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The Ethiopian Economic Association
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Economics Department
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MACRO DATA AND MACROECONOMIC ANALYSIS: THE RELEVANCE OF A CONSISTENT MACROECONOMIC DATABASE IN ETHIOPIA

Alemayehu Geda¹

Abstract: *Designing and implementing adjustment programmes in the context of a mixed economy requires the understanding of the macroeconomic condition in general and public and private sector interaction in particular. However, much of the macroeconomic analyses in Ethiopia suffers not only from the lack of accurate data sources but also from inconsistency across different sources on the one hand and analytical inconsistency within an identified source on the other. The focus of this study is the discrepancy and inconsistency of the existing data reported by different institutions. By highlighting the problem first and outlining the relevant analytical framework, a consistent macro database is built for the period 1970-1990 (G.C.). Although the data is built using international sources the methodology can readily be applied to data from domestic sources (notably National Bank of Ethiopia, Central Statistical Authority, Ministry Finance and Ministry of Economic Development and Cooperation. It is also recommended that the above institutions need to co-ordinate their data in an analytically consistent framework.*

I. INTRODUCTION

Much of the macroeconomic analyses in Ethiopia suffers not only from lack of accurate data sources but also from inconsistency across different sources on the one hand and analytical inconsistency within an identified source on the other. Needless to list such macro analyses as all of them are not based on an integrated consistent macro database (See the articles in the recent collections in [2] and [6] for instance). A comparison of some of the macro economic variables across institutions can vividly show this. In this paper we will not attempt to investigate the problem at the level of the source of data. The focus will rather be on the discrepancy and inconsistency of the existing data reported by different institutions. The rest of the paper is organized in three sections. In section two the problem will be mapped by using illustration. Section three explains an integrated analytical framework which can be used for organizing the

existing data. Section four discusses the methodology for defining and estimating the external gap. Section four will conclude the paper by providing the implication of the analysis.

2. THE PROBLEM

An important component of the design of adjustment programs for developing countries and the macroeconomic diagnosis which precedes them is the relationship between the external capital inflow and the internal saving - investment balance. In such broader framework the behavior of the interaction of the public and private sectors plays a key role. The theoretical underpinning of the design of adjustment programs seems to assume that the private sector simply accommodates the external shocks and the effects of fiscal-monetary policies. One needs, however, to analyze the behavior of the private sector and its interaction with the public sector before indulging in such a big venture. This requires a consistent and institutionally disaggregated capital account (saving investment balance, current account balance and source of external finance) database. Lack of such consistent database is quite apparent in the standard international data sources. National data sources are not better either. In the context of Ethiopia, this problem can be seen in most of the data sources.

The first problem relates to the inconsistency across different sources. Table 1 gives a sample of macro variables obtained from different sources. It should be noted that the discrepancies are very high as the percentage is related to the total GDP. For instance a 1% discrepancy in 1986/87 implies adding or deducting 100 to 150 million Birr.

The second major problem relates to analytical inconsistency. The National Accounts of Ethiopia as reported by the Ministry of Planning and Economic Development for the year 1986/87 is used to illustrate this point. As will be explained in section II consistency between *National Account* and *Balance of Payments* data requires the net factor payment and current transfer computed from the National account should be equal to the same item computed from the balance of payments. When this is computed for 1986/87, it gives (as percentage of GDP) -13% for the former and -2% for the latter. Similar computation done for the same year on data from the National Bank of Ethiopia gives -1% and -6% respectively. Thus, clearly there are two problems on the macro data: inconsistency by source and analytical inconsistency within a source in question. The rest of the paper addresses the latter issue.

Table 1: The Macro Data Inconsistency

	1984/85	1985/86	1986/87
	(% of GDP)		
Gross Fixed Capital formation			
Mulatu (1990)	13.98	12.72	14.59
Ministry of Planning and Economic Development (1994)	12.38	12.91	14.25
National Bank of Ethiopia (1989/90)	15.53	14.33	15.76
Total Consumption			
Mulatu(1990)	97.18	97.77	96.59
Ministry of Planning and Economic Development (1994)	97.49	91.85	92.99
National Bank of Ethiopia (1989/90)	95.59	96.08	95.21
Gross Domestic Saving			
Mulatu(1990)	2.82	2.23	3.41
Ministry of Planning and Economic Development (1994)	4.18	10.69	8.35
National Bank of Ethiopia (1989/90)	4.41	3.91	4.79
Export of goods and non-factor services			
Mulatu(1990)	11.49	12.66	11.52
Ministry of Planning and Economic Development (1994)	8.19	9.46	8.32
National Bank of Ethiopia (1989/90)	11.46	12.57	11.32
Imports of goods and non-factor services			
Mulatu(1990)	22.65	23.15	22.70
Ministry of Planning and Economic Development (1994)	16.14	17.30	16.39
National Bank of Ethiopia (1989/90)	22.57	23.00	22.29

3. AN INTEGRATED MACRO FRAMEWORK AND THE ACCUMULATION BALANCE

The analysis relies on two institutional categories (public and private). Public sector refers to central government, local government, central bank and financial and non-financial public enterprises. The rest of the sectors are defined as the private sector.

The Accumulation Balance

A typical feature of developing countries is being recipient of foreign inflow with a deficit on the current account and domestic capital expenditure exceeding domestic saving. For such an economy total investment (I) should equal national saving (S_n) and net capital inflows or foreign saving (F).

$$I = S_n + F \tag{1}$$

F defined as the net change in asset and liability position of the country is equal to the deficit of the current account of the balance of payments: (see also CAD given in equation (6) below)

$$F = M - X - N \tag{2}$$

where M and X are imports and exports of goods and non-factor services and N is net factor payments and current transfer from abroad. Rearranging equation (1) and disaggregating by institutional category yields,

$$(I_g - S_g) + (I_p - S_p) = M - X - N \tag{3.a}$$

$$= F_g + F_p \tag{3.b}$$

where the subscripts g and p refer to the public and private sectors respectively. Equation (3) states that the investment saving gap equals to the deficit (surplus) in the current account and represent a decline (improvement) in the net foreign exchange position, which necessitates a net inflow (outflow) of the foreign exchange resulting from capital transaction. It is based on these identities that reconciliation of various sources is possible. The reconciliation in this paper is based on data reported by international institutions (UNCTAD, World Bank, IMF etc.).² The next part deals with (3.a) the external balance which is followed by the analyses on (3.b) the internal balance.

The External Balance

(a) Exports and Imports

Of the three main items in the current account balance X and M can easily be obtained from national account statistics. Since the data in this paper is reported in dollars, the domestic currency value given is converted using average annual exchange rate (as given in equation (19) and (20) below).

(b) Net Factor Payments and Current Transfers from Abroad

The net factor payments and current transfer from abroad (N) are not consistently reported in the national accounts and the balance of payments. N can be derived from national account data by subtracting gross domestic saving (S_d) from gross national saving (S_n). That is $N = S_n - S_d$. Thus, it can be written as:

$$N = NFP + NTR = S_n - S_d \quad (4)$$

where NFP and NTR are net factor payments and net current transfer from abroad, respectively. Another source for the net factor payments and current transfer is IMF's *Balance of Payments Statistics*. This source is used together with statistics from the World Bank's *Debt Reporting System*. These data are used to disaggregate net factor payments and current transfer by public and private sectors. This will include net interest payment by government to abroad (NIg), grants received by the government from abroad (Gr), workers' remittances received from abroad (Rem) and interest payments made by the private sector to abroad (NIp). The major adjustment lies in dealing with the discrepancy between the national accounts estimate of the net factor payment and current transfer from abroad ($S_n - S_d$) and that derived from the balance of payments statistics. Depending on the assumption about the accuracy of national accounts data vis-à-vis the balance of payments there are two options in dealing with this discrepancy. If one assumes that the N computed from national account is correct, this value could be imposed on the balance of payment statistics. The discrepancy on the balance of payment will be accounted for in the variable *other net factor payments and current transfers of the private sector* (N_{po}) [or any other reasonable choice]. Hence, the latter variable is composed of: the reported interest payment and current transfer to abroad of the private sector (NI_p), an item representing the discrepancy between the national accounts and balance of payments figures for the net factor payments and current transfer, and other factor payment and current transfer items appearing in the balance of payments (i.e. $N_{po} = NI_p + \text{Errors} + \text{OTHERS}$). A database based on such adjustment mechanism is reported in Alemayehu [1]. The second alternative is to assume that the net factor payments and current transfer computed from balance of payments is correct. In such a situation the net factor payments and current transfer obtained from the balance of payments should be imposed upon the domestic saving to give the national saving. Assuming further that saving in the public sector is relatively accurately recorded, the private sector saving could be chosen to account for

the discrepancy between the net factor payments and current transfer as computed in national accounts and that of the balance of payments³. The choice between the two alternatives should depend on the nature of the analysis to be made using the data and the relative faith one puts on the two sources. For instance, if the analysis is largely based on the external sector it is reasonable to assume net factor payments and current transfer as computed from balance of payments to be correct (assuming both sources are equally trusted). It is this latter assumption chosen in this study. Further, disaggregation by institutional category results in

$$N = N_g + N_p \\ = Gr + Rem - NI_g - NI_p \quad (5)$$

The net interest payments by the public sector (NI_g) are reported in Balance of Payments Statistics in lines 15, 16, 19-24; net grants received by the public sector are reported in lines 39-24. Worker remittances are taken from the lines 27, 28 and 33-38. Investment income of the private sector is taken from the lines 11-14, 19 and 20⁴ (See Appendix IV).

(C) The Current Account Balance

The variables defined in (a) and (b) together will define the current account balance of the balance of payments. The current account deficit (CAD)⁵, which is equal to F in equation (1) is defined as,

$$CAD = M - X - N \\ = M - X - [Gr + Rem - NI_g - N_{po}] \quad (6)$$

As explained above, CAD, X, M are taken from national accounts. The individual items constituting the net factor payments and current transfer from abroad (N) are from the balance of payments statistics. In principle the two sources should give identical value for N. In practice they do not. As one of the ways out of this inconsistency problem (based on assumption one), the two sources of the data could be reconciled by a balancing item - other net interest payments and current transfer from abroad of the private sector (N_{po}). In this paper, assuming the record on the *Balance of Payments Statistics* is correct (i.e., following the alternative assumption), the saving of the private sector is chosen for reconciliation of such a discrepancy. Hence, the N_{po}

computed from Balance of payments is added to domestic saving (S_d) to give the national saving (S_n). Given a public saving (S_g) (which is assumed to be relatively accurately recorded), the private sector saving is computed as residual (accommodating the discrepancy).

Internal Balance

(a) Government Revenue and Expenditure

Government current revenue (T) and expenditure (G) represent the current revenue (including grants) and current expenditure of the public sector. Including grants (Gr) in Government current revenue (T) ensures consistency as the same item appears as a current transaction in the balance of payments. Similarly, government current expenditure (G) includes net interest payment (NIg). The main data source for T and G is the IMF's *Government Finance Statistics* (GFS).⁶

Public sector savings are derived as the difference between current government revenue and government expenditure, i.e.

$$S_g = T - G \quad (7)$$

Private sector savings are computed as residuals and are equal to the difference between total national savings (S_n) and public sector saving (S_g):

$$S_p = S_n - S_g \quad (8)$$

(b) Saving and Investment

Estimates of national saving (S_n) and domestic investment (I) are available in the national accounts statistics. These are taken from *World Tables*. A series for the proportionate share of the public and the private sector in total investment is generated from government capital formation data given in [9] and [10]. The level of public investment is derived by applying this ratio on gross domestic investment obtained from the *World Tables*:

$$I_g = (I_g/I) \cdot I \quad (9)$$

The level of private investment is obtained as residual

$$I_p = I - I_g \quad (10)$$

The above variables define the public and private sector resource gap, $(I_g - S_g)$ and $(I_p - S_p)$, respectively. This, as shown in equation (3), creates the linkage with the balance of payments.

Net Resource Transfer from the Private to the Public Sector

A common feature of developing countries is the existence of a large public sector resource gap financed by both external and domestic resources. The methodology for defining and estimating the external resource is given in the next section. The domestic resource transfer to the public sector (Z) is computed as residual - as the difference between the use and source of public sector funds. It results *ex post* from range of measures (like inflation tax, for instance) adopted to finance the budget deficit and public enterprise capital requirements:

$$Z = I_g - S_g - F_g \quad (11)$$

where F_g is net foreign capital inflow to the public sector. It is possible to isolate within Z the component of total resource transfer that accrues to the government (Z_g) - estimated as the net outstanding claims on the central government (which corresponds to the figures appearing on line 32an of the *International Financial Statistics*). The difference between Z_g and the total transfer of resources (Z) thus might be interpreted (ignoring statistical discrepancies) as a residual measure of net transfer of resources from the private to the public sector.

4. PRIVATE SECTOR RESOURCES GAP FINANCED BY EXTERNAL SOURCES

This section gives the methodology for defining and estimating the external gap. It also defines the capital accounts for both the private and public sectors.

Foreign Capital Inflow

The foreign capital inflow into the economy is defined as the net change in the external asset and liability position: i.e.

$$F = \Delta L - \Delta A \quad (12)$$

For public and private sectors this can be given as

$$F_g = \Delta L_g - \Delta A_g + \Delta R \quad (13)$$

and

$$F_p = \Delta L_p - \Delta A_p \quad (14)$$

where ΔA and ΔL represent the changes in assets and liabilities, F is the foreign capital inflow with the subscripts denoting the public and private sectors, and ΔR is the change in reserves.

Data pertaining to changes in the assets, liabilities and reserves of the public and the private sector are reported in US dollars in the Balance of Payments Statistics (BOPS). To obtain the figures in domestic currency, it is possible to use the corresponding annual conversion (exchange) rate reported in the *World Tables*. The changes in the assets of the public sector (ΔA_g) correspond to the sum of the figures reported in BOPS lines 53 - 55, 62 - 64 and 84 - 85, while change in recorded (R) private sector assets (direct investment abroad, portfolio investment, other long-term assets, and short term assets), ΔA_p , refers to BOPS lines 45 - 48, 56, 59, 69 - 71, 77 - 79, 89 and 93 - 94. The changes in the liabilities of the public sector (ΔL_g) are reported as the sum of the figures in BOPS lines 86 - 88 (for other, short term liabilities), but net flows corresponding to long term external debt transactions (including bonds) by the public sector borrowers were derived from the World Bank's *Debtor Reporting System* (DRS). Recorded private sector external liabilities (ΔL_p) are the sum of direct foreign investment inflows and equity investment (BOPS lines 49 - 52, 60 - 61); long term external debt transactions, including bonds, by private sector borrowers from the DRS, and short term private sector borrowing (BOPS lines 90 - 92 and 95 - 97). The changes in official reserves (ΔR) are the sum of the figures in BOPS lines 98 - 111 (See Appendix III).

The net inflow of foreign capital to the public sector is derived as in equation (13). In case of the private sector, however, the derivation is complicated by three factors: (i) the unrecorded accumulation of private external assets (ΔA_p), (ii) errors and omissions (BOPS line 112), the balancing item of the balance of payments; this item is assumed largely consists of unrecorded, short term (private) capital movements (referred as F_pURCA in the database); and (iii) the discrepancy in the national accounts and balance of payments figures (referred as F_pURNA in this database). The inflow of foreign capital to the private sector is consequently derived from the following:

$$F_p = (\Delta DL_pR - \Delta DA_pR) + F_pURCA + F_pURNA \quad (15)$$

The errors and omissions item in the capital account of the *Balance of Payments* (F_pURCA) is a balancing item which refers to an unrecorded capital inflow when positive and an unrecorded outflow when negative.

F_pURNA is a balancing item which captures the discrepancy between the national accounts figures of the current account balance and the balance of payments figures. A strong assumption is made here that this discrepancy may be interpreted as unrecorded capital transaction by the private sector.

Capital Accounts of the Public and Private Sectors

The public sector capital balance or the balance between the uses and sources of public sector funds now can be defined by rearranging terms in equation (11):

$$I_p = S_g + F_g + Z \quad (16)$$

and the capital account of the private sector are defined as:

$$I_p + Z = S_p + F_p \quad (17)$$

with the uses of private sector funds, investment (I_p) and the resource transfer to the public sector (Z), appearing in the left hand side and the sources of private funds, private sector saving (S_p) and net inflow of foreign capital to the private sector (F_p), appearing on the right hand side.

The series on the capital position of the public and private sector is based on the *International Financial Statistics*, the *Debtor Reporting System* and the *Balance of Payment Statistics*. Data on the long term liabilities of the public sector (L_p) and the private sector (L_p) is obtained from the indebtedness position of the country as reported in the *Debtor Reporting System* (DRS) of the World Bank (data by institution type of borrowers). The DRS does not report, however, on the short term liability position by institutional sectors. Where such data are available, it is not disaggregated by institutional sectors. We derived the short term liabilities of the public sector (DS_p) as the cumulative sum of the net changes in short term liabilities reported in lines 86 - 88 of the *Balance of Payments*. Similarly, the short term external liabilities of the private sectors (DS_p) for the period are calculated as the cumulative sum of the net changes in the short term liabilities of the private sector as reported in BOPS lines 90 - 92 and 95 - 97 (See Appendix III).

Foreign assets of the public sector (reserves) are derived from the BOPS. The foreign asset position of the private sector may be derived in various ways. The calculated values of the database include an estimate of the cumulative value of *unrecorded* private capital outflows:

$$\text{CumA} = \sum \Lambda = \sum (-F_p \text{URCA} - F_p \text{URNA})$$

However, when assumption two is employed the discrepancy is accounted for by the level of private sector saving. The domestic capital position⁷ of the public and private sectors is reported in the *International Financial Statistics*. Public sector liabilities or claims on the central government (B_p) in IFS line 32an, and private sector liabilities (B_p) in IFS line 32d. In this database the net domestic asset position of the private sector is derived as the difference between the monetary base (31n + 32) and claims on the private sector (32d) as reported in *International Financial Statistics*. Where relevant, a modified figure (using information on other banking institutions can also be given). For some countries the IFS data shows substantial claims of 'other banking institutions' on public sector entities (IFS lines 42a - c). These can be interpreted as constituting (directly) private sector claims on the public sector and are added to the private domestic asset position.

One of the price variables given in this study is the exchange rate. The nominal exchange rate (local currency per US dollar) is taken from *World Tables* (but corresponds to that given in the IFS, line rf). Real exchange rates are calculated for two types of definitions: the first is a trade

related real exchange rate defined as the nominal exchange rate (e) times the arithmetic mean of the export (P_x) and import (P_m) unit price indices divided by the domestic GDP deflator (P_d) and the second is a 'dollar - asset' related real exchange rate where the US GDP deflator (P_s) replaced the foreign trade price index in the definition:

$$RER (a) = \frac{e \cdot (P_x + P_m) / 2}{P_d} \quad (19)$$

$$RER (b) = \frac{e \cdot P_s}{P_d} \quad (20)$$

All relevant data are taken from *World Tables*.

Another price variable is *real interest rate* (r). Three interest rates are given. These are lending rate (i_l), deposit rate (i_d) and the US dollar based 3 months LIBOR as reported in *International Financial Statistics*. The real domestic interest rates are computed using GDP deflator:

$$r_l = \frac{1 + i_l}{1 + \bar{P}_d} - 1$$

$$r_d = \frac{1 + i_d}{1 + \bar{P}_d} - 1$$

Where: \bar{P}_d = domestic inflation rate (GDP deflator)

Limitations and Accuracy of the Database

Although this framework allows to correct inconsistency and disaggregate the data by institutional sectors it is not without problems. First, it does not address the root cause of the inconsistency and merely tries to make the best use of the existing database. Second, the methodology might result in a systemic bias (over or under estimation) in the figures for some variables. As discussed in the text, the net factor payments and current transfers are disaggregated using the balance of payments data. Subsequently net factor payments and current transfer as computed from the balance of payments is imposed upon domestic saving to get

national saving (the private saving being the accommodating variable). In this process the 'private saving', computed as residual to ensure consistency, could be under/over stated.

Third, if the discrepancy of net factor payments and current transfer computed from the two sources is high, the estimate of the net external borrowing (F_p) to the private sector may be unreliable. Further, this problem could be exacerbated in some cases because of certain accounting incompatibility between the DRS and BOPS. The DRS reports in principle only actual debt transactions (flows) and actual interest payments. The BOPS, on the other hand, follows another practice, which is to report on interest payments and debt repayments that are due, arrears and refinancing through debt rescheduling are then used as counterpart items constituting 'capital inflows'. From BOPS it is unclear how consistently this practice is followed in each country, nor it is always possible to distinguish between interest repayment arrears involving public or private sector debt. As long as arrears relate to principal payments and rescheduling are booked in the BOPS under short term liabilities, and such values affect the estimates in the database, particularly the residual F_p is again affected. Further, as indicated, the current account balance as estimated in the BOPS accounts for interest payments due, thus it may include arrears on interest payments implying that the current account deficit in the BOPS may be 'overestimated' in this sense. A change in the short term liabilities, exceptional finance, functions as a counterpart item, but no distinction is made between interest and principal repayment. It is difficult to make appropriate corrections (by public and private sector) in the consolidated capital accounts for this potential source of discrepancy.

Finally, in the computation of net domestic asset of the *private* sector (wealth indicator data) we have assumed total money supply (as inferred from the monetary base) to represent gross domestic asset of the private sector. However, it is possible that the public sector could have a part in it and our domestic asset of the private sector could be overstated by that amount. The difficulty of getting disaggregated data may force us to accept this limiting assumption.

Despite these problems, it is clear that the database construction brings together seemingly separate statistical sources of information and shows, ideally, the data should match given the logic of integrated accounting framework that ties the variables together (See equation (3)).

5. CONCLUSION

By using different data sources, the above integrated macro framework is applied. The result shows that it is possible to produce analytically consistent database. The major contribution of this work should be sought in its effort to organize Ethiopia's macro data in analytically consistent framework so as to investigate the macro economic condition in general and the public private sectors interaction in particular. It is also desirable that data supplying institutions (i.e. the National Bank, Ministry of Finance, Ministry of Economic Development and Cooperation, Central Statistical Authority, among others) organize the domestic data in such consistent analytical framework. If the diagnosis is wrong the remedy is sure to fail.

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Notes

1. Institute of Social Studies, The Hague, The Netherlands.
2. It is possible to use domestic sources.
3. Data for 20 African countries build on the basis of this alternative assumption will be reported in Alemayehu (1995) (forth coming, ISS working paper). Interested researchers could contact the author for the electronic data.
4. In terms of the variable codes in the Balance of Payments Statistics it is:
$$Nlg = 1G1A4 + 1G1B4 + 1G3A4 + 1G3B4 + 1H1A4 + 1H1B4 + 1H2A4 + 1H2B4$$
$$Gr = 1H1A4 + 1H1B4$$
$$Rem = 1M1A4 + 1M1B4 + 1K.A4 + 1K.B4$$
$$Nlp = 1EA4 + 1E1B4 + 1E2A4 + 1E2B4 + 1G3A4 + 1G3B4$$
5. Alternatively it is possible to define the current account BALANCE as $CAB = X - M + N$
6. In the IMF's *Government Finance Statistics* total revenue and grants is reported in domestic currency units in line AI. Line VI should be subtracted from it to arrive at the current revenue and grants (T) which can also be

obtained as the sum of Line AIII and VII. Government current expenditure (G) is given in line CIII. It is this value which is used. For most countries the *International Financial Statistics* (IFS) reports a much longer series for current government revenue (T) (as the sum of lines 81 and 81z). Only total government expenditure figures are available (reported in line 82) which have to be adjusted for government capital expenditure to arrive at current expenditure (G). The *World Tables* also report current revenue and current expenditure but for some developing countries the current revenue is actually the total revenue.

7. The external asset position of the private sector could be computed as the sum of line 7a.d of the *International Financial Statistics* (though it is limited to banks) and FpURCA and FpURNA under the assumption of no statistical errors and the existence of unrecorded transaction.

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APPENDIX 1: SYMBOLS USED

A	Change in total external asset position
Ap	Change in external asset position of the private sector
Ag	Change in external asset position of the public sector
Au	Unrecorded net accumulation of private external assets
Bg	Bank claims on private sector (domestic outstanding liabilities)
BOPS	Balance of payments Statistics (of the IMF)
CAD	Current Account Deficit of the balance of payments
DRS	Debtor Reporting system of the World
DSg	Short term external liability of the public sector
DSp	Short term external liability of the private sector
e	Nominal exchange rate
F	Total net capital inflows (or foreign saving)
Fg	Net capital inflow to the public sector
Fp	Net capital inflow to the private sector
FpURCA	Errors and omission of the BOP, which are assumed to reflect unrecorded short term private capital movements from abroad (if positive; and to abroad, if negative)
FPURNA	Discrepancy between CAD estimate in the National Accounts and that in the Balance of payments statistics
G	Current Government expenditure
GDS	Gross Domestic Saving
(Sd)	Government Financial Statistics (of IMF)
GFS	Grants
Gr	Gross Domestic Investment
I	Private Investment (or private gross capital formation)
Ig	Public Investment (or public gross capital formation)
id	Domestic nominal interest rate on deposits

APPENDIX I (...continued)

ii	Domestic nominal lending rate on deposits
IFS	Internal Financial Statistics (of the IMF)
L	Change in total external liability position
Lp	Change in total external liability position of the private sector
Lg	London Interbank offer rate (on 3 months on US dollar deposit)
LIBOR	Imports of goods and non-factor services
M	Net factor payments and net current transfer from abroad
N	Net factor payments and net current transfer from abroad to the private sector
Np	Net factor payments and net current transfer from abroad to the public sector
Ng	Net factor payments from abroad
NFP	Net interest payments on external debt by the public sector
NIg	Net interest payments on external debt by the private sector
NIp	Other (non-interest) net factor payments and current transfer to abroad by the private sector
NTR	Net current transfer from abroad
Pd	Domestic price index (GDP deflator)

Appendix II. Public and Private Sectors Assets and Liabilities

<i>Description</i>	<i>BOPS Line NO.</i>	<i>Variable Name</i>
PRIVATE SECTOR		
Change in Assets		
Direct investment abroad	45-48	3LX4
Portfolio investment	56+59	6B1X4+6D1X4
Other long-term capital of Banks#	69-71	5C1Y4+5C1W4+5K1X4
Other long-term capital of other sectors	77-79	8C1Y4+8C1W4+8K1X4
Other short-term capital of Banks	89	5L2X4
Other long-term capital of other sectors	93-94	8C2X4+8K2X4
Change in Liabilities		
Direct investment in the country	49-52	3Y.X4
Portfolio investment (excluding bonds)	60+61	6V1X4+6S1X4
Other short-term liabilities:		
Banks	90-92	5U2X4+5V2X4+5X2X4
Other Sectors	95-97	8W2X4+8P2X4+8S2X4
Other long-term liabilities*		
PUBLIC SECTOR		
Change in Assets		
Portfolio investment	53	6A1X4
Other long-term capital of official sectors	62-64	4C1Y4+4C1W4+4K1X4
Other short-term capital of official sectors	84-85	4C2X4+4K2X4
Change in liabilities		
Portfolio investment	54-55	6T1X4+6Q1X4
Other short-term liability of official sectors	86-88	4W2X4+4P2X4+4S2X4
Other long-term liabilities*		

Source: International Monetary Fund (IMF), 'Balance of Payments Statistics Yearbook'

* For these variables the source is "The Debt Reporting System (DRS) of the World Bank

NOTE: One major problem is that the institutional set up of the source of capital (creditor) is assumed to be similar to that of the recipient. In such set up most likely public sector long term liabilities could be understated by the amount of capital inflow from private sector (with similar amount over statement of the private sector).

Unlike other countries, in Ethiopia's case the Banks should be included under the public sector. In the data this change is made.

Appendix III. Factor Payments and Current transfers

<i>Description</i>	<i>BOPS Line NO.</i>	<i>Variable name</i>
FACTOR PAYMENTS		
PRIVATE SECTOR (Excluding 27+28)		
Investment income		
Reinvested earning on direct investment	11+12	1E1A4+1E1B4
Other direct investment	13+14	1E2A4+1E2B4
Other investment income	19+20	1G3A4+1G3B4
Other investment income (of foreign official)	17+18	1G2A4+1G2B4
Others:		
Property income	29+30	1M2A4+1M2B4
Other goods, services and income	31+32	1M3A4+1M3B4
Other foreign official sector	25+26	1I3A4+1I3B4
PUBLIC SECTOR		
Investment income		
Other investment, inter official	15+16	1G1A4+1G1B4
Other investment income	19+20	1G3A4+1G3B4
Other investment income		
Inter official, n.i.e.	21+22	1I1A4+1I1B4
Other official	23+24	1I2A4+1I2B4
CURRENT TRANSFER		
PRIVATE SECTOR		
Worker's remittances	27+28+33-38	1M1A4+1M1B4 +1K.A4+1K.B4
Other transfers	43+44	
PUBLIC SECTOR		
Grants	39+40	1H1A4+1H1B4
Other transfer	41+42	1H2A4+1H2B4

REGULATION VERSUS THE MARKET FOR THE PRODUCTION OF ACCOUNTING INFORMATION: A REVIEW OF THE THEORY IN THE CONTEXT OF SUB-SAHARAN ECONOMIES

Minga Negash¹

Abstract: *This paper examines the plausibility of the arguments for and against regulating the production of accounting information. The literature is reviewed and discussed in the context of Sub-Saharan Africa countries. After a careful review of the debates and the contemporary theories of financial disclosures, it is argued that voluntary disclosure mechanisms cannot be used as policy instruments because of the absence of institutions. Two epilogues are provided: first a general one and the second specific to Sub-Saharan economies.*

1. INTRODUCTION

Background

Since the late seventies, research on the role of accounting information and its production methods has changed its traditional style. Research paradigms and design methods have changed particularly with the publication of Watts and Zimmerman's [109] seminal works on positive theory. The availability of methodological guidelines [6, 35], organized databases and powerful soft-wares facilitated the change. Though epistemological controversies (see [49] for reviews) continue, at least the norm has become examining ontological (reality) issues.

Empirical research in accounting has come up with some theories that attempt to explain and predict accounting practices. For instance, there is now substantial evidence which shows that firms disclose information voluntarily. Analytical research has also demonstrated that firms have a threshold level of discretionary disclosures [105]. Various stock market based research has documented that some price reactions can be observed because of mandatory accounting changes [65]. Cumulatively, from a policy point of view, these results in turn brought a more fundamental question: whether socially optimal level of accounting information can best be produced under

a regulatory environment or through the adoption of voluntary/ non-regulatory corporate disclosure mechanisms. These questions have important implications to countries which are in the process of selecting policy options and to those which are re-examining their past financial reporting policies.

Normative Versus Positive (Accounting) Research

Many accountants in the developing environments, as a result of their training orientation, are familiar to the concepts provided by what is now known as the true income school. In the sixties accounting terms like principles, assumptions, postulates, axioms and concepts started appearing in the literature. The ideas embodied in these terms have been presented (for example in textbooks) as the core theory of accounting standards. The school [73, 42, 86, 17] is now viewed as the school of accounting classics. However, the contributions of this school did not go beyond emphasising that accounting should have better measurement techniques. From a policy point of view, the effects of these early thinkers were the establishment and /or the strengthening of standard setting bodies world-wide².

The next school concentrated on studying the "usefulness" [1, 50, 51] or the "true and fair view" [3, 33] of financial statement numbers. However, as their predecessors, and because of policy biases of such research, most of the arguments had prescriptions in mind. They saw accounting as a technical problem involving mainly measurement issues. As a result, the debate as late as the early eighties focused on defining the "objectives" of accounting. Accounting faced philosophical and methodological problems. Sound theories and tests of theories were seldom found in the literature. Recognition of this situation obliged some researchers (see for example [68]) to be concerned with developing a "theory of" versus a "theory for" accounting. These weaknesses made accounting vulnerable to attacks from all corners [11, 13]. Criticisms continue, and more recently accounting is alleged to be "the problem" rather than part of the solution of control [73]. Collectively, most writings of this school were described as normative and rhetorical. Nowadays, the main stream journals abound in North American schools have more or less established a norm of their own: anything that is not testable and verifiable [89, 61] is regarded less scientific.

Our Place in the Research World

In the rest of the world, the academic accounting community can be classified into four main groups in relation to the new research direction: (a) The leftists: those who argue that positivism cannot be a leading criterion to the validation of accounting research [19, 64, 104]; (b) The social democrats: those who are trying to follow the new paradigm (mainly researches on European databases [92]); (c) The psychologists and the populists: those who see accounting as a "human science" to be studied in the context of organizations [47, 66]; and (d) The fourth group is mainly focusing on the so called Third World Accounting [94, 48].

With some support from the Britons, the latter group has now started to develop the equivalent of a dependencia theory for accounting³. The premises for the shift was the alleged inappropriateness of the type of accounting technology that is being transferred; presumably not epistemological⁴. Other than this, the literature on African accounting is scanty. It is not published in the "main stream" journals. The few that are available are confined to doctoral dissertations which are not commonly available to policy making institutions. The works that are available are mostly results of commissioned research. Such works are usually done by foreign experts, and funded by donor/multilateral institutions. The studies involve surveys and largely remain descriptive.

Objectives and Summary of the Research Problem

This paper has the objective of examining the plausibility of anti-regulation thoughts, in the context of the production of accounting information. The theory of corporate information disclosure is analysed in the context of Sub-Saharan economies. The paper attempts to review and discuss the theoretical basis for the regulation of the production of accounting information. Towards the end, country specific policy recommendations are made. The paper does not address the extent to which information markets should be regulated.

The paper is presented in the following order. In section II arguments for and against regulation are presented and discussed. In section III, observations on the plausibility of the arguments are dwelt upon and the competing contemporary theories of corporate disclosure presented. Section IV depicts the Sub-Saharan situations and introduces accounting in the context of development

and institutions. It analyses the relevance and implications of the theories to Sub-Saharan economies. Section V presents the conclusion and direction(s) for future research.

2. PRO AND CONTRA REGULATION ARGUMENTS

Ever since regulatory bodies like the Securities and Exchange Commission (USA) were created, there has been reservation as to whether regulating the production of accounting information is socially useful. Several questions such as the following have been raised. What are the merits and who are the beneficiaries of regulation? Is it true that unregulated markets are better in achieving optimal resource allocation? How does one characterize accounting information: as a private good or a public good? These questions continue to be asked today. However, the answers to these and other similar questions largely depend on who one asks: those who are for or those who are against regulation. Further, the analytical models used to find answers to these questions are largely drawn from general equilibrium type models and centre on information economics [46, 24].

Regulation Free Thoughts

These arguments are based on the premise that firms have incentives to report about themselves to an extent that no external rule governing financial reporting is necessary to produce the financial information needed for the efficient functioning of the economy. Agency theory, efficient market hypothesis, the private acquisitions of information that is not voluntarily reported are the main arguments presented in support of unregulated accounting information (markets).

Agency Theory

Many of today's business concerns can be best described by this theory [55]. The recent version of the theory tries to explain organizational behaviour in the event of the breakdown of Fisher's separation theorem⁵.

The conflict of interest between agents and principals necessitates nontrivial monitoring costs. These costs are incurred mainly to force (or entice) the agent to behave in line with the dominant

principals. Monitoring costs however, reduce both the value of the firm and the agent's compensation. Hence, it is argued that the agents have an incentive to minimize agency costs by reducing their conflicts with owners. Accounting based executive compensation schemes, budgets, audits and even the market based ones (for instance stock options) are devices used to reduce agency costs.

In this regard, corroboration of the theory shows that even the early English firms (the merchant guilds) voluntarily kept accounts that were routinely audited by the owners; long before mandatory rules were made (in the thirteenth century)⁶. Agency theory therefore, suggests that managers have an interest in reporting voluntarily and reliably, making mandatory disclosure rules unnecessary.

Competitive Capital Markets

This argument states that firms have an incentive to report voluntarily to the capital markets even in the absence of mandatory disclosure requirements. The competition among firms for scarce risk capital obliges the firm to inform the market about itself. The theory further states that firms which report more extensively and reliably would be able to raise capital easier and cheaper [98, 18, 60]. The empirical support for this hypothesis is largely drawn from the efficient markets theory. Most of these "event studies" followed positively normative methods (computations of cumulative excess returns) to test the Fama-Jensen version [28, 54] of semi strong hypothesis. A number of researches (see [92] for reviews) have reported that there is some evidence which shows the movement of systematic risk coefficients (betas) around the announcement of disclosure standards. That is, disclosing firms had lower betas than non-disclosing firms⁷.

These reports suggest that all companies which have good performance would have strong incentives to report fully and reliably. Those who do not report, could still be better off by reporting even "bad" information in order not to lose credibility from the stock market. Such an arrangement, it is argued, does not require the prescription of external disclosure rules.

Contractual Opportunities

Wolk et al. [115] note that any information not voluntarily reported under deregulation, can be obtained for a price by privately contracting with the firm itself, its owners or the information intermediaries (example: financial analysts). The market will determine how much information should be produced and the price. This arrangement can lead to a more efficient allocation of resources to information production. Subscriptions to investor newsletters and fees for investment advisors are examples that people are willing to buy the information that they think is useful. Under such an arrangement, regulatory intervention is not only unnecessary but also undesirable since the market itself determines the optimal quantity of information and its price. Accounting information here is treated like any other normal good, where quantities and prices are determined by demand and supply forces. In short, the price system solves the problem.

General Scepticism Against Regulatory Bodies

The widely held view is that regulations are corrective measures for market failures. However, here too there are competing and differing views about the beneficiaries and benefits of regulations.

Conventional wisdom of regulations is that society at large benefits from such rules. Particular emphasis is given to investors with small holdings who are unlikely to be well represented in the board of directors.

The second view states that regulations do not benefit anybody. There are no clearly identifiable groups which are gaining. The social benefits that may be obtained by regulating an activity or a market are taken up (eaten) by the implementation costs. Thus, the net benefits of regulation at the aggregate level are negligible.

The third argument is basically a corroboration to the second. It states that regulations benefit policy executing bodies themselves. Regulatory bodies established to deal with a particular problem stay long after their alleged purpose is no longer relevant. In short, it is argued that policy implementing bodies and their bureaucrats maximize their stay and get the benefits that may come out of the regulation.

Pro Regulation Thoughts

In the foregoing section we have seen four main reasons for unregulated information markets. The protagonists of regulation also provide several arguments. They are: (i) the firm is a monopolistic supplier of information; (ii) information asymmetry problem; (iii) the public good character of accounting information; (iv) externality problems under unregulated information markets; (v) the speculation problem; and (vi) the aggregate social consequences (public policy aspects) of unregulated markets. These points are collectively referred to as market failure arguments.

The Firm as the Sole Producer of Information

One of the causes of market failure is that the firm is a monopolistic supplier of information about itself. In an unregulated market, the firm can restrict the production of information and charge monopoly prices. This results in inefficient allocation of resources. Mandatory disclosures would result in more information and a lower cost to society (*ceteris paribus*) than could be achieved in unregulated monopolistic information markets. Hakansson [97] suggests that the production costs of mandatory reporting requirements may be small since most of the basic information is produced as a by-product of internal accounting systems. If this is the case, then the social costs of mandatory reporting may be small, making such reporting more efficient than the private buying of information. Moreover, searches by information intermediaries about firms could be resisted for another reason. Privacy concerns (breaking the law which provides for the right to privacy) can be a major hindrance to making such options operational. This makes the plausibility of anti-regulation arguments weaker.

The Asymmetry Problem

Even under regulation, accounting and auditing have been criticised for low quality reporting (Briloff *op cit*). Fraud not detected by auditors and the absence of "truth and fairness" in the numbers contained in annual reports require regulatory agencies to protect public interest. The so-called creative accounting is a case in point. Another typical case which shows that annual reports do not mean much is that of the Dutch conglomerate Phillips N.V. In May 1990 its stock price collapsed, the firm engaged in heavy restructuring. Nevertheless, the annual report for the (preceding) year did not signal any of these events.

Information asymmetry occurs when one individual is endowed with more information than the other party (for instance in a transaction). In a seminal work, Akerlof [2] demonstrated how difficult it is to distinguish "the lemon" products from the good ones. In other words, there is an adverse selection problem. In the market for information, information asymmetry about securities can lead to a situation where "good" and "bad" securities (securities with different returns and same risks or vice versa) can be traded at the same price. One of the major lessons of market efficiency that advises investors to trust market prices ([10 p.272] for example) faces a breakdown. The market becomes inefficient (in the Beaver op.cit sense) in processing information and prices may not indicate the real worth (intrinsic value) of the security. Godenes et al [41] noted that Akerlof's (op.cit) analysis of quality and price can be extended to the accounting setting. Therefore, more and better regulations are necessary; not only to improve disclosures but to curb the activities of those with more information from reaping the benefits that result from their privileged access to organizational information.

The Speculation Problem

The speculation problem is created by market participants (investors, information intermediaries, etc.). Heterogeneous beliefs and imperfections in capital markets create grounds for speculations about the firm; for example before the publications of annual reports or the announcement of earnings. Transaction costs are incurred (in security trading); the market place is busy and prices are altered. This is happening not because something underlying the firm's investment/asset structure has changed, but purely on speculative grounds. The search for information continues at an extensive level for the validation of rumours. This situation obviously does not change aggregate real wealth in the market but the firm's market value changes simply because of speculation motives. Here, the speculation creates wealth transfers (as in gambling) and does not increase the pie. Therefore, it is argued that regulatory disclosure helps in curbing such undesirable behaviour of market participants. Laws that require the disclosure of "material information" that affect value and/or penalties for fabricating rumours are intended to curb such activities.

The Externality Problem

If the market for information is left unregulated, the result will be competition among firms in reporting information about themselves. Firms who are caught in this competition may be forced to release strategic and sensitive information simply to overcome the market's wrong pricing of their securities, if they do not disclose. Absence of information can be interpreted as bad news. Taken as a whole, the disclosure practices of one firm influences the other firms' disclosure policies. The type of externality could be both negative and positive. First, it enhances disclosures and thus, corporate transparency. Secondly, on the negative side, the practice can push some firms into a disadvantageous position⁸. Therefore, it is unlikely or rather difficult to assume that firms by themselves will internalize such costs [34]. Accordingly, regulation is not only desirable but also necessary.

The Exclusion Problem

Accounting information can be characterised as both a public good [67] and a private one [102]. Information can have a private value if its arrival is ex-ante to a decision and that information is held privately. Ex-post public information has only social values [46 op cit] and no private value.

Public information (for example annual reports) can be freely passed from person to person and the consumption by one does not exclude the consumption of the same information by others; once annual reports are issued⁹. This brings financial information, specially those released through annual reports closer to a public good. Public goods are underproduced in unregulated markets because consumers under-reveal their preferences. Thus, "free riders" benefit from the good or the service not only without paying but by not even admitting that they need it. And a public good producer who attempts to exclude non-payers incurs non-trivial costs. Therefore, anti-regulation arguments are further weakened.

Moral Hazard and Epistemological Problems

Regulations are usually considered as correcting tools for market failures. In other words, economic regulations are aimed at curbing the under/over production of a public or private

commodity. In addition to the above market failure arguments, the moral and redistributive issues resulting from non-regulatory practices become reasons to intervene in the process of "well functioning markets". In other words, politicians may not like the distributional impacts of such markets. Helleiner [45, p.542] for example notes the following:

... almost imperceptibly, prisoners of their own paradigm, students of economics risk in beginning to regard all government policies as interventions; likely to impede the harmonious functions of the market and beginning to regard distributions of income and power as a matter wholly independent of market functions to be handled by separate polices (lump sum transfers) that do not interfere with markets...

Self interest [44] and unregulated market theories also face epistemological issues. Christenson (op cit), Low et al (op cit), Tinker et al (op cit) argue that self interest and regulation free arguments take market phenomena as natural and universal. The supporters of regulation-free information markets ignore the institutional backgrounds that define the rule according to which market behaviour is played out. In short, they are value-laden. Therefore, it is argued that the advocates of anti-regulation in fact justify a particular type of social contract.

3. GENERAL EPILOGUE AND A COMMENT ON THE CONTEMPORARY THEORY

Given both sides of the debate, it is now proper to make some observations and examine the current theories of disclosure. In the first section, we report our earlier observations [53].

- a. Since managers have incentives to reduce agency costs, there would be substantial disclosure without mandatory disclosure rules. The contractual terms that define the relations between the agent and the owners would normally make provisions for trade-offs between full monitoring costs and the level of incentives to induce the manager to have an interest which is in line with the owner.
- b. Regulated financial reporting causes or facilitates a transfer of wealth from the firm or its customers or both to the users of financial information. How much wealth is transferred depends on the extent to which the firm is able to pass the costs of regulation compliance

- to its customers through higher product prices. Nevertheless, it is obvious that the firm's information system is part of the technology applied by the company in making its products available to the market place.
- c. Standardization of accounting policies and procedures (semi-regulated information) leads to more uniformity among companies than would occur in unregulated markets. This improves the comparability of financial statements; including those prepared across national boundaries.
- d. Research in the seventies and eighties concentrated on finding the microeconomic consequences of increased corporate disclosures. Most researchers examined the behaviour of security prices and risk coefficients around the promulgation of new mandatory (accounting) disclosures. The evidence by and large is that those firms that complied to the new standard or those firms which have been disclosing voluntarily selected items of information were characterised by lower systematic risk and returns [92, 21, 25]. Despite the ample reports, some (see for instance [15]) suggest that reporting patterns do not describe any economic phenomena.
- e. Between these extremes one finds Verrecchia's [105] proprietary cost theorem. Using analytical methods, he shows that because of the existence of (constant) proprietary costs (which may be endogenous or exogenously determined), a firm will have "a threshold level" of discretionary disclosure. Thus, the existence of proprietary costs mitigates the adverse selection problem; in favour of full disclosure. This argument looks plausible particularly if the firm has good news¹⁰.
- f. Darrough and Stoughton (op cit) and Verrecchia [106] further show that firms not only disclose voluntarily favourable news but even bad news. The purpose here is deterrence of (potential) competitors' entry to product markets. In a more recent work, Skinner [99] provides evidence which shows that managers disclose bad news promptly and states that they behave as if they are facing "asymmetric loss functions" in choosing their voluntary disclosure policies. In other words, managers behave as if they bear large costs when investors are surprised by large negative earning news. Skinner's explanations are stockholders' ability to sue and the incidence of reputation related costs (for managers).

In short, managers have both legal and reputation (market) incentives and attempt to preempt large negative earnings surprises. Skinner's findings are not claimed to be proprietary cost variables.

4. IMPLICATIONS OF THE DÉBATES TO SUB-SAHARAN ECONOMIES

A Profile of the Sub-Saharan Situations

Most Sub-Saharan countries are roughly three decades old as nation states. Slave trade, colonialism, commodity production, independence resistance characterized their recent history. Post-colonial states spent a considerable time in "nation building" exercises. In the process, massive attempts of the centralization of the economy and the administrative structures followed. The contradictions between colonial influences (institutions) and nationalism became serious. The cold war exacerbated internalized contradictions and Sub-Saharan Africa became the battle ground of the East and the West. The proxy wars and latent internal conflicts ruined the fabrics of society and institutions (new and old). As a result, many states have collapsed (Somalia, Rwanda, Burundi) or are nominally existing. Now, pluralistic models are being tried without fundamental institutions. Trust and credibility of the modern political institutions and the legal systems are disappearing. Enforcement of basic laws and contracts is curtailed by capacitation problems and frequent political interventions. Information is obtained through personal, tribal, religious and (to some extent) trade networks. Under such a scenario it is no surprise to find that there is little public interest in published (accounting) reports.

Macroeconomic indicators show consistent and long-term economic regress [97]. Transitions to "market oriented economies" are being pursued as a panacea in nearly all the states. And the prescriptions of the Brettonwood institutions are fairly standard (see [52] for example). Dismantling command economies, rearrangement of property rights, trade liberalizations, macroeconomic stabilization, currency realignment programmes, reducing budgetary deficits are vigorously pursued. Yet, these shocks are not responding "as expected". Lessons are being learned by doing. Clear choice on the speed (gradual versus rapid) of liberalizations of the formal economy [69] has become controversial. Moreover, the limits of financial reform programmes

[26, 39] are overlooked. As a result, in most countries of the region, there is a serious problem of macroeconomic control. Further, reliance on the command and control institutions of the reform programmes has become dubious. This worsens the process of trust making in largely traditional and pre-capitalist societies [88].

The search for the "invisible hand" has become difficult to identify in these societies. Some times one sees it, and other times one does not. Despite this, some monetarists perceive the problem as if market (concepts, mechanics, paradigms, policies and rules) can be implanted in the absence of organized (market) institutions.

The indigenous institutional settings consist of an interdependent web of organizations most of which are not characterized by increasing returns. Trust making and uncertainty reduction largely rely on tribal, religious and personal affiliations [93, 80] than on published reports and records. As a result, transaction cost, information asymmetry and cost of information search are deemed high in these societies.

In the "informal" sector, petty traders compete intensely by having a bazaar type (Suqe) trade. Peasant agriculture remains the main-stay of the economy in most of the countries. Governments' influence and controls in these sectors are minimal and mostly rhetoric. Economic historians (see North op cit for example) provide evidence that such institutions did not evolve to advanced (economic) organizations.

In the formal or upper strata of the economy, one observes some multinational companies, some "home-grown" entrepreneurs and state owned enterprises (SOEs). Most of them are import substituting concerns. The multinationals use their subsidiaries for vertical integration; mainly for obtaining raw materials and commodities or for developing non-overlapping geographical markets. The SOEs sector is in the process of restructuring. That involves property rights rearrangements. For a number of reasons the SOEs sector has become prone to dismal financial performance [78, 103, 76]. In the finance sector, the commercial banks still serve their precolonial time purposes; mostly the facilitation of commodity trade [80]. Credit rationing is high. Secondary markets are few and small. The tradition of "la bourse de papa" is nonexistent. Where secondary markets exist, they are characterised by price distortions, thinness, volatility, liquidity problems, lengthy settlement procedures and under-capitalization. Most of the shares

are held by institutional investors.

Development, Markets and Accounting

With the above ontological factors, then comes the thorny issue of development¹¹. Various paths have been suggested to the study of African development. They include environment, population (demography), institutions (state and law) and price theory. The literature on price theory overshadows the others. The result is that many observers have concluded on shortages of capital and trained manpower as the crucial seeds for closing the gap between Sub-Saharan countries and MDCs.

These perceptions of the problems and the resultant solutions are not free of puzzles however. If the price system and market rule were making more sense in these economies, one would guess that shortages (capital and trained labour) would be reflected in prices. That is, the marginal rates of returns on invested capital and wage rates of the trained should have been higher in the region (compared to MDCs). What we see is rather capital flight, trained labour "exodus", etc. The relation between price and scarcity is indeed basic to price theory.

These facts signal that rather than searching answers to the problems of underdevelopment in the area of price theory, a closer look at Alfred Chadler's (1977) "visible hand" (see also [87, Porter 1990]) perhaps provides a better insight.

An economy is as strong as its institutions [37]. Arrow [3, p.33] also notes that: "organizations are a means of achieving the benefits of collective actions in situations in which the price system fails". Institutional economics [20, 114, North op cit] despite its limitations [32], focusing on institutional evolutions may offer a better venue than reliance solely on general equilibrium theory. Stiglize[100, p.202] for instance notes the following:-

...Indeed, the difference between MDCs and LDCs lies largely in matters of economic organization... then the first item on the research agenda should be a better understanding of the microeconomies of LDCs...

Still another issue is whether "the market" system in itself is or can be self regulatory in this environment¹⁷. Platteau [88] stresses the need to posit fundamental institutions or constitutional rules that contain agent's behaviour in order to bring coherence to the market system. Platteau [88] goes further and argues that whatever analytical path one follows, the problems of institutions or social norms cannot be evaded (P. 545). Institutions and social norms' major role in a society are to reduce uncertainty by establishing a stable (but not necessarily efficient) structure of human interaction.

Hence, the development process must then concentrate on one hand the building of new institutions and on the other hand, understanding ways of facilitating changes into existing institutions. Evidently, both old and new institutions ought to be characterized by increasing returns. Additionally, keeping aside the intuition that markets are self regulatory, even by its own standards of market failures, the need for a supra individual mechanism that facilitates trust, coordinate efforts and enforce agreements is basic.

Accounting's role becomes much larger when discussed in the light of real institutions (closed and open systems) rather than in the context of abstract price theories. If this is the case, the main challenge is whether there could be an extrapolation from some aspects of institutional economics [20, 80], organisations [96] and accounting [8, 109, 59]. A multi-disciplinary matrix is required to develop a theory for less "rationalized" economies. In other words, "rediscovering" Sub-Saharan institutions is basic to the understanding of the problem. The objectives of such a marriage should be: widening and deepening the market, establishing trust, facilitating institutional evolutions, reduction of transaction costs and information imperfections, transformation of uncertainty into risk. In short, mitigating the extent of market failures and identifying the areas where the supra individual institutions' involvement becomes optimal. As Platteau [88] notes, stable orders can be produced in the market place and the problem of trust making can be mitigated only by assuming the existence of rules (with enforcement capacity) that constrain behaviour. *Ceteris paribus*, the need for a supra institution, the next formidable question is knowing how effective such an institution can be in restoring trust.

Epilogue Two

If the foregoing is a fair presentation of competing theories and the prevailing situations in Sub-Saharan countries, then, we should be able to examine where the current accounting debate stands. We should attempt to answer the plausibility of anti-regulation arguments in the context of Sub-Saharan economies. First, for the reasons explained in previous sections, competitive capital markets fall short of describing the ontological aspects of these markets.

Agency theory, however has the potential to describe some institutions in the upper sector of the economy. Nevertheless, the idea that a typical indigenous African firm can be described as "a nexus of contracts" remains abstract as most firms are not share companies. More importantly, agency theory has the potential to explain the SOE sector. Here, there are at least four stages of agencies: the public shareholder but without shares, the parliament, the government and the manager of an SOE. Thus, the monitoring mechanism for the owner becomes complicated and expensive. Nevertheless, the multiple stages do not rule out some level of (voluntary) disclosures.

On the pro-regulation side, nearly all arguments hold for Sub-Saharan economies. Again, mostly for the upper strata of the economy. The asymmetry issue however, needs a closer look.

The asymmetry problem is less serious in the village economy, even by the standards of Akerlof's [2] lemons principle. Sub-Saharan village and nomadic societies do not commonly charge interest on borrowed money. The economy is less affected by monetary (interest rate) policies and borrowings are restricted within families and distant relatives circles. The punitive consequences of dishonesty are more than its financial benefits.

The concept of interest and hedging against default perhaps are implied in lendings granted by proto farmers: where the borrower in return is required to work in the fields. In short, the Indian village money-lender traditions are not predominant and Islam has a role.

The asymmetry problem becomes suddenly visible in traditional bazaar type markets (Merkato of Addis Abeba, Mbare of Harare for example); where trust and honesty in trade are established after several contacts. The problem becomes complicated if trust is established through intimacy,

especially in environments where certain ethnic or religious groups specialize in (petty) trading. Hence, the lemons principle and the scenario that good and bad products can be sold for the same price creates a welfare loss. Therefore, regulatory interventions with a view to reducing uncertainty, and providing tools for institutional evolutions have rooms here.

Next, a series of questions can be raised. They are not whether anti-regulation arguments still prevail but it is where to begin. And the lessons do not require us to go far. It is embodied in the modern history of accounting.

The reactions of policy makers to the great depression (1933/34) and the various stock market crashes (example 1987), the post-war reconstruction policies in Europe and Japan, the oil crises of the 1970s or other economic shocks either forced the establishment of regulatory bodies or the creation of new accounting rules [58, 62, 83]. This is the case even though there has been enough evidence both from euro-history [8] or otherwise [54] that a sort of voluntary disclosure(s) happened long before mandatory rules were established. More recently, after the end of the cold war, East Europeans are trying to replace their old (accounting) institutions with the myths and realities of market institutions. Hence, in sum, studying the history of these rule making bodies reveals that there had been some economically or politically significant events prior to the establishment of accounting institutions (law). Nowadays, the accounting laws of many nations provide detailed prescriptions as to the forms and contents of financial statements. With the increasing integration of economies, harmonization of accounting laws and practices has become the current preoccupation of many policy makers.

Consequently, these observations imply that the production of accounting information is not only likely to remain a regulated activity but is also showing signs of international rigidity. As a result, most self-regulation arguments and the option of leaving the production of accounting information to market forces become weaker not only in the context of Sub-Saharan economies but even in "modern" economies.

V. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

This paper has attempted to review the literature and discuss the merits of using regulatory tools for producing socially "optimal" level of accounting information. In doing so arguments from the anti-regulation side were addressed. Agency theory, informational efficiency of capital markets, private contractual opportunities and general scepticism about regulatory agencies have been examined. Agency theory has some potential to explain the upper sector of the economy. Thus, the existence of multiple stages in the SOE sector does not rule out the possibility of voluntary disclosures. However, whether it will serve as a policy instrument requires a further study.

On the side of pro-regulations, the public good nature of accounting information, failure of agent monitoring tools, asymmetry and speculation problems, moral hazard and adverse selection problems have been considered. A scenario based analysis of both sides of the arguments lead us to the conclusion that leaving the production of accounting information to markets became weaker, specially in Sub-Saharan environments. It follows then, for countries like Ethiopia, the option is not whether the market will solve the under-production of accounting information. It is how to strengthen and revise the laws (Commercial Code 1960, Proclamations Nos. 163/79 and 25/92) that are governing accounting practices and economic institutions.

Future research is hoped to examine the implications of adopting international regulations by using positive methods. Three policy paths are available. The first is to adopt the International Accounting Standards Committee's (IASC) standards. The second involves writing own rules with the risk of poor drafting and loss of reliance on published accounts internationally. The third is to establish a tiered system. One rule (IAS) for the upper section of the economy and another (local) for the lower sector. Accounting for institutional rearrangements (lease, valuations, privatisation), finding regulatory and institutional mechanisms for improving the activities of the informal sector, accounting for (peasant) agriculture, assessing the impacts of conventional accounting teachings/practices, estimating the direct and indirect costs of writing and implementing accounting regulations, are likely to shed some light.

Notes

1. Department of Accounting, Rhodes University, South Africa. Post Office Box 94, 6140 Grahamstown, South Africa. Telephone [27+461-318203], Fax [27+461- 25049], E-mail [accmn@sable.ru.ac.za].

2. Gaa (1986:438) summarizes the main arguments for the establishment of standard setting bodies. To correct market failures (Godenes and Dopuch 1974, May and Sundrem 1976), to produce actions which are collectively rational (Avaizian and Callon 1983), to economize on contracting costs between firms, investors and creditors (Ng 1978), to promulgate standards that are in the interests of some economically or politically powerful groups possibly at the expense of weaker groups (Watts 1977, Jensen 1978, Watts and Zimmerman 1979).

3. While the dependencia theory in economics had created some audience, it is obvious that not much has been achieved in explaining the development-underdevelopment dichotomy.

4. About seventy-five percent of IASC standards are taken from FASB or British accounting standards mainly through product differentiation strategies. Many Sub-Saharan countries have adopted (partially) these standards.

5. See Copeland and Weston (1982:1-15) for reviews.

6. See Watts and Zimmerman (op cit) for example.

7. Nevertheless, in these research designs there are two hypotheses. The model and the hypothesis (that the market is efficient) are tested together. And it is difficult to separate which is which. See Beaver (1981) for more discussion on the issue.

Ceteris paribus, the counter argument that risk (beta) and cost of capital cannot be manipulated by the extent of disclosure/volume of information released for example through annual reports is also growing (Garsombeke 1979, Ohlson 1980, Negash 1990:1995). Reconciling the two seemingly conflicting reports requires a separate work.

8. Darrough and Stoughton (1988) for example note that firms can disclose voluntarily bad news about their activities to deter new entrants in product markets.

9. It should be noted that the existence of possible rivalries between the various (external) users of annual reports, does not necessarily change the public good nature of accounting information.

10. The concept that a seller of a product (example a security) will make (selectively) good news disclosure (to entice buyers) about his product is not something new. What is novel about the proprietary cost theorem is its attempt to provide analytical mechanism for the observed empirical regularity about the existence of voluntary disclosures.

Nevertheless, two problems arise in evaluating the theory. First there are few methodological guidelines for test designs. Scott's (1994) work on the labour relations of Canadian firms is the only evidence that (this author is aware of) are possible proprietary cost variables. Moreover, validation of the theory outside MDCs' environments is not an easy task. Secondly, the search for these variables may not go further than Watts and Zimmerman's (op cit) political cost variables.

11. For a summary of the issues involved, see Patel (1993).

12. Field (1981:175) describes markets as rules which presuppose at the minimum elementary guarantees against the use of force or fraud. White (1981:544) defines markets as "tangible cliques of producers observing each other" and notes that markets are shaped by trade-offs between dispersions, not by averages as suggested by the niche' that supply equals demand

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EVALUATING THE EFFICIENCY OF FARMERS IN ETHIOPIA

Abrar Suleiman¹

Abstract: *This article is primarily concerned with applying Data Envelopment Analysis (DEA) for measuring the efficiency of smallholders in Ethiopia. Two variants of DEA models, Constant-returns-to-scale (CRS) and Variable-returns-to-scale (VRS), are applied on individual farm level cross-sectional data from three villages in Ethiopia. The empirical results of both measures show that the farmers in the sample are more technically inefficient than scale inefficient. This implies that policy should largely focus on means of raising technical efficiency. Moreover, the results also indicate that there is regional variation in the level of efficiency, suggesting selective policy intervention based on the specific environment.*

1. INTRODUCTION

There are many reasons for measuring efficiency. First, efficiency measures help identify relatively efficient units and give an estimate of the potential for resource conservation and/or output increases of the inefficient ones are improved. From an applied perspective, therefore, measuring efficiency is important as this is the first step in a process that might lead to substantial resource savings.

Second, these resource savings have important implications for both policy formulation and firm management. Moreover, it is only by measuring efficiency and separating its effects from the effects of the production environment one can explore hypotheses concerning the sources of efficiency differentials. Identification of these sources is essential to the institution of public and private policies designed to increase the output of a firm by simply increasing its efficiencies, without absorbing further resources.

Third, the benefits that could be reaped from the reallocation of resources from the less efficient areas to those that are efficient are immense for a developing economy. These benefits are more pronounced for Ethiopian agriculture where there is very little room, at the moment to expand the sector through extensive use of land [14].

The investigation of the structure of production frontiers and measurement of production efficiency relative to these frontiers required modifying the conventional econometric techniques. New approaches have been developed that have raised the level of analysis and broadened the range of efficiency hypotheses that can be formulated and tested. For the last two decades, two quite different methodologies have been extensively used for determining efficiency frontiers, and the nature, existence, and magnitude of departures from the frontiers. These are: (a) econometric estimation of production functions; and (b) Data Envelopment Analysis (DEA) which is a version of mathematical programming.

Notwithstanding the ample work on the causes of the poor performance of Ethiopian agriculture, most of which identified policy failure as the major reason, very little attention was given to a systematic analysis of the efficiency of resource use in the small-scale peasant sector. In addition, few of the available studies on efficiency have centred on imperfect and partial measures of productivity such as yield per hectare and output per unit of labour. Only recently have some attempts been made towards systematic evaluation of the efficiency of farmers in Ethiopia. (see e.g. [1], [2], [3], [5], [10]). Yet, all of these studies used econometrics to measure efficiency.

This study attempts to apply DEA on farm level data from Ethiopia, and tries to investigate the existence, nature and extent of production inefficiency of these farms. The rest of the paper is organised as follows. The next section gives an overview of the basic conceptual framework used in the study and briefly comments on the major approaches to measuring efficiency. Section three presents a cursory review of the DEA models applied in this study. Section four discusses the sources and nature of the data, and explains the variables used in measuring the efficiency of the farmers. Section five provides with a discussion of the empirical results. Finally conclusions are drawn.

2. BASIC CONCEPTUAL FRAMEWORK AND APPROACHES TO MEASURING EFFICIENCY

Various definitions of technical efficiency have been forwarded. The most formal and notable definition of technical efficiency was given by Koopmans [21]. Accordingly, a producer is technically efficient if an increase in any output requires a reduction in at least one other

output or an increase in at least one input, and if a reduction in any input requires an increase in at least one other input or a reduction in at least one output. Thus, a technically inefficient producer could produce the same output with less of at least one input, or could use the same inputs to produce more output. The various approaches to measuring efficiency are generally in line with this basic concept.

The classical approach to measuring efficiency is invariably attributed to the seminal paper by Farrell [15]. He suggested that we could usefully measure technical efficiency of a firm in terms of observed deviations from an idealised frontier or isoquant. His approach provided a theoretical basis for redirecting attention from the traditional average response production functions based on least squares estimates specifically to the deviations from that function, and for respecifying the regression and the techniques accordingly. Figure 1 is adapted from Battese [9] to illustrate Farrell's basic idea.

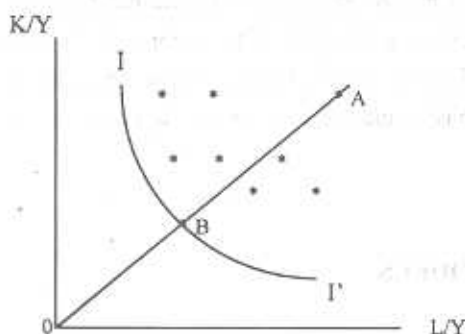


Fig. 1 Technical efficiency of firms in relative input space

Given a production function with constant returns to scale, Farrell [15] assumed that observed input-per-unit-of-output values for firms would be above the so-called *unit isoquant*. If Figure 1 depicts the situation in which firms use two inputs of production, K and L, to produce their output, Y, such that the points, defined by the input-per-unit-of-output ratios, $(K/Y, L/Y)$, are above the unit isoquant. The unit isoquant defines the input-per-unit-of-output ratios associated with the *most efficient* use of the inputs to produce the output involved. The deviation of observed input-per-unit-of-output ratios from the unit isoquant was considered to be associated with *technical inefficiency* of the firms involved. He then defined the ratio, OB/OA , to be the *technical efficiency* of the firm with input-per-unit-of-output values at point A. The same could have been illustrated using production frontier (see Battese [9]).

The Farrell approach can be considered as a deterministic, non-parametric frontier approach. Frontier approaches refer to the concept of the production frontier as being the upper bound of the feasible region of production, i.e., the production function represents the maximum level of output that is technically feasible. These approaches focus on estimating the parameters of a production function where the production function is a true frontier of technically feasible production. Two major variants of frontier approaches can be distinguished, namely, Deterministic and Stochastic².

On the other hand, based on the estimation procedure adopted, the approaches to measuring efficiency can also be classified as: (a) econometric, which attempts to distinguish the effects of noise from the effects of inefficiency, and (b) mathematical programming, which lumps noise and inefficiency together and calls the combination 'inefficiency'. The econometric approach is parametric and confounds the effects of misspecification of functional form (of both technology and inefficiency) with inefficiency, while the latter approach is non parametric and less prone to this type of specification error³. Indeed, some progress is underway to make the programming approach stochastic and the econometric approach more flexible in its parametric structure.

3. THE DEA MODELS

Farrell's traditional concept of technical efficiency can be applied to firms only when they aim at a single goal, and cannot be used when they seek to satisfy multiple goals. His approach was later generalised by Charnes, Cooper, and Rhodes [12] to multiple outputs, and was reformulated as a mathematical programming approach to efficiency measurement thereafter known as Data Envelopment Analysis (DEA). In this approach, the initial task is to determine a set of decision-making units (DMUs), as represented by observed data, that form an empirical production function or envelopment surface.

Then, DEA provides a comprehensive analysis of relative efficiency for multiple input-multiple output situations by evaluating *each* DMU and measuring its performance relative to the envelopment surface composed of other DMUs⁴. In other words, the efficiency of a given unit is measured *relative* to the efficiency of all other units subject to the restriction that all

units lie on or below the frontier. Thereafter, units that lie on the surface are deemed 'efficient' as per the DEA terminology.

Different varieties of DEA models can be identified based on their orientations. On the one hand, models may focus on increasing, decreasing or constant returns to scale; on the other hand, they may determine an efficient frontier which may be piecewise linear, piecewise log-linear or piecewise Cobb-Douglas. Still another, they may utilise Archimedian or non-Archimedian constructs. Above all, models may aim at either input saving or output augmenting, or both.

The input-saving measure shows how large a proportion of the observed input would have been necessary for the output quantity observed if the unit in question had been moved to the efficient frontier. The output-increasing efficiency measure compares the actual output produced to that of a unit at a point on the production frontier that uses the same amount of inputs. Note that this study produces only the output-augmenting efficiency measures.

As yet, while the envelopment surfaces are identical for both input and output orientation, an efficient DMU is projected to different points on the envelopment surface based on the focus of orientation, i.e., according to whether or not the emphasis is on conservation of resources (input reduction) or maximising productivity (output augmentation)⁵.

The traditional DEA model of Charnes, Cooper and Rhodes (CCR) [12] imposes three restrictions on the frontier technology prior to solving the envelopment problem, namely, constant returns to scale, strong disposability of inputs and outputs, and convexity of the set of feasible input-output combinations. The (output-oriented) DEA envelopment problem constitutes in solving the following linear programme:

$$\text{Max } \theta \dots\dots\dots(1)$$

$$\theta, \lambda$$

subject to:

$$X\lambda \leq X_0$$

$$\theta Y_0 \leq Y\lambda$$

$$\lambda, \theta \geq 0$$

Where, X is an n by N input matrix with columns X_i ;
 Y is an m by N output matrix with columns Y_i ;
 λ is an N by 1 vector of weights to be attached to the sample firms for construction of an efficient firm ;
 k denotes the DMU under investigation;
 $i=1, \dots, N$ indexes DMUs;
 n is the number of inputs;
 m is the number of outputs; and
 θ represents the output-oriented measure of technical efficiency.

Solving (1) amounts to maximising the efficiency of the unit k subject to the efficiencies of all units in the set having an upper bound of one. The key feature of the model is that the weight vector, λ , is treated as unknown, and is chosen so as to maximise the efficiency of the target unit, k . The efficiency of the target unit, k , will either equal one in which case it is efficient relative to the other units, or will be less than one in which case it is inefficient. The values of the weight would of course generally differ from unit to unit.

The solution value, θ^* , gives the maximum possible output expansion for the firm k under consideration within the production possibility set for a given input level. The reciprocal of θ^* gives the (output-oriented) efficiency measure, i.e., $TE_i = 1/\theta^*$, for firm k . Problem (1) is solved N times, once for each producer being evaluated, to generate N optimal values of (θ, λ) and efficiency measures for each firm in the sample. The mean efficiency, i.e., $E(TE_i)$, gives a picture of the overall performance of the sample.

The type of reference technology assumed is important for the efficiency distribution obtained. By introducing restrictions on the sum of intensity weights (λ), DEA can accommodate different varieties of returns to scale. Banker [6] introduced the idea that the sum of the intensity variables in the DEA model can be used to identify the type of returns to scale⁶. The variable returns-to-scale variant of this problem introduced by Banker, Charnes, and Cooper (BCC) [7] can be modelled simply by adding to (1) the constraint⁷:

$$e' \lambda = 1 \dots\dots\dots(2)$$

where e is an N by 1 unit vector.

The technical efficiency measures corresponding to both constant returns to scale (CRS) and variable returns to scale (VRS) can be established by solving problem (1) both without and with the constraint (2) respectively. The consequence of the constraint (2), i.e., $\sum \lambda_j = 1$, on the distinction between the two models (CCR and BCC) is that the former measures the aggregate efficiency (i.e., purely technical and scale efficiency) while the latter yields a measure only of purely technical efficiency.

When the reference technology exhibits VRS, a need for a measure of scale efficiency arises. The two models can then be used to determine the scale efficiency of a unit. The scale efficiency (SE) of a unit (see, [7]) is the ratio of its CRS efficiency to its VRS efficiency. Scale inefficiency can be due to either decreasing or increasing returns to scale. Where CRS do not prevail, units can be compared given their scale of operations, or at least it would be informative to know the extent to which any inefficiency is the consequence of their scale of operations. In such cases, the overall or aggregate efficiency of a unit can be decomposed into its 'pure technical' and 'scale' efficiency. Such a decomposition has important policy implications since the two types of inefficiency do not call for the same type of cure. To illustrate these concepts, consider Fig.2.

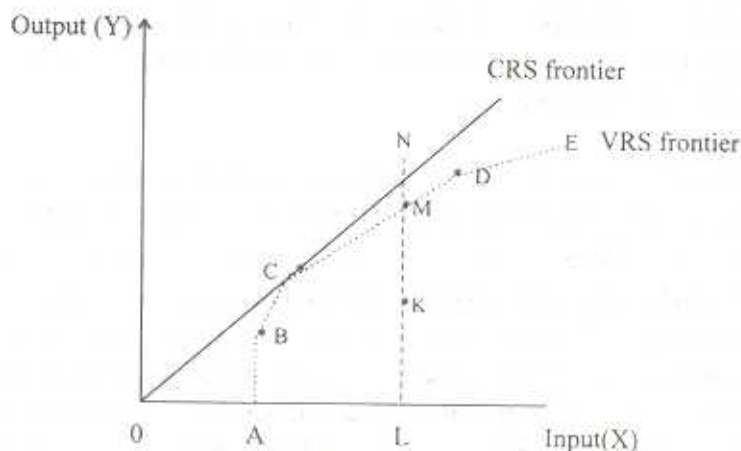


Fig 2 DEA-based frontier and efficiency measures

The figure depicts the production possibility set for the input-output mix (X, Y) , where X is a vector of inputs and Y is a vector of output levels. The dotted curve $ABCDE$ is the boundary of the production set (or it can be considered as the best practice frontier with VRS), while the thick ray from the origin through point C is the CRS frontier. Similarly, the frontier with non-increasing returns to scale is given by $OCDE$. The measure of inefficiency of observation K , which is inefficient, for its given scale of operations, can be obtained if it is compared to observation M which has the same input levels as K but is efficient.

The ratio LK/LM , which is the ratio of observed output to potential frontier output for given inputs, measures the level of pure (output-augmenting) technical efficiency of K . A measure of the (output-oriented) aggregate technical and scale efficiency of K is given if it is compared to C (or N) both of which have the largest average productivity (and C , being within the production set, is said to have the most productive scale size (MPSS)). Hence, the aggregate efficiency of K is given by the ratio LK/LN . The CCR and BCC models can then be used to determine the scale efficiency of a unit, which is measured by the ratio of aggregate efficiency and pure technical efficiency, i.e., LM/LN .

We can see from the figure (Fig. 2) that the (output-oriented) efficiency ratings as given by VRS are always higher than that of the CRS due to the additional constraint in the former. But, for the input-saving case, the former is lower. In general, of course, the input and output measures of scale efficiency do not coincide. This is due to the fact that the two measures yield different results towards the VRS model.

The CCR model can also be used to characterise the 'local' returns to scale for a given unit. A unit will be operating at decreasing returns to scale (DRS), at increasing returns to scale (IRS), or at the most productive scale size (MPSS) if the sum of λ^* at the optimal solution to (1) is greater than, less than, or equal to one, respectively. If IRS prevails at a point, then it is intuitive that average productivity (Y/X) would increase with increasing scale size, i.e., for greater values of X . In the same manner, if DRS prevails locally, the average productivity can be increased with smaller scale size, i.e., units with DRS are encouraged to decrease their activities rather than increase them. This implies that if a point is at MPSS, and hence maximises average productivity, then constant returns to scale (CRS) must prevail locally at that point.

Thus, IRS corresponds to the production possibility being less than MPSS (i.e., to the left of point C in Fig. 2), and DRS corresponds to the production possibility being greater than MPSS (i.e., to the right of point C in Fig.2). This characterisation of the optimal frontier into the three parts can also be carried out for the VRS model⁸. Information as to whether a unit is operating at increasing or decreasing returns to scale can prove useful in indicating potential redistribution of resources. For one thing, resources might be transferred from units operating at DRS to those operating at IRS to increase average productivity at both sets of units.

DEA is a programming approach. As such, it has an advantage since it is non parametric, i.e., it does not use any algebraic form for the frontier. Nor does it assume an inefficiency distribution, and hence it is deterministic. Moreover, the DEA approach, with its various extensions, provides a number of alternative ways to measuring efficiency. To begin with, the way the production frontier is constructed has some merits, for the DEA frontier envelops the data set in a better way than most econometric models do. Furthermore, subject to certain assumptions about the structure of the production technology, it envelops the data as tightly as possible. It is observed that, in some other respects as well, DEA appears to be a robust procedure for efficient frontier estimation [23].

The DEA has also provided new insights and additional information that is not available in the econometric methods. The empirical orientation and the absence of a priori assumptions of DEA proved particularly adept at uncovering some relationships that remained hidden from other methodologies, notably the comparison of returns to scale. In this connection, it is shown that DEA outperforms the stochastic frontier functions when it comes to estimating scale efficiency and determining the most efficient scale [18]. On the other hand, while DEA is relatively insensitive to model specification, it can be sensitive to variable selection and data errors, and is therefore usually criticised on statistical grounds. The empirical results of this study should be looked against this shortcoming of the DEA approach.

3. DATA AND VARIABLES

The data used in this study are from the first round of the Ethiopian Rural Household Survey which has been conducted by the Department of Economics, Addis Ababa University, in

collaboration with the Center for the Study of African Economies, Oxford University. In the first round of the survey, the International Food Policy Research Institute (IFPRI) participated in collecting data in the seven of the fourteen villages. The project is an integrated rural household survey covering different aspects of the activities of rural households. In selecting the villages, emphasis was given to capture different types of farming systems and to incorporate the different agro-ecological regions of the country. All the villages are peasant associations (PAs) and the sampled households are randomly selected from them such that the number of sampled households in each PA is proportional to the population size of each *Woreda* (sub-district) in which the respective PAs are found. The survey covered in the first round a total of about 1500 households, and has generated a unique data set that will help in understanding the rural economy, enhance research on agriculture and help policy analysis in Ethiopia.

Data from only three PAs, Turufe Kechemba (near the town of Shashemene), Sirbana Godeti (near the town of Debre Zeit), and Aze Deboa (near the town of Durame, Kambata) is used. Most of the annual, perennial and permanent crops that grow all over the country are grown in one or more of the villages⁹. The majority of the farmers in these villages use fertilizer, with the exception of Aze Deboa where the amount of fertiliser used is not significant. It was asserted that farmers in Shoa use relatively higher amount of fertiliser than farmers in the rest of the country [22].

The prominent crops grown in the three villages include: *teff*, barely, wheat, maize, sorghum, millet, potatoes, linseed, coffee, *chat*, *enset*, *gesho*, banana, eucalyptus tree and tobacco. Smaller number of observations are used than those included in the original data due to the removal of observations with missing values for some of the variables included in the study. This resulted in a sample size of 93 for Turufe Kechemba, 81 for Sirbana Godeti and 74 for Aze Deboa, giving a total of 248 observations.

Because of the widely used practice of mixed farming in Ethiopia, the value of production for all crops grown in the 1994 *Meher* (main farming season in Ethiopia) is considered as the dependent variable. Only aggregate data (for all crops) on the input variables are available¹⁰. The non-marketed produce is valued at prices received for marketed surplus. Four inputs are used: land, labour, fertiliser, and a proxy for draft animals (total value of cattle). The land variable includes the total amount of land (in hectares) that is used for cropping in the *Meher*

season of the same year. Labour is measured in man-days and includes all categories of labour spent in the major farming activities, i.e., ploughing, weeding and harvesting. The total value of fertiliser (in Birr) is taken as fertiliser input. Since the amount of draft animals is not included explicitly in the data, the total value of cattle owned (in Birr)¹¹ is used as a proxy. A summary of some of the descriptive statistics on output and input variables is presented in Table 1.

Table 1: Summary of Descriptive Statistics on Output and Input Variables

Variable	Sample mean	Sample std. error	Minimum value	Maximum value
Value of output (Birr)				
Turufe Kechemba	1916.47	1748.04	10.00	7722.50
Sirbana Godeti	3284.67	2086.76	10.00	9931.00
Aze Deboa	539.97	506.75	10.00	3504.00
Land (hectare)				
Turufe Kechemba	1.09	0.94	0.06	7.00
Sirbana Godeti	1.07	0.61	0.25	3.25
Aze Deboa	0.69	0.33	0.25	1.75
Labour (man-days)				
Turufe Kechemba	179.08	316.98	10.00	1942.50
Sirbana Godeti	814.49	742.44	11.00	3891.00
Aze Deboa	97.24	129.97	11.00	761.00
Fertiliser (Birr)				
Turufe Kechemba	134.66	124.98	10.00	645.00
Sirbana Godeti	191.40	150.16	10.00	700.00
Aze Deboa	46.03	44.16	4.00	200.00
Cattle (Birr)				
Turufe Kechemba	934.06	979.06	17.00	4402.00
Sirbana Godeti	836.23	908.32	12.00	3341.00
Aze Deboa	948.34	564.78	20.00	2673.00

Source: Ethiopia Rural Household Survey Data

A close examination of Table 1 reveals that the mean of both input and output is the highest in Sirbana Godeti (except for land and cattle). Apparently, this is because farmers in this area are surplus producers and suppliers of one of the most important cash crops, *teff*, and the village is located in Ada *Woreda* that is known for its best quality *teff*. Apart from this, Ada, near Addis Ababa, has the most urbanised and commercial environment of all cereal producing villages in the country. Data on all variables (except cattle) confirm that Aze Deboa is by far the poorest of all the sites. This area is occasionally hit by famine and it is one of the most densely populated areas of the country. Farmers in this area largely depend on permanent crops and are known to migrate for occasional employment to other parts of the country as a result of population pressure.

We can see from Table 1 that Sirbana Godeti has the highest standard deviation on all variables except land and cattle (the variability in land and cattle being the highest in Turufe Kechema). Perhaps, partly this is owing to the great discrepancy among the farmers in the village. On the other hand, this discrepancy is moderate in Aze Deboa which, by and large, consists of poor, and mostly, subsistent farmers. Another aspect of this table which needs closer attention is that of land. We observe farmers who own as much as 7 hectares while the amount of official land holding is barely greater than or equal to two hectares, on average. This is not surprising since, in the analysis, all land that is cultivated during the season is included, and it is evident that some farmers rent in land from other households informally through fixed rental arrangements or share cropping.

5. EMPIRICAL RESULTS

The output-oriented technical efficiency estimates are calculated for the three villages separately¹². The two variants of DEA are applied, one with constant returns to scale and another with variable returns to scale. Table 2 presents the mean technical efficiencies of the farmers for both CRS and VRS together with the number of farmers falling in each category of returns to scale. The table also presents the mean scale efficiency scores.

The mean technical efficiency estimated for each village (CRS) shows that the farmers involved are highly technically inefficient (0.44, 0.39, and 0.40 for Turufe Kechema, Sirbana Godeti and Aze Deboa, respectively). This indicates that the outputs for the average farmer in

each village could have been increased by more than 50% had the CRS frontier technology been employed. The VRS estimation also produced similar results, except that smaller gains are obtained in comparison to the CRS ones, as it should be. Other studies also showed that Ethiopian farmers are characterised by high level of technical inefficiency. A study also arrived at the same conclusion using a different data set for Ethiopian farmers [10]¹³. The results (both CRS and VRS) also indicate that farmers in Turufe Kechema are, on average, more efficient than farmers in the other two villages since the mean technical efficiency is the highest for Turufe Kechema.

Table 2: Mean Technical and Scale Efficiency Estimates

Turufe Kechema				
	ORS (n=43)	CRS (n=14)	DRS (n=36)	All Observations
CRS	0.40	0.71	0.38	0.44
VRS	0.55	0.71	0.54	0.57
Scale efficiency	0.81	1.00	0.73	0.81

Sirbana Godeti				
	IRS (n=12)	CRS (n=24)	DRS (n=45)	All observations
CRS	0.37	0.46	0.35	0.39
VRS	0.63	0.46	0.53	0.52
Scale efficiency	0.63	1.00	0.67	0.76

Aze Deboa				
	IRS (n=50)	CRS (n=8)	DRS (n=16)	All observations
CRS	0.34	0.73	0.40	0.40
VRS	0.42	0.73	0.46	0.46
Scale efficiency	0.87	1.00	0.88	0.88

Source: Own Manipulations.

* n=number of observations in each category.

At this juncture, it seems appropriate, once again, to stress one important merit of DEA. Unlike the econometric approaches, it enables comparison of some production characteristics of units, particularly the analysis of the level of scale efficiency and local returns to scale¹⁴. When we examine the scale properties of the farmers, we find from Table 2 that a large

proportion of farmers in Sirbana Godeti are operating under DRS and are less efficient than those operating under IRS. Hence, it seems that for these farmers technical inefficiency arises due to DRS.

But note that about 70% of the farmers in Aze Deboā are operating under IRS. This indicates that most of the farmers in Aze Deboā are too small as it is evident from their low levels of inputs (Table 1). The reason may be intensive population pressure on land in Aze Deboā. This latter argument can also be applied for Turufe Kechema where most farmers are also operating under IRS and where population pressure is relatively higher than Sirbana Godeti, though lower than that of Aze Deboā. Despite this similarity between Turufe Kechema and Aze Deboā, those farmers in Turufe Kechema operating under IRS are more technically and generally efficient than those operating under DRS. The opposite is the case for farmers in Aze Deboā, i.e., the main source of inefficiency seems to be IRS.

Table 3: Percentages of Technical Efficiency Estimates

Range	CRS			VRS		
	Turufe Kechema	Sirbana Godeti	Aze Deboā	Turufe Kechema	Sirbana Godeti	Aze Deboā
≤ 0.09	5,4	9,9	9,5	3,2	7,4	5,4
0,10-0,19	9,7	7,4	27,0	5,4	1,2	24,3
0,20-0,29	21,5	18,5	10,8	15,1	9,9	10,8
0,30-0,39	17,2	21,0	13,5	13,9	14,8	14,9
0,40-0,49	13,9	13,6	6,8	10,8	17,3	6,8
0,50-0,59	9,7	12,3	6,7	9,7	12,4	2,7
0,60-0,69	6,5	7,4	4,1	8,6	9,8	5,4
0,70-0,79	3,2	2,5	6,7	2,1	8,7	9,4
0,80-0,89	4,3	3,7	6,8	4,3	4,9	4,1
≥ 0,90	8,6	3,7	8,1	26,9	13,6	16,2

Source: Own manipulation

Turning to the scale efficiency measures, Table 2 depicts that the level of scale efficiency of the farmers in the three villages is higher than their technical efficiency. Thus, there is obviously no severe scale efficiency problem. In other words, technical inefficiency accounts

for the largest potential of efficiency improvement. The level of scale efficiency for all the farmers is low in Sirbana Godeti is the lowest (0.76) compared to the other two villages (0.81 and 0.88, respectively, for Turufe Kechema and Aze Deboa). Also the scale efficiency estimates for Sirbana Godeti, for both local IRS and DRS, are lower than the other two villages.

An important question, however, pertains to whether scale inefficiency is due to IRS or DRS. In Turufe Kechema, the larger proportion of scale inefficiency seems to be due to DRS than IRS. The converse is true for Sirbana Godeti. But for Aze Deboa, it seems that both IRS and DRS have equal contribution to scale inefficiency¹⁵.

More information can be obtained about the distribution of the alternative efficiency measures if we examine Table 3 which presents DEA-based technical efficiency scores in terms of the percentages of occurrences of technical efficiency in different ranges. For instance, it is apparent from the table that the proportion of farmers with a score of technical efficiency less than 50% (CRS) for the three villages is 68%, 70% and 68%, respectively, for Turufe Kechema, Sirbana Godeti and Aze Deboa.

6. CONCLUSIONS

This study had, as its central theme, the task of applying the DEA approach to measuring efficiency. To this effect, the two commonly used techniques of DEA, i.e., the original CRS and its extension, VRS, were applied to agricultural data from Ethiopia. By far the most important finding of the study is that the two alternative DEA models of measuring technical efficiency generate about the same conclusion, namely, that inefficiency is one of the main characteristics of agricultural production for the sampled farmers. This shows that there is a great potential for increasing the efficiency of these farmers, given the available resources and technology.

In addition, it was attempted to investigate the scale efficiencies of the farmers in the sample, and was found that inefficiency in their scale of operations contribute to the overall inefficiency, though they seem to be relatively more scale efficient than they are purely technically efficient. The over-riding message for policy formulation is that more benefits

could be tapped from implementing strategies of enhancing their level of technical efficiency. Another caveat that would impinge on policy is the spatial variation in the level of efficiency, a fact which implies selective adoption of policy according to the environment.

Finally, this exercise points to avenues of future research in at least two directions. First, the study is likely to provoke further research that incorporates the peculiar characteristics of small-holder agriculture in Ethiopia, notably risk and uncertainty. In a similar vein, the factors which contribute to high inefficiency of production for these farmers and the main sources of regional efficiency variations remain to be investigated, and the conclusion of this study should stimulate further research in this respect.

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Notes

1. Lecturer, Department of Economics, Addis Ababa University, P.O.Box 1176, Addis Ababa Ethiopia.
2. For more details, see [17].
3. For more details, see [17]. Applications of DEA in the measurement of efficiency are now abundant. For a more extensive bibliography of DEA studies, see [24].
4. An important difference between stochastic and DEA is that while the former optimises across all firms, DEA optimises on each firm using a series of optimisations. An important caution is in order concerning DEA as a measure of efficiency. Since DEA yields relative efficiency measures and defines a unit as inefficient by comparing combinations of input and output with other units, units operating with input-output quantities sufficiently far from the other units at both ends of the size distribution may be identified as efficient for the sheer reason of the lack of comparable units. Problems of this kind are, however, minimal if the sample size is large in comparison to the number of inputs and outputs, which is the case in this study. This is because larger

samples decrease the average level of efficiency due to the positive probability of including more efficient outliers in the sample.

5. For constant returns to scale, the input-oriented and the output-oriented efficiency measures are identical. Moreover, it is straight forward to obtain an input-oriented envelopment problem by replacing problem (1) with its dual minimisation problem.
6. The concept of returns to scale as used in DEA is that of multiple output case unlike the conventional single output definition of the concept. For more details, refer to [8].
7. Note that the type of technology assumed in problem (1) is constant returns to scale.
8. The convexity of the VRS frontier ensures that IRS will be more frequent at smaller units.
9. All the three villages are located in the former Shoa province (Aze Deboa and Turufe Kechemma, Southern Shoa, and Sirbana Godeti, Eastern Shoa). Two of them, Turufe Kechemma and Sirbana Godeti, are in region 4, while Aze Deboa is in the Southern region.
10. All the variables are for the last four months of *Meher* season.
11. Since other modern inputs such as HYVs and herbicides are used to an even lesser extent, the results should not be biased by the exclusion of these inputs.
12. The DEA estimation was programmed in Gauss 3.2.
13. The mean efficiency scores in this study are very low, even worse than the stochastic results of the same data set [2]. This is not surprising since DEA technical efficiency estimates are biased down-wards due to the fact that DEA lumps the effects of measurement error and any other external factors to inefficiency. This only shows that great care has to be taken when using DEA to analyse agricultural production units in LDCs like Ethiopia where there is high degree of uncertainty and risk.
14. Because the hypothesis that farmers in the sample operate under constant returns to scale was tested formally using an F-test for a restricted model and the results indicated that constant returns to scale can not be rejected at 5% level of significance.
15. Asmerom and David [4] argue that a large proportion of farmers in Northwest and Central Ethiopia (not using fertiliser) are too small.

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DEMOGRAPHIC CHARACTERISTICS OF POOR HOUSEHOLDS IN URBAN ETHIOPIA: THE CASE OF DIRE DAWA TOWN

Yohannes Kinfu¹

Abstract: The paper presents evidence on the links between poverty and demographic variables such as marriage patterns, household size and composition, fertility and mortality experiences, perception and preferences for children and also knowledge, attitude and practices of family planning, using household level data for Dire Dawa in the early 1990s. The study first identifies the poor using a subjective poverty line and then assesses their demographic characteristics. The results indicate that the poor have large family size, high dependency of children and high fertility. However, compared to others, poor households wished to have fewer children (and most of them also need no more additional children) which the study interpreted as a behavioral response to the increasing costs of children. However, the study found out that most of these women had limited knowledge of family planning methods, and even those who know about it had rarely practiced it. The results also show that, as one would expect, death rates were consistently higher among the poor and lower among the well-off.

1. INTRODUCTION

Like in several other developing countries, poverty is a major social and economic problem in Ethiopia. Current studies show that roughly over half of the country's population lives in abject poverty (MOPED, 1994). Problems of poverty are multi-dimensional and hence have multiple sources. In the case of Ethiopia, poor economic performance, rapid rate of population growth, low technological base, periodic drought and famine, and internal displacement have continued to exacerbate poverty.

Poverty affects people of different characteristics in different ways, because they play different roles, have different needs and face different constraints. It is most likely that households in extreme poverty differ from the average and non-poor households in several distinct ways such as in demographic characteristics and other socio-economic conditions. Proper understanding of these characteristics and conditions constitutes an essential starting point and is a key to the formulation of policies and practical steps that the Government can take in order to alleviate poverty and promote sustainable growth.

The aim of this paper is to present evidence on the links between poverty and demographic variables such as marriage patterns, household size and composition, fertility and mortality experiences, perception and preferences for children as well as knowledge, attitude and practices of family planning, using data for Dire Dawa in the early 1990s. Dire Dawa is one of the largest industrial and commercial centres in the country. Thus, there are reasons to believe that the existence of diversified social groups and, hence, pronounced disparities in economic status among the residents of the city makes the research area ideal to understand the nexus between poverty and demography in an urban setting.

2. CONCEPTS AND MEASUREMENTS OF POVERTY

According to the literature on the subject, poverty is said to exist in a given society when one or more persons do not attain a level of material well-being deemed to constitute a reasonable minimum by the standards of that society. Hence, the starting point in any poverty study is the question of how one measures or assesses well-being and based on that at what level of measured well-being does one classify that a person as poor or non-poor.

There are a number of alternative indicators that may be used to quantify well-being or welfare at individual or household levels. These include per capita or per household income, consumption, and food expenditures; nutritional and anthropometric indicators, proportion of household budget spent on food, known as food ratio; basic needs and so on. Given the strengths and setbacks of each of the indicators as a measure of welfare, the choice from among them largely depends on the nature of the available data and the objectives of the study. But still, selection of a particular welfare indicator does not by itself give a definition of poverty. Since defining poverty consists of classifying the population into poor and non-poor, a decision has to be taken where to draw the poverty line to transform welfare indicators into definitions of poverty.

The poverty line is a cut-off living standard level below which a person is classified as poor [10]. In setting a poverty line three alternative approaches can be followed. These are absolute, relative and subjective poverty levels.

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The poverty line is a cut-off living standard level below which a person is classified as poor [10]. In setting a poverty line three alternative approaches can be followed. These are absolute, relative and subjective poverty levels.

An absolute poverty level is one which is fixed in terms of the living standard indicator being used, and fixed over the entire domain of the poverty comparison [7]. The most usual practice in setting an absolute poverty level is to estimate the cost of a bundle of goods (both food and non-food) deemed to assure that basic needs are met in the specific domain of the poverty comparison. In most developing countries, absolute poverty lines have been set based largely on food expenditure necessary to attain some recommended food energy intake and in some cases, including essential non-food requirements. Similar procedure was, for instance, followed by Dercon, Krishnan and Abdulhamid (1994) in their study of rural poverty in Ethiopia.

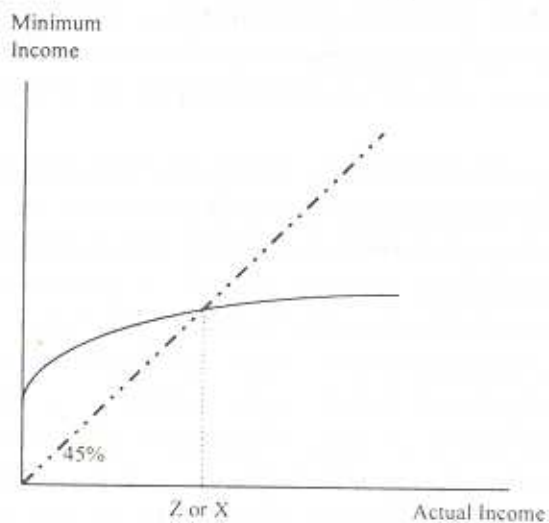
The method, however, has some shortcomings. According to Ravallion [7], the major pitfall relates to determining the minimum food energy requirement, which can vary across individuals and over time for a single individual. In addition, the procedure is more of measuring food poverty. But, as noted by several writers attaining adequate nutrition is not the sole motive for human behaviour, even for the poorest; nor is it the sole motive in food consumption.

An alternative way of setting a poverty level is using what is called a relative poverty line concept. The procedure involves disaggregating the population into various income or expenditure (or any preferred well-being indicator) percentiles and, then subjectively labelling the lowest 'x' percentage of the population as 'the poor'. Once this is done, one may use the corresponding income or consumption level for this percentile as the poverty line for comparison with other groups, dates or places (Glewwe and Twum-Bahaa, 1991). First and foremost, of all the methods, this technique is entirely dependent upon the value judgement of the researcher. In addition, it is not clear whether the method is an indicator of poverty or a measure of income inequality, which may mean two different things in developing societies. Moreover, as argued by Ravallion [7] such a method is technically feasible only for developed countries. This is because the basic assumption of the method that poverty line is a constant proportion of the mean and thus the elasticity of the poverty line with respect to the mean is unity, is only true amongst the industrialised countries.

The third variation is to define poverty based on survey responses to an attitudinal question such as the following:

What income level do you personally consider to be absolutely minimal? This is to say that with less you could not make ends meet [7].

The poverty level set on the basis of such an approach is called the subjective poverty line. This approach explicitly recognises that poverty lines are inherently subjective judgements people make about what constitutes a socially acceptable minimum standard of living in their own societies. Studies that have made use of this procedure found the relationship between actual income and what is considered as the minimal income to be an increasing function as shown in the following graph (Kapteyn et al., 1988). "The point 'x' or 'z' in the figure is a good candidate for a poverty line; people with income above x or z tend to feel that their income is adequate, while those below x tend to feel that it is not" [7].



Due to the minimum element of subjectivity involved in the procedure (at least from the side of the investigator) and its special relevance to the study objective, this method was used to identify the poor and measure well-being in the present study. The discussion on the application of the method and its relevance in relation to the nature of the data will immediately follow the discussion on the sources of data.

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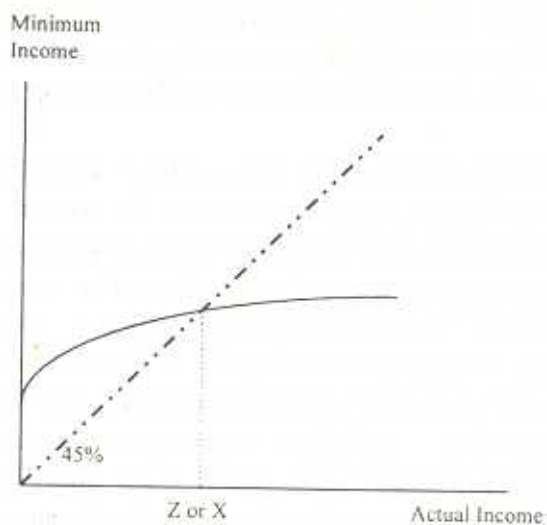
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3. SOURCES AND NATURE OF DATA

The study was based on a cross-sectional single period survey data collected from a sample of households in Dire Dawa in 1994 by the Demographic Training and Research Centre of Addis Ababa University. The sample was obtained on the basis of a two-stage simple random sampling procedure. At the first stage, out of the 23 *kebeles* in the town a sample of nine were chosen. And from these *kebeles*, in the second stage 2,000 households were randomly drawn, though only 1,899 households were successfully interviewed (see Table 1). Finally, appropriate weighting procedure was applied on the sampled data in order to ensure the overall selection of a representative sample.

Table 1: Numerical and Percentage Distribution of Sampled Household by Kebele, Dire Dawa 1994

Sampled Kebeles	Sampled households	Number of respondent households	Response rate	Weighted responses	
				No.	% share
02	145	123	84.8	1769	13.96
03	265	251	94.7	1231	9.71
04	142	122	85.9	1240	9.78
05	225	219	97.3	1415	11.16
07	261	251	96.2	1391	10.97
09	275	269	97.8	1170	9.23
10	155	137	88.4	493	3.89
11	230	230	100.0	1834	14.46
12	302	297	98.3	2138	16.86
Total	2000	1899	94.9	12681	100.00

* In this study, a household is defined as a group of people who have a common source of major income, who share a common source of food and who sleep under the same roof.

The content of the survey data is reasonably comprehensive by most standards. Data on the economic status of the household were collected in several forms. These included data on household income and expenditure, possession of household items (such as car, TV, radio, telephone, refrigerator, tape-recorder, air conditioner, etc.), house tenure status, materials used for construction, sources of fuel, type of toilet and an attitudinal question on the adequacy of household income. The consumption data covered all monetary expenditures on goods and services consumed plus the monetary value of all consumption from income in kind such as food

produced on the family farm and the value of owner-occupied housing. Similarly, the income definition included personal income in cash and in kind, remittance from children and others and other sources of income, such as the monetary value of children's activity in family business. Apart from data concerning wealth (i.e., household possessions), the period of observation for all income and expenditure related data referred to a single month. Information on the details of the breakdown of consumption of food and non-food items was not collected.

4. IDENTIFYING THE POOR AND POVERTY PROFILE

In this study, attitudinal question concerning household income and welfare was measured by using the subjective poverty line approach. The following question was used and responses from all households were recorded on the basis of four possible pre-coded non-numeric responses provided along with the question:

In your opinion is the household income sufficient to make the family's ends meet?

- | | |
|------------------------------|---------------------------|
| (i) Inadequate or too little | (ii) Moderate |
| (iii) Sufficient | (iv) More than sufficient |

Except for the response for one household which was reported in the last category and later merged with the welfare group immediately below it (i.e., the sufficient category) at the analysis stage, the remaining responses were maintained as they were reported, and considered as indicators of self-declared welfare status. Accordingly, three welfare categories were identified: those who reported their earnings to be inadequate or too little are renamed 'Poor'; those who considered their income as 'Moderate' and, those who regarded their own incomes as 'Sufficient'.

Below a brief comment on the major advantages of the procedure is given. The first relates to the validity problems related to the conventional measures of welfare (such as income or expenditure) in relation to the study objectives. As it may be noted, most of the demographic variables that will be investigated in the study (such as marriage, fertility and mortality) are life-time events whereas data on either monthly expenditure or monthly income, which are often used as measures of well-being, in the strict sense, are current status indicators and are also more likely

to vary over time. Therefore, the major advantage of classifying the population based on self-reported welfare status is that it is less likely to be affected by such problems, since it does not explicitly involve a specific time element.

The second reason that necessitated the use of the subjective poverty level approach, on the other hand, emanated from recognition of problems that might possibly emerge from problems related to the quality of the income and expenditure data. Like the case in many related surveys, if the data, by any chance, suffer from poor responses and if these are also systematically correlated with true levels of well-being, using such data for any type of analysis is likely to lead to erroneous conclusions. Thus, the best thing that can be done is to make use of less of such data and depend more on information that do not directly involve numerical estimates, such as the attitude question.

Table 2: Selected Living Standard Indicators by Self-declared Welfare Groups for Sample Households, Dire Dawa, 1994

Indicator	Self-declared welfare group			All Dire Dawa	F-ratio	Significant pairs at 5% level (Scheffe Test)
	Poor	Moderate	Sufficient			
Household monthly expenditure	277.38	487.21	796.63	360.00	1424.66	All
Household monthly income	313.58	645.54	1552.47	468.75	1786.91	All
Per capita monthly expenditure per adjusted adult equivalent units	69.08	121.63	189.83	89.23	1261.07	All
Per capita monthly income per adjusted adult equivalent units	77.77	160.22	368.63	115.20	1687.70	All
Food expenditure as a percentage of total expenditure	81	67	62	76	12.06	(1,2) (1,3)*

* 1 stands for poor 2 represents moderate and 3 stands for sufficient.

Source: Author's calculations based on Fertility and Family Welfare Survey data, DTRC, AAU.

Lack of relevant data from the survey was also an additional reason that motivated the use of the subjective poverty line approach. For instance, as duly noted earlier, the procedure of setting an absolute poverty level, apart from information on household monetary expenditure, requires data on food and non-food items consumed at the household level. It also needs information on prices of commodities prevailing in the study area. Even though price data could be obtained from secondary sources, data on items consumed by the household, was not collected in the survey

being used. This limits the application of an absolute poverty line approach, even if one wishes to do so.

To help assess how robust were the welfare groups identified based on self-declared responses in relation to conventional indicators, they were compared with selected alternative welfare measurements as shown in Table 2.

5. DEMOGRAPHIC CHARACTERISTICS OF POOR HOUSEHOLDS

Interrelationships between population and poverty can be viewed at different levels and from several perspectives. Perhaps the most common approach is macro-level analysis, which looks into the pressure of growing population on resources such as social services, investment and natural resources. However, many of the interactions between population and poverty originate, or are felt most strongly, at the micro-level, that is at the level where fertility related decisions are made, and where the effects of poverty on mortality are absorbed. In this section, we shall examine the relationships between selected demographic variables and standard of living, with emphasis on the poor households. Nevertheless, it should be noted that observed associations do not necessarily imply causation.

Marriage and Household Composition

Although marriage is the predominant context for childbearing and rearing all over the world, the structure and the customs, prevalence and stability as well as age at marriage vary from country to country and within country between social groups. Table 3 provides comparison of mean age at marriage between the different categories of the study population.

Clear pictures of association emerge between welfare and age at marriage in the study area. It appears that average age at first marriage tends to be relatively higher among those respondents in the higher welfare category followed by those in the moderate group; it was the least for the poor households. However, from the results of the F-test, it was noted that these differences were statistically significant only for females. In addition, the results of the Scheffe test also indicated that, even for females, pairwise differences in mean age at first marriage were significant only

between the poor and the sufficient group and between the moderate and the sufficient group. No significant difference in age at first marriage was noted between the poor and those who declared themselves as moderate. Thus, in general the results of the analysis suggested that women in poor and moderate households were more likely to marry earlier than their counterparts in the sufficient category.

Table 3: Family Formation and Household Structure Indicators by Self-declared Welfare Groups, Dire Dawa, 1994

	Self-declared welfare group			All Dire Dawa	F-ratio	F Prob	Significant pairs at 5% level (Scheffe Test)
	Poor	Moderate	Sufficient				
Age at first marriage							
Males	27.72	27.78	28.35	27.80	1.34	0.2630	---
Females	19.70	19.85	20.71	19.80	15.00	0.0000	(1,3) (2,3)*
Mean spousal age difference	8.07	7.87	7.62	8.00	1.86	0.3057	---
Mean household size	6.34	5.9	5.10	6.27	9.28	0.0001	All
Average age of head of household	46.0	45.6	46.2	45.7	15.65	0.0915	---
Ratio of children to adults	1.1292	1.0442	0.8921	1.09	30.47	0.0000	All

* 1 stands for poor / 2 represents moderate and 3 stands for sufficient.

Source: Author's calculations based on Fertility and Family Welfare Survey data, DTRC, AAU.

Education can be one possible reason that explains the differences. For instance, as noted from the survey data, female school attendance was both universal and prolonged among the well-to-do group in contrast to women in poor and moderate households. Other things being equal, the longer years of schooling probably might have acted as a cause for delayed marriage among the women in the sufficient category and the other way round for women in moderate and poor categories.

The differences in age at first marriage observed among the different groups of the population could have far-reaching demographic implications, some of which are poverty-related. For instance, if the poor have limited knowledge of and access to family planning, as will be demonstrated in the following sections, early marriage implies longer exposure to childbearing,

and hence high fertility. In fact, this argument fairly agrees with the finding shown in the same table that the poor households in the study area were characterised by both large household size and high proportion of dependants. As can be observed from Table 3, the average poor household had at least one additional member compared to an average household in the sufficient category and about half a person compared to moderate households. Similarly, as shown by the child-adult ratios in the same table an adult in a poor household was expected to care for himself and support an additional 1.13 dependants as compared to less than one for the sufficient group. Overall and pairwise differences in average household size and proportion of dependants, as tested by the F-ratio and the Scheffe test respectively, were all statistically significant at the specified levels. The potential effects of such high dependency among the poor goes far beyond the immediate implications. With increasing withering away of subsidies in the social service sectors, such as education and health, the poor would be in a much difficult condition to send their children to school and provide them with the necessary health-enhancing goods and services. And, the lack of such opportunities implies the possibility of inter-generational poverty transmission.

Achieved Fertility

A substantial volume of empirical as well as theoretical work has, for over three decades, explored the determinants of fertility at the household level. Among behavioural factors found to be associated to fertility, many are closely related, in one way or the other, to poverty indicators.

The data from the present study, shown in Table 4, also convey clear inverse association between well-being and fertility, as measured by mean parity. Compared to women in both moderate and sufficient categories, women in poor households consistently registered higher number of children per woman. For instance, the average parity which was in the neighbourhood of two children per woman for all welfare groups at age group 20-24 increased to about four in the age group 30-34 in the case of poor women, while it is at least less by one child for women in the same age in the sufficient category. There were, of course, some variations in the level of statistical significance of pairwise differences in observed mean parities by age cohort of mothers, as confirmed by the Scheffe test.

For the younger ages (ages less than 30 years), the differences in the observed mean values were significant only between moderate and poor and sufficient and poor, but not between moderate and sufficient categories. While for women over 40 years, the pairwise mean differences were significant only between sufficient and poor and sufficient and moderate, but not between moderate and poor women. The probable reason for the insignificant pairwise parity differences between the categories of moderate and sufficient, for the younger ages and between the poor and the moderate among older women, could be that these women probably had more or less similar characteristics in certain variables that would affect fertility.

Table 4: Average Number of Children Ever Born by Age of Mother and Self-declared Welfare Groups for Sample Households, Dire Dawa, 1994

Age group	Self-declared welfare group			All Dire Dawa	F-ratio	P Value	Significant pairs at 5% level (Scheffe Test)
	Poor	Moderate	Sufficient				
20 - 24	2.38	2.04	2.00	2.30	4.59	0.0118	(1,2) (1,3)*
25 - 29	3.09	2.70	2.60	2.93	11.53	0.0000	(1,2) (1,3)
30 - 34	3.84	3.60	2.94	3.74	15.41	0.0000	All
35 - 39	4.86	4.51	4.18	4.62	25.42	0.0000	All
40 - 44	6.06	5.48	4.96	5.74	28.91	0.0000	(1,3) (2,3)
45 - 49	6.69	6.56	5.75	6.61	8.42	0.0002	(1,3) (2,3)

* 1 stands for poor, 2 represents moderate and 3 stands for sufficient.

Source: Author's calculations based on Fertility and Family Welfare Survey data, DTRC, AAU.

In the case of the middle age groups, that is between 30-39 years, the differences were, however, all significant for each of the pairs, meaning that over this age interval the fertility experience of 'poor' and 'moderate' women, 'poor' and 'sufficient' women and 'sufficient' and 'moderate' women were all significantly different from each other. In addition, the analysis also conveyed statistically significant differences in both completed and life-time fertility at all ages between poor women and women who considered their income as sufficient. Observed differences in fertility experience can be partly explained by differences in the choice available in reproductive strategy and imperfection concerning fertility control devices. Differences in the value of children and child mortality experience could also be other valid reasons. The target of household reproductive strategy is presumably surviving children. And, other things being equal, any actual or perceived mortality is, therefore, more likely to raise fertility in order to assure a certain

number of surviving children.

Ideal Family Size and Demand for Additional Children

The relationship between standard of living and family size goals, as measured by desired number of children, observed in the study area is an interesting one with a number of policy implications. As can be seen in Table 5.a, on average, most women in the sample population wish to have less than four children; and for that matter, ideal family size has been found to be the lowest for the poor women followed by women in the moderate category. Women in the sufficient income group in contrast had the highest desired number of children, which was in the neighbourhood of four children per woman. The low family size desires among the poor could be a behavioural response to the increasing costs of children and, if properly addressed by policy makers and service providers, it would probably help to bring down expressed family size levels to the level of family size goals.

Table 5a: Mean Number of Ideal Family Size by Age of Mother and Welfare Group, Dire Dawa, 1994

Age of mother	Self-declared welfare group			All Dire Dawa	F-ratio	P Value	Significant pairs at 5% level (Scheffe Test)
	Poor	Moderate	Sufficient				
20 - 34	2.78	2.99	3.77	2.89		0.0000	(1,3) (2,3)*
35 - 49	3.74	3.38	4.01	3.26	27.29	0.0000	All
All ages	3.00	3.17	4.04	3.11	57.81	0.0000	All

* 1 stands for poor, 2 represents moderate and 3 stands for sufficient.

Source: Author's calculations based on Fertility and Family Welfare Survey data, DTRC, AAU.

A closer look into the data on ideal family size in conjunction with reported achieved fertility levels shown in Table 4 is more instructive to examine the links between these two important indicators of current and future trends of fertility. For instance, if we compare desired number of children for women in the age group 20-34 with mean parity that these women had by the same age from Table 4 by level of self-declared welfare status, we may observe that women in the poor category have already exceeded their ideal number by 1.06 children and those in the moderate group by 0.61 child, while women in the sufficient group still need an additional 0.83 child to reach to their family size goals. This can be interpreted in several ways. One possibility is that fertility among the poor and the moderate groups is probably a matter of chance than choice,

which as we shall demonstrate below is the case. On the other hand, as we have mentioned earlier, since the target of reproductive strategy is surviving children the excess of expressed fertility may be seen as an insurance strategy against future possible deaths. The latter, however, is less likely to be the case and may be proved indirectly from the data on demand for additional children shown in Table 5.b, which shows lesser demand for additional children among poor women than women in the sufficient group.

Table 5b: Demand for Additional Children by Welfare Group (percentages)

Responses by age of women	Self-declared welfare group			All
	Poor	Moderate	Sufficient	Dire Dawa
Yes	19.7	28.8	37.6	23.2
No	55.8	40.6	23.4	49.2
Up to God	24.7	30.6	39.0	27.1
$\chi^2 = 211.311^* \text{ d.f.} = 4$				
35 - 49				
Yes	6.3	7.1	11.5	6.8
No	57.6	18.3	4.0	80.0
Up to God	11.2	17.4	19.5	13.2
$\chi^2 = 59.83^* \text{ d.f.} = 4$				
All Ages				
Yes	10.7	15.7	21.8	12.8
No	74.7	62.5	55.6	70.2
Up to God	14.6	21.8	22.6	17.0
$\chi^2 = 151.1^* \text{ d.f.} = 4$				

The hypothesis of no correlates between demand for children and welfare is rejected by the chi-square test at the one percent level.

As can be noted from the table, the percentage of younger women (aged below 35 years) demanding no additional child increases from about less than a quarter among women who consider their income as adequate to 41 percent among those in moderate groups and more than 55 percent among women in poor households. A similar pattern of relationship also exist for the older cohort (35 through 49 years). The percentage of women demanding no more children

increases from less than 5 percent in the sufficient group to almost one in five in the moderate category and about one-third among women in poor households. The above observation also suggests that given the tendency that fewer younger women are generally demanding additional children than the women in the older cohort, *ceteris paribus*, there is a greater potential for future fertility decline in the area.

Knowledge, Attitude and Practice of Family Planning

We have earlier argued that part of the explanation for the deviation between achieved and desired family size lies on differences in the level of choice in reproductive strategy. Knowledge and attitude about family planning and use of contraceptives are, hence, its practical expressions.

As may be learned from Table 6.a, attitude towards family planning was generally more favourable among women who consider their income as sufficient followed by those in the moderate category. Women in poor households had relatively less favourable attitude towards family planning. Looking at the data given for all ages, the percentage of women who approve family planning increases from about 70 percent for women in poor households to close to 80 percent for women in the sufficient category. Using the chi-square test, these differences in attitude were found to be statistically significant at less than one percent level.

In fact, the differences in attitude concerning family planning that exist between the different self-declared welfare groups become much wider when age differences are considered. For instance, among the younger cohort only less than 2 percent of the women in the 'sufficient' category disapprove family planning compared to a little higher than 15 percent among the poor women. It is likely that part of the differences in attitude are outcomes of differences in knowledge about family planning and are likely to create differences in the use of family planning methods, which, at the same time, might be the underlying reasons for the differences in fertility levels observed in the earlier sections.

There were also statistically significant differences in knowledge about family planning methods between different welfare groups as confirmed by Table 6.b. Knowledge was generally high among women who consider their income as sufficient followed by those in the moderate category. Women in poor households had relatively low knowledge about family planning.

Looking at the data reported for all ages, the percentage of women who know any family planning methods declines from about 74 percent for those in the 'sufficient' category to less than 60 percent for the poor category. As shown by the chi-square test, the observed differences in knowledge were statistically significant at less than one percent level.

Table 6a: Attitude Towards Family Planning by Age of Mothers and Welfare Group, Dire Dawa, 1994 (percentages)

Age of mother	Self-declared welfare group			All Dire Dawa
	Poor	Moderate	Sufficient	
20 - 34				
Approve	84.3	85.8	98.3	85.4
Disapprove	15.7	14.2	1.7	14.6
$\chi^2 = 22.19^* \text{ d.f.} = 2$				
35 - 49				
Approve	64.2	69.5	72.1	65.9
Disapprove	35.8	30.5	27.9	34.1
$\chi^2 = 19.66^* \text{ d.f.} = 2$				
All Ages				
Approve		70.5	79.9	72.2
Disapprove	29.5	24.8	20.1	27.8
$\chi^2 = 21.45^* \text{ d.f.} = 2$				

Although knowledge and attitude about family planning show how much people are ready to exercise reproductive-related choices, the ultimate determinant is the practice or use of effective fertility control devices. Consistent with the observation of high fertility, relatively low knowledge and less favourable attitude towards family planning, the poor continue to be the least users of modern family planning with a contraceptive prevalence rate of less than 5 percent. In contrast, the prevalence rate among those women in the adequate category is observed to be twice of those in the poor category and 40 percent higher than those in the moderate group.

Table 6b: Knowledge of any family planning method by age of women, current use of modern family planning methods and self-declared welfare group, Dire Dawa, 1994 (percentages)

	Self-declared welfare group			All Dire Dawa
	Poor	Moderate	Sufficient	
20 - 34 (Knows any family planning method?)				
Yes	78.4	75.3	91.5	78.2
No	21.6	24.8	8.5	21.8
$\chi^2 = 19.04^* \text{ d.f.} = 2$				
35 - 49 (Knows any family planning method?)				
Yes	49.2	60.4	66.5	52.9
No	50.8	39.6	33.5	47.1
$\chi^2 = 81.89^* \text{ d.f.} = 2$				
All Ages (Knows any family planning method?)				
Yes	58.3	65.6	73.9	61
No	41.7	34.4	26.1	39
$\chi^2 = 91.5^* \text{ d.f.} = 2$				
Currently using modern FP	4.6	7.2	12	5.8

Mortality

The relationship between mortality and poverty or generally standard of living is perhaps one of the most extensively researched areas. In the present study, four different, but related, indicators of mortality were calculated from survivorship data on children ever-born by age of mother in order to investigate the links between mortality and self-declared welfare status. These were infant mortality, mortality between exact age 1 and 5 years, under five mortality and expectation of life at birth (see Table 7).

Irrespective of the measurement used, as expected, death rates were consistently higher among the poor and lower among the well-off. The average expectation of life of a newly born baby in a poor household was at least 10 years shorter than his/her counterpart born in households which

regarded their income as sufficient. Similarly, with respect to infant mortality, out of 1000 infants born in poor households 91 of them die before their first birthday and this is in contrast to only 41 per 1000 among infants born to households with sufficient income. This represents a 270 percent higher risk of death among infants of poor households compared to babies born into households with sufficient income.

Table 7: Mortality and Standard of Living

Mortality indicators	Self-declared welfare group			All Dire Dawa	Significant pairs at 5% level (Z-Test)
	Poor	Moderate	Sufficient		
Infant Mortality Rate					
Male	95.4	85.0	42.2	90.4	(1,3) (2,3)*
Female	86.2	56.3	39.8	79.8	All
Both Sexes	90.9	70.7	41.0	85.2	All
Child Mortality					
Male	31.0	21.8	9.8	28.4	All
Female	26.0	14.6	5.6	19.0	All
Both Sexes	28.5	18.3	7.7	23.8	All
Under Five Mortality					
Male	123.4	107.7	51.6	116.2	All
Female	110.0	70.1	45.2	97.3	All
Both Sexes	116.8	87.7	48.4	107.0	All
Expectation of Life at Birth					
Male	58.8	60.4	68.4	59.5	(1,3) (2,3)*
Female	60.2	66.1	70.9	62.4	All
Both Sexes	59.5	63.2	69.6	60.9	All

* 1 stands for poor, 2 represents moderate and 3 stands for sufficient.

Source: Author's calculations based on Fertility and Family Welfare Survey Data, DTRC, AAU.

There were also significant differences in mortality experience between the poor and moderate and between the moderate and the sufficient. But interestingly, for most mortality measures the difference between the poor and the moderate was statistically significant only for females and

not for males.

A number of possible explanations can be given why mortality should be higher among the poor and lower among those with sufficient income. Higher income guarantees a household to provide children with sufficient amount of food. It also provides a means to pay for preventive services including for the physician, hospitalisation, drugs and maternity care during child birth. Moreover, since both size and quality of housing are likely to be correlated with household income those with higher income enjoy better facilities and hence are able to reduce the chance of exposure of their children to infectious agents.

Generally, it is believed that those households with better economic status have the opportunity to provide more health enhancing goods and services that affect child health and survival through increased per capita calories and nutrients, clothing and shelter, sanitary facilities, use of medical facilities and adult supervision than the lower-income households.

6. SUMMARY AND CONCLUSION

Interrelationships between population and poverty can be studied at different levels and from several perspectives. Perhaps the most common approach is macro-level analysis, which looks into the pressure of growing population on resources such as social services, investment and natural resources. However, many of the interactions between population and poverty originate, or are felt most strongly at the micro-level; that is, at the level where fertility-related decisions are made, and where the effects of poverty on mortality are observed. The present study, making use of cross-sectional data from Dire Dawa collected in 1994, made an attempt to examine the micro-level relationships between selected demographic variables and standard of living, with emphasis on the poor households.

The findings of the study are that poor households tend to experience early marriage, have large family size, high dependency of children and high fertility. But interestingly, compared to others, poor households wished to have fewer children (and most of them also need no more additional children) which was interpreted in the study as a behavioural response to the increasing costs of children. However, the study also found out most of these women had limited knowledge of

family planning methods, and even those who know about it had rarely practised it. In relation to mortality, as may be expected, death rates were consistently higher among the poor and lower among the well-off. For instance, infant mortality risk was observed to be 270 percent higher among infants of poor households compared to babies born into households with sufficient income.

The implications of the findings are that concerned bodies should attempt to provide the poor with facilities that enable them to exercise their choice, particularly in the area of fertility regulation. Adequate IEC programmes and expanded family planning services could be useful in this direction. Provision of expanded primary health-care facilities that are known to significantly reduce infant mortality rates could also help to bring down health-related disparities between the haves and the have-nots.

Notes

1. Lecturer, Demographic Training and Research Centre, Addis Ababa University.

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