead] surrounded by coffee trees, banana, fruit trees and an assortment of livestock foraging around. On the side nearby, a brick walled corrugated iron house, one of the status symbols of today's rural Uganda, was nearing completion. We at first thought it was being put up by members of the new generation or those for whom the *Mzee* [elderly person in Swahili] worked. Two fairly well dressed ladies, one in her fifties and another in her early thirty breast feeding, were lingering near the gate. As this was a rich village, we reckoned that the *Mzee* was a farm-help. He was not to be.

Having recognized us, acknowledged our presence and listened the objectives of our visit, the *Mzee* disappeared into the house, changed his clothes in the manner befitting when meeting urban people and sat with us. The discussion was later joined by the only wife, the older of the two described above. It transpired that he had P4 education and had for a long time combined the position of school cook with farming in his village. He has put his hands in a variety of crops around the homestead and virtually all types of livestock from the area.

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in the short term is a make or break input in the household economy. The calamities of AIDS has not made matters any better.

<sup>40</sup> It might be interesting to study the reasons for dropping out and the social and gender profile of the children who do so. The writer's hypothesis is that they are mostly the children of the poor, female headed households and girls.

He had four daughters who all married 'outside'. Two had died recently. Their kids are being looked after by the grandparents (rendering the social security function shouldered by the state in late capitalist countries!). The marriage of the couple was further cemented by an unfortunate event. The wife had looked after and waited for the *Mzee* when he was in jail for 7 years following his accidental killing of a burglar at his home.

The husband drank occasionally and even then only in moderation. This was smilingly attested to by the wife. The rapport between the two was such that it seemed that they were newly wedded sweethearts. He appeared to not only enjoy his old age, the brick house under construction was his. Upon its completion, the couple were to enact their marriage vows in a church ceremony. One of the main ingredient of success of these lives appears to be a sustained and loving marriage [more a function of luck?], disciplined management of resources and a sense of belonging/having root in the village.

By contrast, the second *Mzee* lived (or rather wandered) in a poor fishing village. Although he was in his early sixties, he looked like he was in his seventies. He was dressed in rags and walked on his own on the periphery of the village for the duration of our stay. He appeared so alienated that one needed tact even talk to him about his life, a problem compounded from my not knowing the local language. One informant mentioned that the old man had been a fisherman all his life and was now unable to go out in the waters to earn a living. He is said to depend on the goodwill of the villagers and other alms. He never married and withstands the nighttime cold by sleeping close to the fish smoking stove. As was the case with most fishermen, he had come from a broken family, could not access land and had lost touch with his kin and kith.

Towards the bustling end of the village, young fishermen appeared well dressed and happy. Most had dropped out of school because of their inability to pay school fees and lack of interest and motivation. The local shopkeeper informed us that in some days their fish catch could earn them as much as Ush60,000/day<sup>41</sup>. Most of this is spent on booze preferring beer to *waragi* (strong alcoholic local Ugandan brew) on such occasions. They drank beyond mid-night and like the old *Mzee*, they obtained their warmth by the fish smoking stove. Having seen the 'retired' fisherman without anything to fall on in old age, one begins to feel for the fate of the apprentice fisherman who come from similar family backgrounds and spending habits.

It appears that in contrast to the first, the second *Mzee* is a victim of his early life which pushed him into rootlessness and a reckless management of his cash flow as could be inferred from his successor fishermen. The cook cum farmer on the other hand is a beneficiary of plantation crops like coffee, which do not require much investment in later life, a judicious management of resources and a network of social relations based on the family and the community at large providing social confidence and support.

The situation of the two *Wazee* brings to the fore the adverse consequences of alienation both from land and social relations. The contrast in social conditions of the two pensioners suggests the centrality of the family as an institution and the need to nurture its flourishing in the context of building a modern society. The trend towards the privatization and concentration of land mentioned under 3 above, could among others deprive the livelihood of the likes of the relatively

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<sup>41</sup> This was higher than the **monthly** wage in Kampala but partly balancing out non fish catch days in the low ebb season.

comfortable pensioner, leading towards the production and reproduction of the problems of the second *Mzee*.

Among fishermen, more than the constraints of absolute levels, what is lacking is a proper management of incomes and confidence in the future. Such groups could benefit from a compulsory social security system. Zimbabwe is working the modality of such a system which could cover rural households as well. Uganda has the advantage of an already existing adult male universal collection in the form of the Graduated Tax. Can it also include a social security component?

Even if the pension payment from such a venture may not be adequate, in the rural setting, where some of the needs of old age could be met locally, its compounded collection may not be an insignificant supplementation. In the social context of rural Uganda, the operation of such a social security policy could build on the almost current universal male land entitlement but with institutional reforms to include women. This can be a policy discussion arena where rural land access institutions can be built upon in the construction of a social security system. A detailed multi-disciplinary study of such rural institutions could offer in sight along this direction.

## 6. Three hours as a working day

We were discussing the loss of oxen power during the civil strife of the 1980s. A question was then raised about the cost of the complementary input with oxen power, labor. The common daily wage rate was said to be Ush900/day. The logical question following it was the length of the working day. It was reported that hired labor usually began working at 7a.m and put down tools at about 10 a.m. What about the afternoon segment of the work day? There was said to be none. Even given the humid nature of the climate in the area, three hours of work a day without any substantial animal or mechanical power is surely a very low labor input. This is particularly so considering the seasonal nature of agricultural tasks

Given the low productivity of the above arrangement, in another district, certain agricultural tasks are contracted out on a piece rate basis. However, when a given piece rate was completed, there was not a second piece of work undertaken in order to obtain more income. It reminds one the contrast with the renting of a bed by three Asian students in Europe to be used on a shift basis in order to maximize income through saving from the cost of accommodation. They studied in one shift and worked in the other. When they left for home, whereas most African students departed with consumptive electronic goods, the Asians did so with working capital, equipment or savings to open up business in their countries. Part of the contrast in the dynamic development of Asia and Africa's backwardness may partly be found in this motivation and capacity for hard work

Agricultural tasks under tropical conditions are laborious, back breaking and 'dirty.' Hence in many parts of the world, they are usually undertaken by migrants (national or international) who are pushed by circumstances and/or attracted by opportunities and therefore have to work harder and longer. Those living in relative abundance with limited needs and aspirations may not be the prime movers of agricultural productivity. The slave trade, transmigration of indentured labour were historical cases in point. Even today, Mexican and other immigrants are the main sources of

agricultural labour in the US. Similar patterns of labour supply took place in the boom years of coffee, tea and coffee in Uganda.

The current low input and productivity of labour compared to wages is one of the major reasons which makes Ugandan agricultural products, for example maize, the most expensive in the region. It seems paradoxical that, countries in the region where such factors as good soils, land and favorable climatic conditions are in short supply, produce most agricultural products at lower costs. This phenomenon calls for a strategy of the introduction and diffusion of adaptive labour using technologies which can alleviate the drudgery of labour without having to make massive substitution of labour by capital.

The adaptation of such tools as hand tillers used in the diminutive and mountainous plots of East Asia might be worth considering. The situation also calls for a policy of free mobility of labour and other supporting measures to reduce the cost of labour while increasing its productivity. The conundrum of high unemployment, underemployment with high unit labour cost and low productivity needs to be untangled through the reform of the education system, adaptive agricultural technology and a liberalized labour market. The reform of the curriculum and educational institutions could make significant contributions along this line.

## 7. A very poor village in a better off district

We were in one of the richest districts in the country. This was once a labour exporting region which changed its land constraint into an opportunity by becoming now one of the most important suppliers of *matooke* [banana processed into staple food], milk and coffee. The management of the banana trees, the numerousness of exotic and cross bred cows and the heavy traffic to and from attest to its emergence of as one of the major agricultural areas of the country.

Where the rich village is located in this district, there was even tapped water [uneconomically give out free] from a collection centre nearby. The primary school was one of the very few with concrete floor, proper windows, office facilities and well maintained school compound with free access to water. The thriving village has even attracted [or welcomed them after the inevitable] its retrenched sons and daughters for gainful employment in farming.

Depending on the route one takes based on the penetrative power of ones vehicle, the poorest village was about 40-50 kms from the district capital. Despite being located in one of the rich districts of the country, it turned out that our 4-wheel was the first vehicle to have ever arrived in the village! When they saw the 'monster' some of the little kids cried while others were excited touching and feeling it. Located on the edge of the Rift Valley facing Mt. Rwenzori, the rough terrain means that journey by foot is hazardous. There is a wide disparity between physical and temporal distances.

Until recently, the place was the preserve of wild animals. Yet, despite its 'remoteness', a bottle of coke was still only Ush500. How the profit margin of the poor is so low! The good news is that the message about the benefit of education was getting across. The community was in the process of expanding the primary school. Most of the children in P1 and P2 appeared to be overage for their class. The village had the only non-English speaking Local Council [LC1] chairman among the

studied villages to the detriment of this writer whose command of the local language was not yet up to standard.

A bunch of *matooke* was about Ush500 while most urban made goods are much more expensive. Part of the reason for poverty here is adverse terms of trade caused by its 'remoteness' and attendant high transport cost. Subsistence rather than commercialization is the norm. The key input to orient the area towards the national economy is access road and reduced fuel price to bring down transfer costs. In order to overcome the circular causation of underdevelopment in the periphery of an otherwise better off district, a regional policy to address the needs of disadvantaged sub-units within a district is imperative. In the context of decentralization, the further refinement of the Equalization Grant<sup>42</sup> could be a step in the right direction.

## 8. Conclusion

Uganda is indeed blessed by nature. Abundant rainfall distributed over most of the year and the variability of seasons across the country makes agricultural production and marketing all year round activities. The vast water bodies and swamps open opportunities to supplement precipitation for undertaking multiple cropping beyond the major and minor seasons. Coupled with the supply of nutritious fish in many parts of the country, it is rare to see symptoms of rural malnourishment, elsewhere vividly manifested in children.

Compared to many other African ones, the country enjoys good network of roads. From Lira Town, to reach the poorest village in the district of Lake Kioga, one traverses three main round about leading to different parts of the district. The basic rural road infrastructures are in place. What is needed is a systematic repair and maintenance system to ensure access in all seasons and directions. The prohibitive transport cost caused by one of the highest domestic fuel prices in the world is, however, a major constraint raising the transfer cost of inputs and outputs.

Given its natural resources including ease of social and economic access to land, good climate, network of roads, a reasonably high level of education, Uganda enjoys a potential capability and capacity to forge ahead with growth and development. In doing so, it has oriented growth towards empowerment and equality. Its publicly enunciated policies of poverty eradication, modernization and universal primary education can be viewed as important tools towards these goals which need to be anchored in viable institutions.

Towards this end, policy analysts need to disentangle the economic, political, social and cultural roots of existing institutions and mould them to nurture and sustain policies and instruments chosen by society. In doing so, such institutions need to be socio-culturally comprehensible but also sufficiently reformist and modernist; inclusive of all stakeholders but attuned to the task environment; endowed with predictable behavior without being inflexible; durable but also adaptable in process and finally transparent and accountable enough to justify their autonomy from undue political interference in their operations.

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<sup>42</sup> This is a grant given based on the relative poverty of districts. It may have to be further sub-divided to take into account very poor villages within better off districts.



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