Ethiopian Economic Association (EEA)

PROCEEDINGS OF THE FIFTH INTERNATIONAL CONFERENCE ON THE ETHIOPIAN ECONOMY

Edited by

Getnet Alemu

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Volume I

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FOREWORD

The Ethiopian Economic Association (EEA) is happy to issue the proceedings of the 5th International Conference (the 16th Annual Conference) on the Ethiopian Economy that was held from June 7 – 9, 2007 at UN Conference Centre. EEA has been organizing annual conferences on the Ethiopian Economy every year as part of its overall objectives to contribute to the economic advancement of Ethiopia through dissemination of economic research findings; promotion of dialogue on socio-economic issues; promotion of education in economics in higher learning institutions; enhancing national, continental and global networks of professionals and institutions; and advancement of the professional interests of its members.

In quest of its mission, EEA has been actively engaged in economic research, training, organization of International and National conferences and round table discussions on the Ethiopian economy and the dissemination of the results of these activities through its professional journals and various publications. It has also been engaged in providing professional opinion and reflections on many issues affecting the development of this country.

As a result of these and other efforts of the Association, EEA has established itself as a truly independent source of socio-economic policy options and data base in Ethiopia for the Ethiopian Government, the Ethiopian people and the International Community at large.

The 5th International Conference on the Ethiopian Economy was attended by about 450 participants. The conference was organized in five Plenary Sessions and four concurrent sessions. Panel discussion was also organized on the Current State of the Ethiopian Economy. The main speakers of the panel discussion were H.E. Ato Neway Gebreab, Director EDRI and chief Economic Advisor of the PM; Ishac Diwan, WB Country Representative to Ethiopia and the Sudan; Geni Kulgman, WB Lead Economist; Mulat Demeke, Economic Department of AAU; and Haile Kibret, EEA/EEPRI. In addition, keynote speech was delivered by Prof. Dr. Joachim Von Braun, Director General of IFPRI on Rural-Urban Linkages for Growth, Employment and Poverty Reduction.

Some of the sessions were co-organized with the World Bank, African Development Bank, Economic Commission for Africa (ECA), International Food Policy Research Institute (IFPRI), Ethiopian Development Research Institute (EDRI), Poverty Action Network (PANE) and Forum for Social Studies (FSS). The Plenary Sessions

discussed about 15 papers on Poverty, Future Agriculture, Urban-rural Linkages. Labour Market, African Development, Environment, Investment, Public Finance etc. Similarly, in the concurrent sessions about 68 papers were presented in the area of macro and sectoral issues, of which 49 papers were presented by individuals while the rest 19 papers were delivered by co-organizers.

Out of the total 49 papers presented by individuals on this 5th International Conference, the editorial committee received 39 papers from authors and reviewed them. Comments and suggestions including editorial comments were communicated to authors for improvement. Among the 39 papers, the editorial committee selected 23 papers to be included in this edition. In addition, 11 papers which were presented by co-organizing institutions were also reviewed and included in this edition. All these papers are organized into three volumes. Volume I contains ***Industry, Trade, Finance and Development;*** Volume II contains ***Social Sectors (Povery, Health, Education)*** and Volume III contains **Water, Natural Resource and Agricultural Practices.**

I would like to take this opportunity to express my heartfelt gratitude, on my own behalf and on behalf of the Ethiopian Economic Association, to the many people and organizations that made the conference a resounding success. First and foremost, I thank the authors of the papers and the audience whose active participations made the conference meaningful and dynamic. The UN Economic Commission for Africa deserves huge thanks for granting us the free use of the UN Conference Centre. The African Development Bank, Commercial Bank of Ethiopia, Bankers Association, Ethiopian Airlines, Future Agriculture, and Ethiopian Manufacturing Industries Association are sincerely acknowledged for sponsoring the conference. The many professionals who dedicated their time to the conference and served as chairpersons deserve due thanks for their special contributions.

The staffs of the EEA/EEPRI deserve a special recognition for their enthusiasm and perseverance in managing the conference from inception to completion. I also want to extend my personal gratitude to the Organizing Committee and members of the Executive Committee of the Ethiopian Economic Association for the dedicated services and the leadership they provided to the Association.

I would like to seize this moment to express our gratitude to the Consortium of Donors who have funded the conference and all other activities of EEA/EEPRI and maintained continued interest in our Association. These are: Friedrich Ebert Stiftung of Germany (FES), Embassies of UK (DFID), Ireland (DCI), Sweden (SIDA), the

Netherlands, Norwegian Church Aid and the African Capacity Building Foundation (ACBF).

Finally, I would like to extend my sincere gratitude to H.E, Ato Tadesse Haile, State Minister of the Ministry of Trade and Industry, for his an insightful keynote speech; ministers, parliament members, and other senior government officials who spared their busy schedule and participated in the conference.

Wolday Amha (Ph.D)
President of the Ethiopian Economic Association

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Keynote Speech

RURAL-URBAN LINKAGES FOR GROWTH, EMPLOYMENT, AND POVERTY REDUCTION[1]

Joachim von Braun[2]

1. Introduction

Traditionally, development policy and related research have adopted a simplified concept of rural and urban areas, with the words *rural* referring to more "remote farming areas" and *urban* to "crowded cities." To a large extent, this view has facilitated the isolated treatment of issues affecting each space, and it has as a result failed to acknowledge the important poverty-reducing inter-linkages that exist between the two spaces and the many variants of the spaces. In reality, farming areas (the very rural) and the megacity (the very urban) coexist along a continuum with multiple types of flows and interactions between those two spaces. The efficiency and effectiveness of infrastructure and market and non-market institutions are important in facilitating such inter-linkages. Key research questions, then, include these: What are the critical infrastructural and institutional barriers to optimal links between urban and rural areas? Further, what policy and program interventions are needed to create infrastructure and to facilitate or strengthen institutions to forge dynamic links between businesses, sectors, and geographic areas?

New contextual and exogenous conditions are changing the opportunities for rural-urban linkages as well as the intensification of such linkages. Elements of the changing conditions include (a) increasing trade and capital flows, which prompt rapid changes in the agriculture and food system as urban consumers increasingly influence the nature and level of interactions among the various stakeholders in the agri-food chain; (b) the information revolution, as more and more rural communities benefit from enhanced access to communications technologies that carry relevant information and facilitate new market institutions and services; and (c) increasingly decentralized governance structures across the developing world, as national

[1] The research assistance of Tewodaj Mengistu and the comments and contributions of Maximo Torero, Stanley Wood, and Shenggen Fan (all at IFPRI) on earlier drafts are gratefully acknowledged. I also benefited a lot from the discussion with various colleagues at the Ethiopian Economic Association (EEA) meeting, where this paper was presented as a draft
[2] International Food Policy Research Institute, Washington, D.C., USA

governments and policymakers, as well as private investors, are involved in regional development and interregional competitiveness.

Although urbanization is part of a healthy economic development process, its unguided shape and speed often bring about market and other institutional failures and result in adverse effects on people and the environment. The urban share of poverty is increasing: by 2002 the urban share of the poor had increased to almost 25 percent from around 19 percent in 1993 (Ravallion, Chen, and Sangraula 2007). Policy must address market failures in urbanization dynamics and in rural stagnation—that is, labor market, services market, and goods market failures attributable to ill-guided expectations, information gaps, and missing markets (e.g., finance); government failures due to biased taxation, pricing, and investment policies; and the negative environmental externalities sometimes engendered by urbanization or lack of rural change.

Against this broad context, the more narrowly stated question this paper addresses is this: how can rural-urban linkages be improved to accelerate inclusive growth, expand employment, and serve the poor? The key premise is that the lack of economically optimal rural-urban linkages is bad for economy-wide growth in that it divides societies, leads to inefficiencies, and is a root cause of inequality, which is in itself growth inhibiting (World Bank 2005). Conversely, strong linkages enhance growth because they facilitate the flow of resources to where they have the largest net economic and social benefits. However, such linkages cannot be taken for granted in development; they must be optimally invested in to help reduce transaction costs related to the linkages of diverse types and stimulate positive externalities and spillover effects. As such, rural-urban linkages need more policy attention, which requires that adequate institutional and organizational structures be put in place. And, to that end, central and local governments need appropriate coordination mechanisms.

The paper starts with a brief synthesis of theoretical and conceptual frameworks of rural-urban linkages so as to identify points of entry for policy. Thereafter, megatrends in rural-urban linkages are reviewed. Next, policies facilitating rural-urban linkages and some criteria for setting policy priorities are identified. Finally, areas for related economic research needs are mentioned.

2. Concepts and framework

The economics profession has dealt with the issue of geography and spatial distribution of economic activity in waves of high and low attention. Such waves have in part been driven by changing beliefs and disbeliefs in planning tools and in the role

of government in regional economic policy. As the roles of local governments expand, local policies and institutions have more influence in determining investment and transaction costs and thereby spatial distributions of economic activity. In fact, the increased "quality" of governance due to strengthened local government on a world-wide scale deepens the spatial dimensions of economic policy and potentially introduces new elements of efficiency into the spatial distribution of economic activity.

In recent years, we have seen resurgence in academia and in policy of the importance of "geography" to the understanding of economic transactions. This section briefly reviews the evolution of theoretical thinking on spatial allocation of economic activity and also the driving forces behind spatial differentiation.

2.1 The evolution of rural-urban linkage concepts and theory

A classical early analysis of spatial distribution of economic activity was reported by J. H. von Thünen in 1826. Using the example of demand and supply of agricultural products (the flow of agricultural goods from rural production to urban consumption areas), von Thünen showed how the interplay of market processes and geography shaped land use decisions in specific locations. He hypothesized that farmers' land use decisions would be driven by the highest "location rent" each potential land use might generate after factoring in the market prices, and production and transport costs associated with each use. Under the simplifying assumptions he made – particular that of uniform land quality, von Thünen illustrated how his location rent hypothesis would result in the emergence of concentric rings of specific agricultural land uses around a central city (demand locus). Given (the then prevailing) market prices, production costs, and transport costs, the latter influenced heavily by the value, bulk density and perishability of individual commodities, dairy and intensive farming were predicted closest to the city, followed by timber and firewood in the second circle, grain production in the third, and finally, ranching and livestock activities in the fourth circle. Already in this early model of the spatial distribution and patterns of rural space urban demand was demonstrated to be a key driver, shaped by the potential marginal returns to assets and labor.

In 1933 Walter Christaller achieved another breakthrough when he developed the *central place theory* to explain how urban settlements are formed and spaced out relative to each other. The main premise of Christaller's theory was that "if the centralization of mass around a nucleus is an elementary form of order, then the same centralistic principle can be equated in urban settlements" (Agarwal 2007). His model, later refined by Lösch (1954), predicted an urban hierarchy of human settlements around hexagonal shapes (the hexagon being the geometrically closest

approximation of efficient ways to travel between the settlements), with varying sizes of centers. The size of the center is determined by the type of goods and services it provides, whereby larger settlements (fewer in numbers) provide goods and services of a "higher order" (which require a large market both in terms of income and population and are therefore more specialized), and smaller settlements provide goods and services of a "lower order." In this framework, since some of the demand for the goods produced in the centers (such as manufacturing) comes from peripheries, production is tied with agricultural land distribution (Krugman 1991).

Such conceptual frameworks not define only *rural-urban* linkages but also *urban-urban* linkages between centers of differing scale related to economies of scale in sub-sectors of the economy. However, the early models were based on strong assumptions such as homogeneous spaces, uniform consumer preferences, and proportionality of transport costs to distance while they are really characterized by different factor endowments. Therefore, such models' applicability to real settings is limited. Nevertheless, they do clarify the gradual nature of the differentiation between urban and rural areas: in reality, and as expected in the theory of economic geography mentioned above, the "very rural" and the "very urban" coexist along a continuum with many in-between stages varying from small towns to peri-urban areas and actually patterns of rural urbanization (Figure 1).

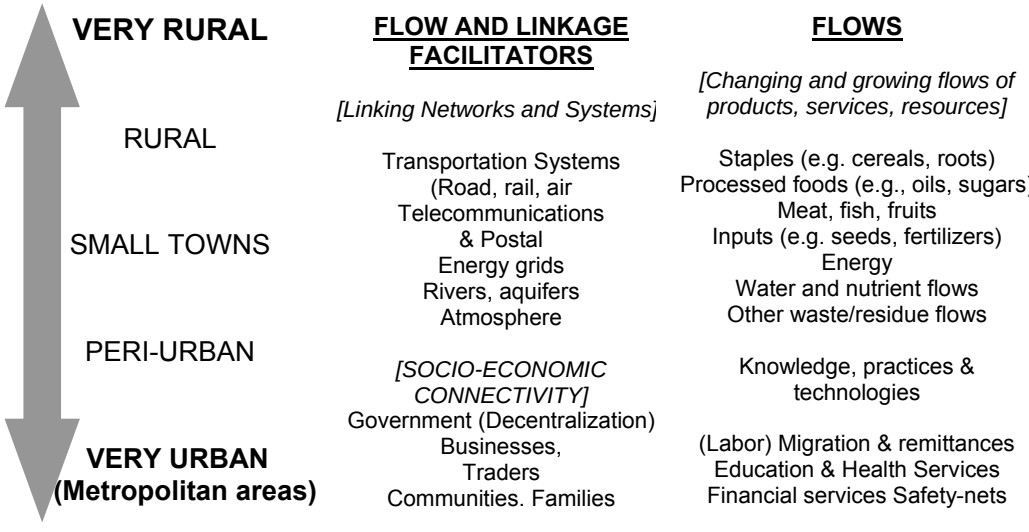
Moreover, a dynamic set of flows exists between these various spaces, creating interdependencies between them. In Ethiopia, for instance, rural households undertake a significant proportion of their economic transactions in local market towns, where they purchase half of their needed agricultural inputs and consumption goods (including food) and sell about a quarter to three-quarters of their crops and livestock (Hoddinott and Dercon 2005).

In general, two dimensions can be conceptually distinguished here: flow and linkage facilitators and actual flows (Figure 1). The first includes infrastructures (broadly defined) and government and other public and private actors, the second includes flows of people, goods, money (in the form of remittances, for example), knowledge, information, and waste. In biophysical perspectives, flows of water, biomass products, and nutrients are relevant. Though goods and factors can move from one area to the other, such movements involve costs. Such costs may be information costs, transport costs, or policy-induced costs.[3] Such costs may be the result of non-economic and/or historical factors, and as these costs are reduced, spatial integration will increase,

[3] Policy-induced costs are costs such as tariffs and restrictions on interregional movements of goods and factors. We separate policy-induced costs from transport and information costs because whereas any

resulting in increased trade between rural and urban areas and, subsequently, an increased level of urban-rural linkages (Chowdhury and Torero 2007).

Figure 1: The stylized rural-urban continuum with its spatial flow facilitating elements and the product-, service-, and resource flows



2.2 Forces behind spatial differentiation

Since the early 1990s, various economic studies explaining spatial differentiation have emerged. Generally, three types of arguments can be distinguished: the first focuses on *geographical endowments* determining comparative or absolute advantages; the second focuses on the existence of linkages (backward and forward) that cause *agglomeration* of certain activities (Venables 1996); and the last argument relates to spatial preferences (such as urban bias) in *government policies* in taxing, pricing, and investment/spending.

Examples of the first type of argument are provided by David Ricardo (1951) and by Gallup and Sachs (1998). Ricardo focused on the spatial variation in the rent that land might earn focused not on its location relative to a market, but on the variation in its quality (Ricardo 1951). Ricardo observed that there are different qualities of a fixed

change in the latter usually involves reallocation/redirection of public and private resources, policy-induced costs do not necessarily require such actions.

supply of land, of which the most productive tends to be used first, earning no rent. Growing (urban and rural) demand for food brings additional land, of lower quality, under cultivation whose unit production costs will be higher (lower yields and/or higher production costs per ha). Thus, farmers on fertile lands would then have a cost advantage, or rent. Farmers on lower quality land would be willing to pay up to that cost/rent difference to farm on better quality land, and that better land would rise in price to reflect this rent. As each successive quality of land is brought into production each higher quality of land will start to earn rent in proportion to the production cost advantage it embodies. Gallup and Sachs drew attention to the ability of inherent geographical differences such as climate and location to explain spatial differentiation of economic activities and well-being. Gallup and Sachs concluded that people tend to converge to locations that are conducive to growth, and as such, some locations are at an absolute disadvantage over others. Through an econometric analysis, they show that landlocked (because they are subject to higher transportation costs) and tropical regions (because they are subject to higher levels of disease) are the most disadvantaged.

The second type of argument is represented by Krugman's (1991) "new economics of geography," whose central assertion is that "the world economy can engage in a process of self organization in which locations with seemingly identical potential end up playing very different economic roles" (Krugman 1999). Building on Christaller and Lösch, he finds that while some of the demand for the goods produced in centers (e.g., from the manufacturing sector) comes from the periphery, demand also comes from the manufacturing sector itself because of backward linkages to other manufacturing industries. This adds a "circular causation" dimension—that is, manufacturing concentrates in a location where the market is large, and at the same time, the market is large where manufacturing is concentrated. Krugman also points to forward linkages as sources of agglomeration of economic activities, as other things being equal, people prefer to live and produce near the concentrated manufacturing sector because it is cheaper to buy goods in this central location where they are produced.

Additionally, Krugman adds a dynamic perspective incorporating changes in economic parameters—such as transportation costs, share of nonagricultural products in expenditure, and economies of scale—to his model. He finds that populations start concentrating in central areas and regions start diverging when the nonagricultural expenditure passes a critical threshold and there are large economies of scale to production and lower transportation costs (Krugman 1991). However, focusing on transport and communication costs, Venables (1996) finds that spatial agglomeration of economic activity happens only at intermediate price levels. He

finds that in the other two extreme situations where transport and communication costs are either very high or very low, economic activity tends to be dispersed, but for different reasons. In the case of high costs, economic activity is dispersed because firms need to be closer to consumers, and in the reverse case of low costs, firms will consider other issues besides costs of transport and communications when deciding on location.

Porter (1998) provides an additional perspective to the new economics of geography. His "new economics of competition" looks at how geographical concentration of a certain economic activity (or a cluster) can create and sustain an advantage for a firm over other regions/locations. According to him, "once a cluster begins to form, a self-reinforcing cycle promotes its growth, especially when local institutions are supportive and local competition is vigorous." However, imperfect competition can also lead to less integration than expected. Faminow and Benson (1990) assume that buyers and sellers are spatially dispersed and intraregional transport costs exist. In this case, producers and consumers consider only nearest rivals. Hence the market is characterized by oligopolistic (oligopsonistic) competition where the expected pricing response of rivals determines prices. In such a situation, the seemingly positive return from arbitrage may reflect only the existence of transportation costs.

The third type of argument asserts that spatial differentiation arose out of urban-biased and industry-focused policies that reinforced and furthered the divide between rural and urban areas. Because the modernization imperative gave precedence to urban-based industrialization, many developing countries shifted their resources out of agriculture and disproportionately concentrated their public resources in the urban sector. Indeed, based on simplistic interpretations of the works of Hirschman (1958), in the 1970s it was widely believed in the developing world that the agricultural sector had weak linkages to the rest of the economy, and that as a result the policy focus should be on promoting industrialization rather than agricultural productivity. These strategies levied heavy taxes on the agricultural sector and applied rural production and price controls to protect and subsidize urban-biased development policies (Adelman 2001). Schiff and Valdés (1992) found that direct and indirect government taxation on the agricultural sector in 18 developing countries depressed domestic agricultural terms of trade by 30 percent and resulted in an income transfer out of agriculture equal to 46 percent of agricultural GDP per year. Public investment policies also frequently resulted in public investments and subsidies that favored urban-centered social services. For example, despite the fact that rural residents account for 69 percent of China's total population and that almost 50 percent of the national GDP was produced by the rural sector (agriculture and rural township and

village enterprises), government spending in rural areas accounted for only 20 percent of total government expenditures in 2000 (Fan et al. 2005).

Against the backdrop of the preceding discussion of conceptual and theoretical evolution, in the following section some megatrends of change affecting rural-urban linkages and their main policy determinants are discussed.

3. Mega-trends and domains of policies facilitating rural-urban linkages

In the last decade, developing countries as a whole have experienced relatively high growth rates: from 1994 to 2004, low- and middle-income countries grew on average by 4.4 percent annually, and sub-Saharan Africa by around 3.5 percent (World Bank 2006). At the same time, the level of interaction between urban and rural areas has intensified, with both positive and negative implications. The first part of this section reviews these interactions in more detail. Subsequently, the second part reviews how widespread economic growth has played out spatially, and whether rural areas have participated in this growth process. What emerges from the analysis is that a large divide between rural and urban areas in developing countries still exists, and as a result major inequalities persist between the two spaces. Finally, the third part looks at facilitators of the intensification of rural-urban linkages with positive externalities, and the types of strategic investments that would allow for these.

3.1 Flows between rural and urban spaces and their implications for rural transformation

Driven by technological progress, improvements in infrastructure, and liberalization and creation of markets, globalization has meant rapid rural transformation across the developing world. As such, the interactions connecting the various spaces between the “very rural” and the “very urban” have become deeper. The evolution of main elements of spatial flows is explored next.[4]

Migration and remittances

Urbanization is happening at accelerated speeds across the developing world—from 1994 to 2004, the annual population growth rate in urban areas for developing

[4] The following subsection does not comprehensively address all rural-urban flows. It is therefore important to keep in mind that a number of other types of flows exist—for instance, through nutrition and health (including animal health–human health interactions, and adaptation in nutrition behaviors in rural areas that are becoming more urban).

countries as a whole was on average 2.6 percent, as opposed to 0.6 percent for rural population growth. The reclassification of areas from rural to urban plays an important part in this change. The average annual rate of urban population growth is even higher for sub-Saharan Africa at 4.4 percent, as opposed to 1.5 percent for rural population growth (World Bank 2006). This trend is expected to continue over the coming decades with urban populations in less-developed regions surpassing rural populations by 2020. In Africa, this will happen around 2025, when the urban and rural populations will reach 807 million and 687 million, respectively (UNDESA 2006).[5]

The causes and dynamics of migration are complex. The economic thinking behind migration decisions dates back to the Harris-Todaro model (1970), which asserts that an individual's decision to migrate is based on the differences in expected earnings in the formal urban sector and the expected earnings in the village. Since then, economic theory has evolved to focus on families as a unit of analysis, as opposed to just the individual. Stark and Bloom (1985) found that migration is a household decision and families invest in a migrant (or migrants) in return for future receipts of remittances. As such, migration is a source of income diversification for households facing income risks and is also circular in that it entails continued (rural-urban) interaction between migrant(s) and their families, who remain in the area of origin.

More broadly, however, migration is determined by push and pull factors. Push factors include droughts, land scarcity, and low wages or absence of wage labor in out-migration areas, and pull factors include better job opportunities and/or the possibility of higher income and lower or different risk profiles in destination areas (von Braun 2005). On the one hand, if people migrate because they are pushed away by the unavailability of work in rural areas, they risk joining the already high number of unemployed in urban areas (Garrett 2005). On the other hand, if people migrate because they have found better jobs, then migration is welfare enhancing (i.e., migrants would be better off and would be able to send remittances back to their communities).

However, rural migration is not always restricted to large urban centers. For instance, in the Philippines migration to smaller towns in rural areas that offer comparable "urban like" opportunities in education and employment for migrants is common. This counters the migration flow to more congested metropolitan centers of the country (Quisumbing and McNiven 2005). And migration is not always permanent. There is a

[5] In 2020, the urban and rural populations in less-developed regions are forecast to reach 3.3 billion and 3.1 billion, respectively. The numbers in 2005 were, respectively, 2.3 and 3 billion. In Africa, the urban population in 2005 was a little over 366 million and that of rural areas was around 556 million (UNDESA 2006).

strong component of seasonal migration in developing countries (especially in Asia and Africa), whereby people are "pulled" into urban areas as a result of strong growth in manufacturing and services. One of the advantages of such migrations, beyond increased earnings, is that the availability of these urban jobs is not tied to the agricultural season, which entails that people can work both in the rural and urban areas (Deshingkar 2005). Seasonal migration can be welfare enhancing; for instance, a recent study in Vietnam found that seasonal migration resulted in an annual increase of about 5 percent of household expenditure, and a 3 percentage point decrease in the poverty headcount (de Brauw and Harigaya 2007).

One of the main outcomes of increased migration (including international migration) linkages is growing remittance receipts in many developing countries (Table 1). Such remittances can play a very important role in supplementing incomes in receiving households. Additionally, the increase in purchasing power of receiving households can stimulate the local economy, and in the particular case of rural areas, increased remittance receipts can stimulate the rural nonfarm economy (Thanh et. al. 2005).

Table 1: Workers' remittances, receipts (millions of current US$)

	2002	2003	2004
Ethiopia	34	46	133
Bangladesh	2,850	3,180	3,572
Honduras	711	860	1,135

Source: World Bank 2006.

Much of the *global* change in labor allocation is related to intersectoral shifts due to enhanced growth in other sectors (manufacturing, industry, and services) in urban areas. Over the next 15 years, the economically active population is projected to increase from 3 billion to 3.5 billion, and while farm employment may go down by about 300 million, employment in services and industry, both in urban and rural areas, is estimated to grow by an addition 400 million people each. It is noteworthy that much of the employment growth is expected in rural (including small town) services and industries (see Table 2).

Table 2: Global employment change, 2005 to 2020 (in billions)

	Farm	Services and industry—rural areas	Services and industry—urban areas	Total
2005	0.9	0.6	1.5	3.0
2020	0.6	1.0	1.9	3.5
Change 2005 to 2020	–0.3	+0.4	+0.4	+0.5

Source: Author's estimates of sector shares based on ILO economically active population projections.

Resource and environmental flows

The intensification of rural-urban linkages with respect to environmental flows has occurred as a result of increased urban demands for rural resources such as land, water, and air. The most visible change is associated with the physical expansion of urban areas, as urbanization has lead to the extension of urban space onto rural space to accommodate growing populations and growing levels of economic activity. Demand for land around cities has increased to build residences, industries, and transport corridors such as roads and highways, as well as for the disposal of urban waste (both industrial and household) (McGranahan et al. 2004).

In many low- and middle-income countries, the growth of cities has produced densely populated and impoverished squatter settlements in peri-urban areas, where people have little access to adequate shelter, sanitation, and other types of services. People residing in these urban sprawls are prone to diseases as often they have no access to safe water and sanitation. In addition, they have to cope with high levels of pollution as manufacturing, food-processing, and urban-building activities release their chemical waste into the atmosphere, soil, and waterways in the nearby peri-urban areas (McGregor et al. 2006).

Water is a resource with strong spatial dimensions, as interregional water flows provide critical links between urban areas and their surroundings. For one, many cities across the world are situated near waterways. This can have important negative ecological implications in terms of loss of ecosystems and loss and degradation of water systems. Second, water diversions created to service urban areas affect both upstream and downstream users and increase the competition between urban and rural demands for water. Moreover, urban areas release waste in local waterways or coastal water, contaminating the water, which can in turn cause health problems for downstream users and damage aquatic systems (Millennium Ecosystems Assessment 2005).

Urbanization also creates pressure on agriculture production, as urban demands grow in terms of both quantity and diversity of agricultural outputs needed, but also as urban expansion encroaches into often highly productive tracts of agricultural lands. Such urban-induced pressure can lead to significant environmental consequences in rural areas as the agricultural frontier is expanded through land conversion,[6] or as

[6] The demand for further expansion of the agricultural frontier is shaped by the growth in demand for agricultural products as well as the need to compensate for the productive land being lost to urban and industrial expansion. The demand for area expansion is, however, mitigated by improvements in land productivity brought about by intensification. If land productivity increases sufficiently it can even eliminate or reverse the need for additional agricultural land. While in most developing countries most increases on production over recent decades has come from intensification over area expansion (roughly by a ratio of

production on existing agricultural land is intensified (Millennium Ecosystems Assessment 2005). Both area expansion and the intensification of production often result in the loss of natural biodiversity, increased greenhouse gas emissions, reduced quantity and quality of available freshwater resources, and accelerated soil erosion and nutrient cycling (impacting soil fertility and water quality).

By degrading the rural natural resource base, the negative environmental externalities of urban-induced demand for greater exploitation of rural resources imposes sustainability risks on both rural livelihoods as well as on the future food security of both rural and urban populations. Furthermore, cross-sectoral aspects of such urban-rural tradeoffs are revealed when enhancing agricultural output diminishes the contribution of rural areas to the supply of other ecosystem services and products that are also required in increasing amounts by urban populations (i.e. fresh water supply, flood protection, fuelwood, and lumber).

The failures of development strategies based on import-substituting industrialization (e.g., in many Latin American and African countries) and the successes of countries that pursued agricultural-led growth (e.g., China) have demonstrated that agricultural productivity growth is essential to launching an economy-wide growth, especially in predominantly agrarian societies. Indeed, agriculture growth engenders both backward linkages in the form of increased demand for farm inputs such as fertilizers and farm equipment, and forward linkages, as increased farm households' income translates into increased demand for consumption goods and services (Mellor 1995; Hazell and Röell 1983; Diao et al. 2007; de Ferranti et al. 2005). These linkages can subsequently lead to rural transformation, with an expansion of the rural nonfarm economy (RNFE) and better linkages with the rest of the economy, with increasing sectoral and spatial flows between rural and urban areas.

In the last couple of decades, significant gains in agricultural labor productivity have been achieved; agricultural value added per worker in low- and middle-income countries increased by approximately 43 percent from 1985 to 2003, going from US$405 to US$580[7] (World Bank 2006). Additionally, globalization of agriculture has led to enhanced agricultural trade and the commercialization of traditional agricultural processes. And, as a part of the general trend toward the liberalization of markets, many developing countries have reduced the level of government intervention (e.g., elimination of price controls on agricultural commodities, reduction of export taxes, privatization and/or dissolution of state-owned enterprises, reduction of subsidies, etc.) in the agricultural sector. As a result of these reforms, some countries, especially

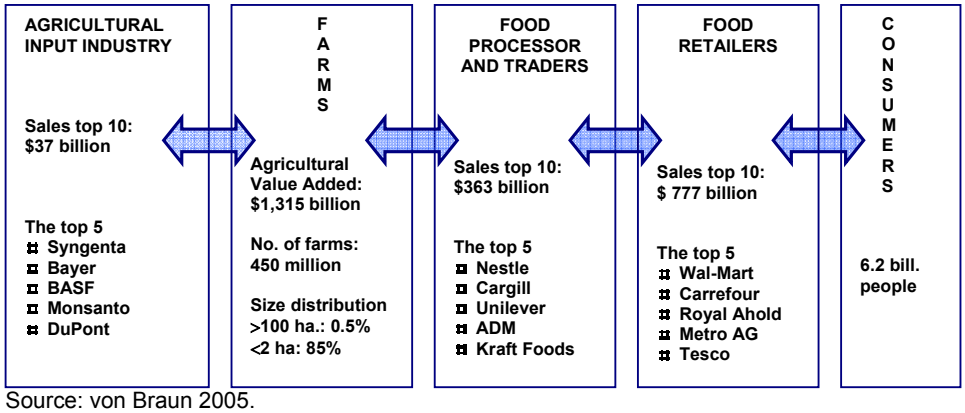
2:1), that share pattern in reversed in sub-Saharan Africa where over two thirds of increased output is attributable to area expansion (Millennium Ecosystem Assessment, 2005).

[7] The data are in 2000 constant dollars.

those where reforms were fully implemented, experienced an increase in trade and higher levels of competition, as well as reduced marketing margins, although in some cases, marketing margins remain high due to inadequate transport infrastructure and high levels of uncertainty (see Kherallah et al. 2002 for an overview of market reforms in sub-Saharan Africa, and Gabre-Madhin 2001 for grain market reform in Ethiopia).

An additional outcome of the increased opportunities brought about by globalization and the liberalization of the 1980s and 1990s is the expansion of the RNFE (von Braun and Pandya-Lorch 1991). Indeed, the RNFE now accounts for approximately 25 percent of full-time employment and about 30 to 40 percent of rural household income in developing countries (Haggblade, Hazell, and Reardon 2007), and in sub-Saharan Africa and Latin America nonfarm activities account for 40 to 45 percent of average rural household income (Barrett et al. 2001).

Figure 2: The global agri-food business chain (2005)



Source: von Braun 2005.

Another feature of the globalization of agriculture is that consumer preferences across the globe have become major driving forces of agricultural production systems. As Figure 2 depicts, they spend about $4 trillion on food and beverages. The retail industry caters to them, while the food-processing and trading industry supplies the retail sector and procures from the farm sector, which in turn is supplied by agriculture input industries. Rising consumer incomes and urbanizing lifestyles have increased the demand for high-value agricultural products, which include meat and fish, fruits and vegetables, and dairy products. To meet these demands, agricultural producers in developing countries are diversifying toward these products. In Indonesia, for instance, the production of high-value products has been increasing faster than that of cereals. However, this diversification is spatially limited to certain locations (Chowdhury, Gulati, and Gumbira-Said 2005).

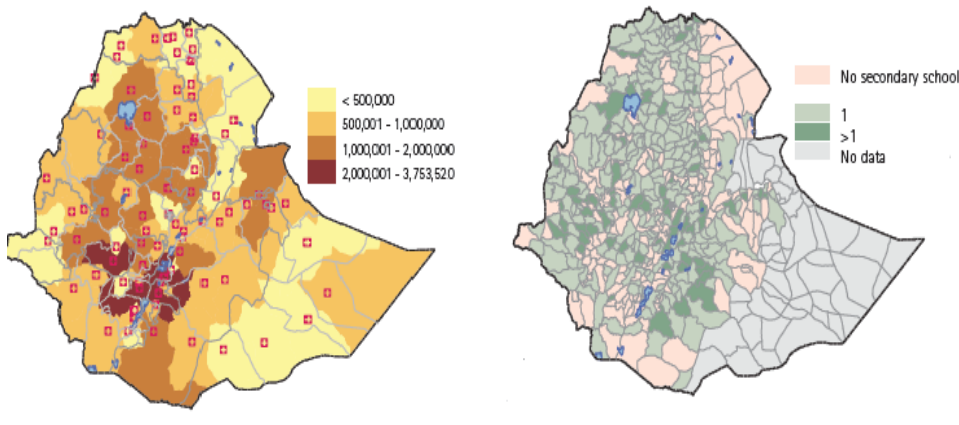
3.2 The rural-urban divide

Despite increasing levels of rural-urban interaction, major rural-urban disparities continue to exist across the developing world. As a result of adverse terms of trade between agricultural and nonagricultural product prices as well as urban biases in government spending on health, education, and physical infrastructure across the developing world, major inequalities between urban and rural areas persist, not only in terms of income but also in asset endowment and human development (Eastwood and Lipton 2004). Thus, while inequality exists separately within the rural and urban spheres, the largest differences are between urban and rural areas; most of the poor live in rural areas and depend on agriculture and related trade, services, and processing activities for their livelihoods. Additionally, in many countries, rural inhabitants do not have the same level of access to social services, such as health and education facilities (see Figure 3 for the Ethiopian example) and infrastructure as their urban counterparts, further perpetuating existing inequalities.

Even more concerning, the rural-urban divide seems to be widening in parts of the developing world (Eastwood and Lipton 2004). China and India provide illustrations. Both countries have experienced sustained economic growth over the last decade (on average 9.5 percent annually for China and 6.25 percent for India between 1994 and 2004) and have achieved major success in poverty reduction (see Table 3).

Figure 3: Spatially differentiated access to services in Ethiopia

Population per hospital **Secondary schools**



Sources: CSA, EDRI, and IFPRI 2006.

However, economic growth and poverty reduction have been distributed unevenly. In both countries the bulk of the poor still live in rural areas and are concentrated in certain regions. In China, the majority of the poor are concentrated in the interior of the country, and in India half of the poor are concentrated in just three states—Uttar Pradesh, Bihar, and Madhya Pradesh. Moreover, spatial inequality in both countries seems to be increasing. In China, the difference in the average monthly per capita income between urban and rural areas almost doubled between 1994 and 2004, going from US$99 to US$16, and the percentage of total inequality (measured using general entropy) due to inequality between inland and coastal areas increased from 6.5 percent in 1990 to 11.6 percent in 2004.

Similarly, in India, the difference between average monthly per capita income in urban and rural areas rose from US$21 to more than US$27 and the percentage of total inequality due to inequality between the North and South regions increased from 2.6 percent in 1990 to 15.9 percent in 2003 (Table 3, Gajwani et al. 2006). According to Gajwani et al., the rising rates in spatial inequality can be partly traced back to efforts to liberalize trade and open up the economy to foreign direct investment in the 1990s, as well as to increasingly decentralized governance structures.

Table 3: Poverty levels and mean income in China and India

		China		India	
		1994	**2004**	**1994**	**2004**
Poverty (% of population living on less than $1 a day)	Rural	34.6	16.8	52.0	40.2
	Urban	0.9	0.3	25.9	19.6
Average monthly income per capita (US$)	Rural	34.64	76.84	37.25	44.8
	Urban	133.96	237.97	58.55	72.28

Source: Data from World Bank 2007.

Increasing inequalities are also a central feature of agricultural production in many developing countries, especially in terms of access to land. Indeed, approximately 85 percent of the world's farms are smaller than two hectares, and of those farms, 90 percent are in low-income countries. For instance, farm sizes in sub-Saharan Africa remain predominantly smaller than one hectare, and there is evidence that farm size is still gradually shrinking over time due to population growth and density (von Braun 2005).

3.3 Domains of policy facilitating rural-urban linkages

This subsection reviews how actions in three major areas alluded to in the conceptual discussion above—research and development (R&D) and technology, infrastructure, and market institutions—can further stimulate rural-urban linkages to promote growth, create employment, and reduce poverty. Additionally, policies that would further facilitate rural transformation and rural-urban linkages are reviewed.

R&D and technology

Technologies work through factor and output markets, processing, and consumption linkages. Here, two types of technologies that have had a substantial impact on rural growth and poverty reduction are explored: innovations arising from agricultural research and development and improvements in information and communications technologies (ICTs).

Agricultural research and development
Science and technology are fundamental for rural-urban linkages, and in this context, agricultural research is fundamental. The Green Revolution experience, especially in Asia, has shown that agricultural R&D can result in technological breakthroughs that enable considerable improvement in agricultural productivity, resulting in agricultural growth, which in turn can translate into substantial rural development and poverty reduction. The Green Revolution technologies, which include high-yielding varieties complemented with irrigation and intensive fertilizer use, were developed in response to the threat of widespread hunger in Asia in the early 1960s emanating from steep population growth and the related overuse of water and land resources. The results were that the new technologies not only enabled higher production of food to meet the growing demand (thus permitting many countries to achieve food security at the national level) but also had spillover effects in terms of rural development, as in the rural nonfarm sectors through consumption and production linkages (Haggblade, Hazell, and Reardon 2007). The urban poor were major beneficiaries of the Green Revolution due to the price-reducing effects of technology.

Today, technological innovations in agricultural production continue to be significant sources of agricultural productivity growth, which can in turn translate into rural growth and poverty reduction. For instance, it is estimated that in Asia and Latin America, for each additional dollar of income generated in agriculture, between $0.6 and $0.9 and between $0.4 and $0.6, respectively, of income is additionally generated in the local rural non-farm economy (Haggblade, Hazell, and Reardon

2007). The multipliers are lower for sub-Saharan Africa because of agro-climate conditions and the lack of infrastructure and sound policies.

Nevertheless, while agricultural performance has been relatively high in recent years, there is cause for concern. Eighty developing countries today together spend only a total of about $1.4 billion on agriculture R&D, which represents only 6 percent of global expenditures. Furthermore, together, the agricultural R&D expenditures of China and India represent 22 percent of the total developing country investments (Pardey et al. 2006). Many small and medium-sized developing countries are not investing enough in agricultural R&D. In effect, as the positive spillovers from technologies previously derived from industrialized countries' R&D dry up, and because even the capacity for adapting technologies is constrained by the low level of expenditures in small and medium-sized developing countries, many of these countries have only limited access to available growth-enhancing technologies. As a consequence, rural-urban linkages become weaker.

Information and communications technologies

ICTs can lower transaction costs by reducing information asymmetries[8] and opening up market possibilities for rural inhabitants, which can result in additional network externalities. Indeed, at the macro level, tele-density is positively associated with growth. Wavermann et al. (2005) found that 10 more mobile phones per 100 people increased GDP by 0.6 percent. But there seems to be a minimum threshold of about 15 percent coverage to achieve the strongest growth effects (Torero and von Braun 2006). Africa and South Asia are far below that critical threshold, especially in rural areas.

At the micro level, the welfare gains from having access to ICTs are large, as the alternatives (sending a messenger or letter) are much costlier and more time consuming. In effect, the welfare gains from a telephone call range between US$1.62 to US$1.91, for instance, in Bangladesh and Peru. As such, the willingness to pay for access to telephones is also relatively high, and typically exceeds the actual prevailing tariff rates (Torero and von Braun 2006).

If information asymmetries persist between producers and consumers based in two spatially separated locations, intermediaries who facilitate the transaction between urban and rural areas emerge, and therefore, any change in information asymmetry can lead to a change in the intermediation process and can lead to the demise of existing (traditional) intermediaries and the rise of new (modern) intermediaries, as is

[8] Information bottlenecks hinder effective rural-urban linkages by raising transaction costs by increasing search, screening, and bargaining costs.

currently happening in the modern food value chains in many developing countries. If not corrected, the lack or differential access to market information can create direct barriers to mutually beneficial exchange and greatly increase the costs associated with trade. The consequences of asymmetric information are that equilibrium may or may not exist, or if equilibrium exists, resources are used less efficiently than they would be if there were symmetric information. Thus, the availability of efficient and reliable market information is a key ingredient in fostering rural-urban linkages.

Infrastructure

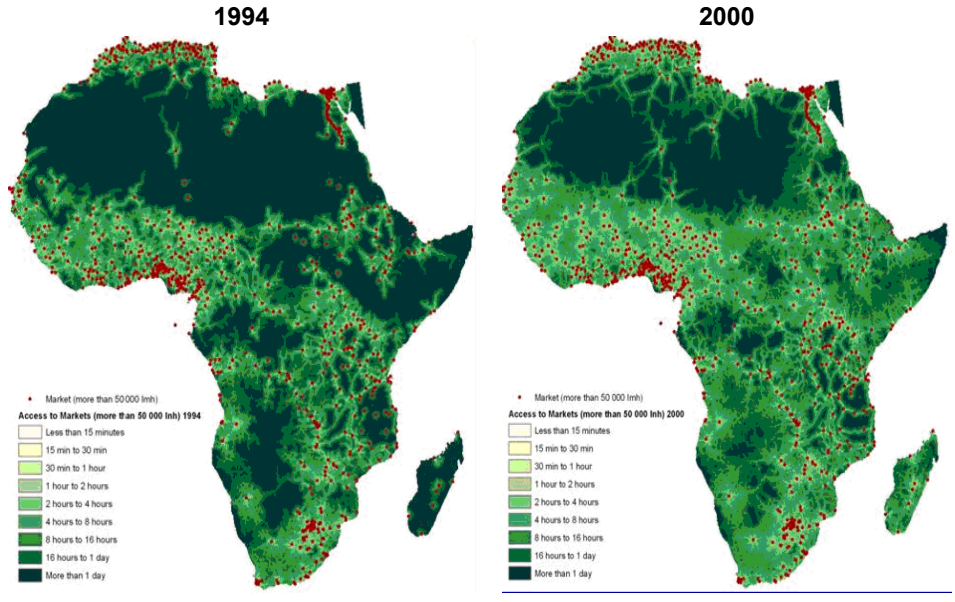
Infrastructure works as a bridge between the rural and urban worlds, and between the agricultural sectors and others sectors of the economy.[9] In particular, in situations characterized by a wide dispersion of production and consumption centers, transport costs account for a significant proportion of total costs to link urban and rural areas. An improvement in rural road quantity (length or density) and quality lowers travel time and reduces vehicle running and maintenance costs, which in turn lowers the actual costs of marketing produce and reduces the costs of delivering inputs, increasing the inter-linkages between urban and rural areas. But the indirect effects of infrastructure for flow of goods, services, and information are important benefits beyond transport cost reductions.

The large returns in terms of growth and poverty reduction of investments in rural roads are well known. For example, in China, the returns to investments in rural roads in terms of national income are over three times that of investments in urban roads—for every yuan invested in rural roads, the return is around 6 yuan, versus 1.55 yuan for urban roads. The returns in terms of poverty reduction are equally better for rural road investments—5.67 persons per 10,000 yuan invested versus 0.31 for urban roads (Fan and Chan-Kang 2005). Similarly, Mogues et al. (2007) find that investments in roads have the highest returns compared with other investments considered.[10] However, the study also finds that returns to road investments vary by region, with regions with better road networks benefiting most. As such, in the last decade, many developing countries have invested heavily in rural roads. For example, in the majority of the African continent, while still high, the time it takes to access markets composed of more than 50,000 inhabitants has been drastically reduced (see Figure 4).

[9] The aggregate-level links between poverty and rural infrastructure have been studied by several authors, but among the most important of these works, in addition to those cited above, are Lipton and Ravallion (1995), Jimenez (1995), and Van de Walle (1996).

[10] The other types of public investments the study considers are agricultural, health, and education investments.

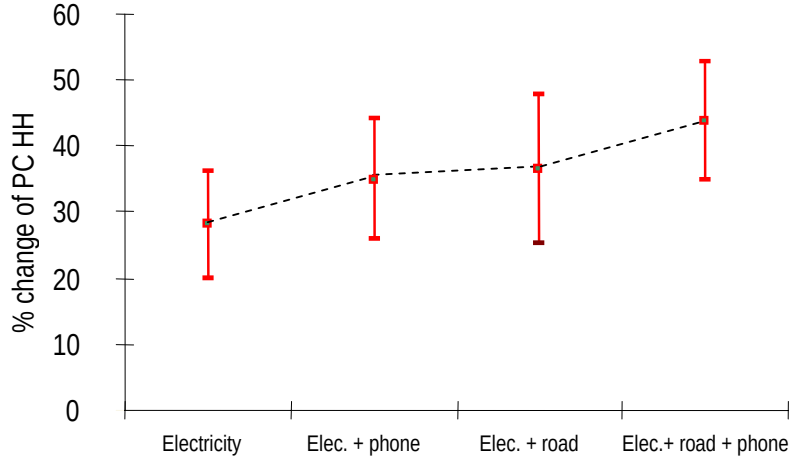
Figure 4: Road infrastructure in Africa



Source: M. Torero (IFPRI) 2006.

What is less well understood, however, is the interaction effect between different types of infrastructure investments and how they can efficiently reduce the major barriers to rural-urban linkages. To that end, one study looking at the complementarities of investments in multiple types of rural infrastructure in Bangladesh found that the effect on household welfare can be more than the sum of the individual impacts, and even multiplicative in some cases (Figure 5; Chowdhury and Torero 2007; and see also Escobal and Torero 2005 for rural Peru). This suggests that providing different types of infrastructure simultaneously rather than individually can potentially strengthen the welfare and poverty-reducing gains of rural infrastructure provision. As such, optimal investment in rural-urban linkages entails complex bundles of infrastructure components.

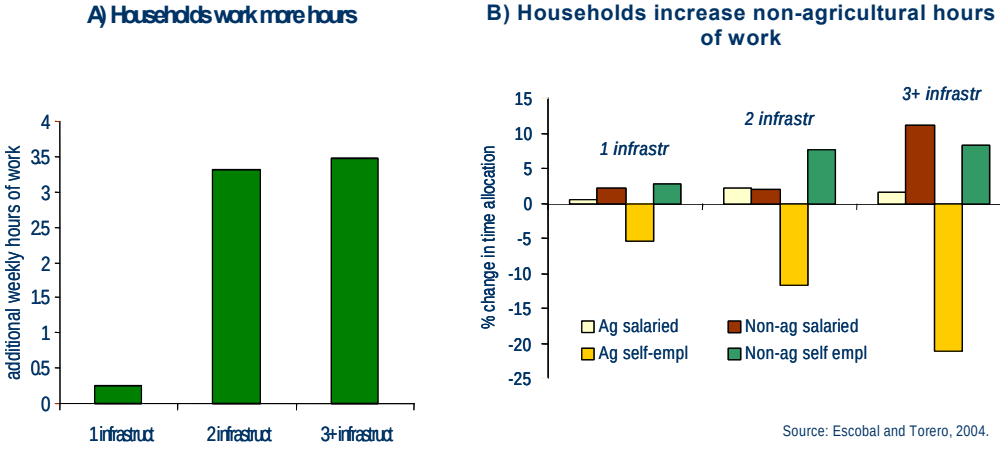
Figure 5: Investment complementarities in rural Bangladesh



Source: Chowdhury and Torero 2007.

Moreover, and in addition to the direct impacts, it is important to understand that there are three possible channels through which improvements in access to infrastructure may indirectly affect rural and urban linkages. First is the impact of changes on the proportion of working hours allocated to different activities—specifically shifts in labor devoted to agricultural and nonagricultural activities given that access to better-quality infrastructure (e.g., electricity) leads to greater opportunities for nonfarm work activities and therefore higher interlinkages with rural areas. The second channel captures the effect of changes in the household's total working hours as a result, for example, of longer hours of access to electricity (see Figure 6 for the case of Peru, and similar results hold for Bangladesh; Chowdhury and Torero 2007). Finally, there is scope for increases in rural households' market efficiency as their purchasing power is bolstered by reduced transportation costs or reduced information asymmetries through access to phones. In this line, the third channel captures changes based on returns to labor (that is, hourly wages) allocated to agricultural and nonagricultural activities. Specifically, in the case of agricultural activities, this will be directly related to prices of their products. These three linkages do not yet include the benefits from linkages through access to services, such as health and education.

Figure 6: Indirect effects of access to infrastructure in Peru
(Propensity score matching (kernel); control group: households with no assets)



Source: Escobal and Torero, 2004.

Market institutions

In developing countries, particularly the low-income ones, market failures such as deficiencies in information and lack of regulation and legal enforcement mechanisms persist and restrict the level of trade between different spaces (Gabre-Madhin 2001). As such, developing adequate market institutions and strengthening them are essential to facilitating spatial flows.

As globalization evolves, the consumer-driven agri-food chain is becoming more integrated, incorporating more small farmers through arrangements such as producer-marketing cooperatives, which facilitate horizontal cooperation, and contract farming, which facilitate vertical cooperation. Such arrangements can substantially boost the income of poor rural households by helping reduce transaction costs and variability in prices of agricultural products. Additionally, such arrangements give farmers better access to produce markets and to technological innovations in agriculture. A study looking at the impact of a large Ethiopian dairy cooperative on the commercialization of smallholders found that, on average, farmers in cooperatives had better market access, higher productivity, and better-quality milk relative to individual farmers (Francesconi and Ruben 2007). However, such arrangements are usually information intensive and require adequate legal frameworks and organizational capacity. Thus, to maximize the potential gains for farmers from integration within the globalized agri-food system, it is necessary to provide farmers access to communications technologies, as well as training and capacity building. An opportunity here is in commodity exchanges appropriately adapted to the

infrastructure and institutional environments of low-income countries. In addition, access to insurance and credit in rural areas are can potentially prevent "stress migration." Thus, development of these markets, for instance, fostered by transaction-cost-cutting ICTs, can have efficient gains in labor markets. In relation to migration and increased receipts of remittances in rural areas, investment opportunity outlets and enhanced banking and savings institutions need to be developed in many countries.

Policies facilitating rural transformation

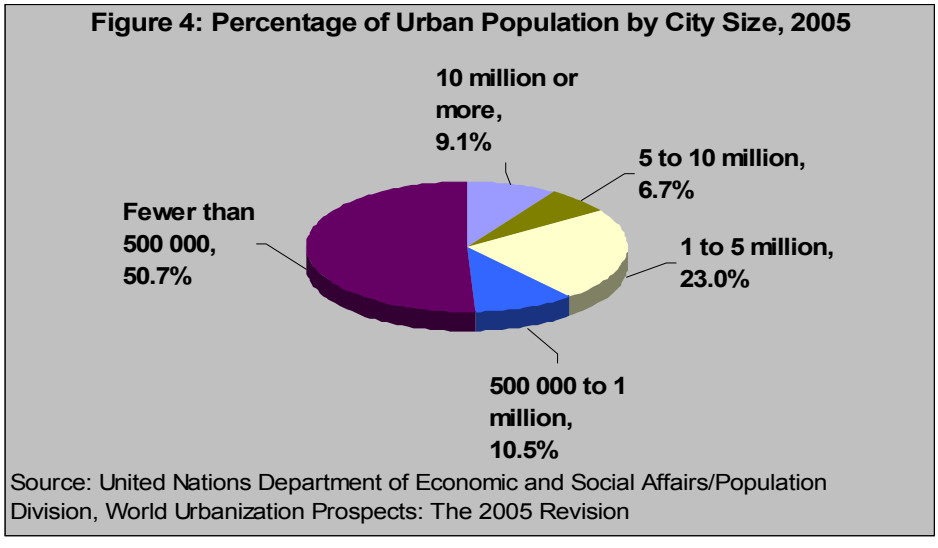
Diversification of rural economies

The development paths taken by many countries have shown that it is inaccurate to simply associate *urban* with *industry* and *rural* with *agriculture.* As stated earlier, rural economic activities outside the agricultural sector are a major source of income and employment, and therefore the rural nonfarm sector is an important contributor to economic growth and poverty reduction during the economic transformation of many developing countries. Rural nonfarm activities are especially important in countries where landlessness prevails, offering the rural poor important economic alternatives to traditional land-dependant activities. However, the ability of the rural nonfarm sector to absorb part of the agricultural labor force is limited.

Development of small towns

The majority of urban dwellers in developing countries do not live in a megalopolis but rather in medium-sized cities (Figure 7). Consequently, small and medium-sized towns play an important role as an intermediary point along the rural-urban continuum, linking and benefiting both rural and urban areas through consumption, production, and employment patterns as well as various types of economic and social provisions (e.g., Satterthwaite and Tacoli 2003; Wandschneider 2004).

Figure 7: Percentage of urban population by city size, 2005



Source: UNDESA, World urbanization prospects: The 2005 revision.

More specifically, small and medium-sized market towns and cities are extremely important to the economic activities of rural households because they provide the economic space for rural households both to purchase their inputs and household items as well as to sell their final products at local markets, thereby linking rural producers to the national and global economy. For example, apart from remittances, rural households in Ethiopia were found to have few direct links to more distant urban centers or the capital, with intermediary cities being the main urban locations where rural households undertook economic activities (Hoddinott and Dercon 2005). Consequently, the development of small and medium-size town infrastructure has the potential to lower transportation costs and improve access to markets for both urban and rural consumers and producers. Small towns can also serve as a stepping-stone or an end point for rural residents seeking opportunities outside of the agricultural sector by absorbing some of the agricultural labor, thereby alleviating the pressure put on already congested metropolitan centers while at the same time contributing to the growth of the national economy and transformation of agriculture.

Furthermore, many higher-level rural services in health and education depend on urban locations. Access to such services depends on infrastructure that links rural and urban areas. This affects, for instance, access to secondary education, and much of rural areas' more complex health services are delivered through small and medium-size towns' hospitals and clinics. For instance, people gain access to TB and

ARV (HIV/AIDS) treatment in eastern Africa mainly in towns through hospitals, and today in some countries access to treatment because of the cost of transportation is more of an issue than is treatment availability and the price of the drugs. This specific example of HIV/AIDS-related rural-urban linkages is of a two-way nature over time: whereas the source of the disease was at first largely urban and along transregional infrastructure axes (transit roads), the disease later became more rural; and the secondary feedback now is about the linkages in the health services, as access to such services requires well-functioning rural-urban linkages. Otherwise, access to treatment at the urban health system is impaired.

4. Conclusions and research implications

The paper highlights the need for new attention to the spatial dimensions of development and to rural-urban linkages for inclusive growth—that is, growth that includes rural areas and the poor. The nature of such "attention" by policy and advisory communities includes

- distinguishing the various types of dynamic flows that exist between rural and urban spaces;
- reviewing the transaction costs of all economic activities between rural and urban areas with an eye toward their optimal reductions; and
- focusing on the nontrivial positive and negative externalities of spatial allocation and concentration of economic activities, including services supporting them.

We have emphasized four *types of public policy actions* that are crucial for enabling better rural-urban linkages:

1. Scaling up of innovation in agriculture and along the whole value chain
2. Scaling up of transport and communications infrastructure toward optimal densities
3. Development of market institutions, including labor markets, that enable the participation of rural areas and the poor in the national economy
4. Reduction of policy barriers to productive rural-urban linkages and services in decentralized political systems

One must keep in mind that policy and investment priorities for fostering rural-urban linkages cannot be "one size fits all." They much depend on initial conditions and require a dynamic analytical framework. These policy issues pose new *challenges for research:*

1. Much progress has been made in regionally disaggregated analysis and economic modeling. Integration of spatial analysis through, for example, the use

of GIS technologies can be useful to the visualization and understanding of changing realities (Wood et al. 1999). Many of the economic models on which the rural-urban framework is based are static, simplistic and do not take into consideration spatial realities such as agro-ecological conditions and growth potentials.[11]

2. The development analyses of practitioners need a broader perspective, too. Agriculture programs should not be planned and evaluated in isolation from infrastructure—the planned incremental output may go nowhere. And vice versa, infrastructure investment, say, roads should not be planned and evaluated in isolation from agriculture investments—the road might lead to nowhere.
3. In addition, historical, social, and cultural settings, as well as the types of institutions governing space, need consideration (Martin 2003). Blending aggregate modeling with information systems that capture local knowledge is a challenge. Sector-specific and domain-oriented economic research (e.g., agriculture economics, infrastructure economics, and services-related economics research) needs to come together to address the opportunities of rural-urban linkages jointly.

[11] One already promising approach for improved evaluation of the spatial alignment of development strategies with the distribution of key determinants of the comparative advantage of locations, is that of "development domains" (Pender et al. 1999, Wood et al. 1999, Omamo et al. 2007, Chamberlin et al. 2006). Development domains are constructed by the intersection of three spatial variables; agricultural potential, market access, and population density, using a geographic information system (GIS). Though the current evolution and application of development domains has focused on evaluating rural development strategy options, their use could readily be expanded to incorporate urban spaces in a consistent and simultaneous manner (e.g., by adding one or more complementary spatial variable that reflects the likely potential for economic activities other than agriculture).

References

Adelman, I. 2001. “Fallacies in Development Theory and Their Implications for Policy”, In *Frontiers of Development Economics: The Future in Perspective* ed. Meier, G.M. and Stiglitz, J.E.; The World Bank & Oxford University Press, Washington DC & Oxford, pp. 103-134

Agarwal, P. 2007. Walter Christaller: Hierarchical Patterns of Urbanization. *http://www.csiss.org/classics/content/67*.

Barrett, C. B., T. Reardon, and P. Webb. 2001. Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. *Food Policy* 26: 315–31.

Chamberlin, J., J. Pender, and B. Yu. 2006. Development domains for Ethiopia: Capturing the geographical context of smallholder development options. DSGD Discussion Paper no. 43. Washington, D.C.: International Food Policy Research Institute.

Chowdhury, S., A. Gulati, and E. Gumbira-Said. 2005. High-value products, supermarkets, and vertical arrangements in Indonesia. Markets Trade and Institutions Division Discussion Paper no. 83. Washington, D.C.: International Food Policy Research Institute.

Chowdhury, S., and M. Torero. 2007. Urban rural linkages in Bangladesh: Impact of infrastructure and the food value chain on livelihoods and migration of landless households, women in the Northwestern region. International Food Policy Research Institute. Discussion paper (forthcoming)

CSA, EDRI, and IFPRI (Central Statistical Agency of the Federal Democratic Republic of Ethiopia, Ethiopian Development Research Institute, and International Food Policy Research Institute). 2006. *Atlas of Ethiopian Rural Economy.* Addis Ababa and Washington, D.C.: CSA and IFPRI.

de Brauw, A. and T. Harigaya. 2007. Seasonal migration and improving living standards in Vietnam. *American Journal of Agricultural Economics* 89 (2): 430–47.

de Ferranti, D., G. Perry, W. Foster, D. Lederman, and A. Valdés. 2005. *Beyond the city: The rural contribution to development.* World Bank Latin American and Caribbean Studies. Washington, D.C.: World Bank.

Deshingkar, P. 2005. How rural is rural? ODI Opinions no. 52. London: Overseas Development Institute.

Diao, X., B. Fekadu, A. S. Taffesse, K. Wamisho, and B. Yu. 2007. Agricultural growth linkages in Ethiopia: Estimates using fixed and flexible price models. IFPRI Discussion Paper no. 00695. Washington, D.C.: International Food Policy Research Institute.

Eastwood, R., and M. Lipton. 2004. Rural and urban income inequality and poverty: Does convergence between sectors offset divergence within them? In *Inequality, growth, and poverty in an era of liberalization and globalization,* ed. G. A. Cornia. Oxford, England: Oxford University Press.

Escobal, J., and M. Torero. 2005. Measuring the impact of asset complementarities: The case of rural Peru. *Cuadernos de Economía* 42 (Mayo): 137–64.

Faminow, M. D., and B. L. Benson. 1990. Integration of spatial markets. *American Journal of Agricultural Economics* 72 (1): 49–62.

Fan, S., and C. Chan-Kang. 2005. Road development, economic growth, and poverty reduction in China. IFPRI Research Report no.138. Washington, D.C.: International Food Policy Research Institute.

Fan, S., C. Chan-Kang, and A. Mukherjee. 2005. *Rural and urban dynamics and poverty: Evidence from China and India*. Washington, D.C.: International Food Policy Research Institute.

Francesconi, G. N, and R. Ruben. 2007. Impacts of collective action on smallholders' commercialisation: Evidence from dairy in Ethiopia. Paper prepared for presentation at the I Mediterranean Conference of Agro-Food Social Scientists, 103rd EAAE Seminar: Adding Value to the Agro-Food Supply Chain in the Future Euro-Mediterranean Space, April 23–25, Barcelona.

Gabre-Madhin, E. 2001. Market institutions, transaction costs, and social capital in the Ethiopian grain market. Research Report no. 124. Washington, D.C.: International Food Policy Research Institute.

Gajwani, K., R. Kanbur, and X. Zhang. 2006. Comparing the evolution of spatial inequality in China and India: A fifty-year perspective. Development Strategy and Governance Division Discussion Paper no. 44. Washington, D.C.: International Food Policy Research Institute.

Garrett, J. 2005. *Beyond rural urban: Keeping up with changing realities.* Washington, D.C.: International Food Policy Research Institute.

Gallup, J., and J. Sachs. 1998. Geography and economic development. In *Annual World Bank Conference on Development Economics, 1998,* ed. B. Pleskovic and J. Stiglitz. Washington, D.C.: World Bank.

Haggblade, S., P. B. R. Hazell, and T. Reardon, eds. 2007. *Transforming the rural nonfarm economy.* Baltimore: Johns Hopkins University Press, forthcoming.

Harris, J., and M. Todaro. 1970. Migration, unemployment, and development: A two-sector analysis. *American Economic Review* 60 (1): 126–42.

Hazell, P. B., and A. Röell. 1983. Rural growth linkages: Household expenditure patterns in Malaysia and Nigeria. Research Report no. 41. Washington, D.C.: International Food Policy Research Institute.

Hirschman, A. D., 1958. *The Strategy of Economic Development.* New Haven, Conn.: Yale University Press.

Hoddinott, J., and S. Dercon. 2005. Livelihoods, growth, and links to market towns in 15 Ethiopian villages. Food Consumption and Nutrition Division Discussion Paper no. 194. Washington, D.C.: International Food Policy Research Institute.

Jimenez, E. 1995. Human and physical infrastructure: Public investment and pricing policies in developing countries. In *Handbook of development economics,* vol. 3, ed. J. Behrman and T. N. Srinivasan. Amsterdam: North-Holland.

Kherallah, M., C. Delgado, E. Gabre-Madhin, N. Minot, and M. Johnson. 2002. *Reforming agricultural markets in Africa*. Baltimore: Johns Hopkins University Press for IFPRI.

Krugman, P. 1991. Increasing returns and economic geography. *Journal of Political Economy* 99 (3): 483–99.

———. 1999. The role of geography in development. In *Annual World Bank Conference on Development Economics, 1998,* ed. B. Pleskovic and J. Stiglitz. Washington, D.C.: World Bank.

Lipton, M., and M. Ravallion. 1995. Poverty and policy. In *Handbook of Development Economics*, vol. 3, ed. J. Behrman and T. N. Srinivasan. Amsterdam: North-Holland.

Lösch, A. 1954. The economics of location. New Haven, Conn: Yale University Press. (Originally published 1939).

Martin, R. 2003. Putting the economy in its place: Economics and geography. Paper presented at the *Cambridge Journal of Economics* Conference, Economics for the Future: Celebrating 100 Years of Cambridge Economics, September.

McGranahan, G., D. Satterthwaite, and C. Tacoli. 2004. Rural-urban chance, boundary problems, and environmental burdens. Working paper series on rural-urban interactions and livelihoods strategies. Working Paper no. 10. London: International Institute for Environment and Development.

McGregor, D., D. Simon, and D. Thompson, eds. 2006. *The peri-urban interface: Approaches to sustainable natural and human resource use.* London: Earthscan.

Mellor, J. W., ed. 1995. *Agriculture on the road to industrialization*. Baltimore: Johns Hopkins University Press for IFPRI.

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC.

Mogues, T., G. Ayele, and Z. Paulos. 2007. The bang for the Birr: Public expenditure and rural welfare in Ethiopia. IFPRI Discussion Paper no. 00702. Washington, D.C.: International Food Policy Research Institute.

Omamo, S. W., X. Diao, S. Wood, J. Chamberlin, L. You, S. Benin, U. Wood-Sichra, and A. Tatwangire. 2006. Strategic priorities for agricultural development in Eastern and Central Africa Research Report no. 150. Washington, D.C.: International Food Policy Research Institute.

Pardey, P. G., J. M. Alston, and R. R. Piggott, eds. 2006. Shifting ground: Agricultural R&D worldwide. Issue Brief no. 46. Washington, D.C.: International Food Policy Research Institute.

Pender, J. L., F. Place and S. K. Ehui. 1999. Strategies for sustainable agricultural development in the East African highlands. EPTD Discussion Paper no. 41. Washington, D.C.: International Food Policy Research Institute.

Porter, Michael E. 1998. "Clusters and the new economics of competition." *Harvard Business Review,* 76 (Nov.-Dec.), pp. 77-90.

Quisumbing, A., and S. McNiven. 2005. Migration and the rural-urban continuum: Evidence from the rural Philippines. FCND Discussion Paper no. 197. Washington, D.C.: International Food Policy Research Institute.

Ravallion, M., S. Chen, and P. Sangraula. 2007. The urbanization of global poverty. Background paper prepared for the World Bank's *World development report, 2008.* Washington, D.C.: World Bank.

Ricardo, D. 1951. An essay on the influence of a low price of corn on the profits of stock. In The *Works and correspondence of David Ricardo: Volume IV, pamphlets and papers 1815-1823*, (reprinted from 1815), ed. Pierro Sraffa. Cambridge: Cambridge University Press.

Satterthwaite, D., and C. Tacoli. 2003. The urban part of rural development: The role of small and intermediate urban centres in rural and regional development and poverty

reduction. Rural-Urban Working Paper no. 9. London: International Institute for Environment and Development.

Schiff, M., and A. Valdés, 1992. *The Plundering of Agriculture in Developing Countries.* Washington DC: The World Bank, 1992.

Stark, O., and D. E. Bloom. 1985. The new economics of labor migration. *American Economic Review* 75 (2): 173–78.

Thanh, H. X., D. N. Anh, and C. Tacoli. 2005. Livelihood diversification and rural-urban linkages in Vietnam's Red River Delta. Food Consumption and Nutrition Division Discussion Paper no. 193. Washington, D.C.: International Food Policy Research Institute.

Torero, M. 2007. New conceptual issues relevant for market research. Presented at the International Food Policy Research Institute, Washington, D.C., June 17.

Torero, M., and J. von Braun. 2006. *Information and communication technologies for development and poverty reduction*. Washington, D.C.: International Food Policy Research Institute.

UNDESA (United Nations Department of Economic and Social Affairs). 2006. World population prospects: The 2006 revision and World urbanization prospects: The 2005 revision. Online access http://esa.un.org/unpp (last accessed May 22, 2007).

Van de Walle, D. 1996. *Infrastructure and poverty in Viet Nam.* Washington, D.C.: World Bank.

Venables, A. 1996. Trade policy, cumulative causation, and industrial development. *Journal of Development Economics* 49 (l): 179–98.

Virchow, D., and J. von Braun, eds. 2000. *Villages in the future: Crops, jobs, and livelihood*. Heidelberg and New York: Springer.

von Braun, J. 2005. Agricultural economics and distributional effects. *Agricultural Economics* 32 (s1), 1–20. Malden, Mass.: Blackwell for IAAE.

von Braun, J., and R. Pandya-Lorch, eds. 1991. Income sources of malnourished people in rural areas: Microlevel information and policy implications. Working Paper on Commercialization of Agriculture and Nutrition no. 5 (May). Washington, D.C.: International Food Policy Research Institute.

von Thunen, J. H. 1826. *The Isolated State*. Jena: Gustav Fischer.

Waverman, L., Meschi, M. and M. Fuss. 2005. *The Impact of Telecoms on Economic Growth in Developing Countries*. Vodafone Policy Paper Series, Number 2.

Wood, S., K. Sebastian, F. Nachtergaele, D. Nielsen, and A. Dai. 1999. Spatial aspects of the design and targeting of agricultural development strategies. EPTD Discussion Paper no. 44. Washington, D.C.: International Food Policy Research Institute.

World Bank. 2005. *World development report, 2006: Equity and development.* New York: Oxford University Press.

———. 2006. *World development indicators, 2006*. Washington, D.C.

———. 2007. PovcalNet Database. Washington, D.C. Online access http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp (last accessed May 2, 2007).

Industry, Trade, Finance and Development

MEASUREMENT AND SOURCES OF TECHNICAL INEFFICIENCY IN ETHIOPIAN MANUFACTURING INDUSTRIES

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Abstract

The inability of firms to operate at full capacities, the low levels of manufactured exports and the decline of labour and capital productivities for the past ten years are some reflections of technical inefficiencies among the Ethiopian manufacturing industries. In light of this, the level of technical efficiencies and factors that are attributable to the existing level of technical inefficiencies are investigated simultaneously using a panel data of 361 firms which are categorized under nine industrial groups during the study period, i.e. 1998-2002. The predicted technical efficiencies for each sub-sector are estimated by panel data model developed by Battese and Coelli (1995) using the maximum likelihood estimation technique indicating that there exists technical inefficiency among the firms in each sub-sector and the mean technical efficiencies are ranged from 62 to 80 percent. Generally, firm size, ages of a firm, type of ownership, firm's location around Addis Ababa and the amount of incentive paid to workers are found to be important variables in explaining the variation in technical efficiencies among the firms. Moreover, firm size and age of a firm tended to have a non-linear relationship with the level of technical inefficiency for most sub-sectors. The result of the study also indicated that the technical efficiency of firms was decreasing during the study period for most sub-sectors, except for textile and chemical industries.

Keywords: Ethiopian manufacturing industries, Technical efficiency, Stochastic frontier production functions.

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1. Introduction

The low level of economic development in Ethiopia has been caused by a poor performance of industrial activities and the dominance of agriculture over other sectors. The contribution of industry, particularly manufacturing industry[2], to the overall national income is one of lowest in the world. In 2003/04, the contribution of industry, composed of manufacturing, construction, mining and electricity, was only about 11.4% of the GDP and that of manufacturing sector was only about 6.4% of the GDP. On the contrary, the industrial sector had an average share of about 29% and 28% from GDP of Sub Saharan African countries and the world in 2003, respectively which depicts that Ethiopia is one least industrialized economy in Sub-Saharan Africa and in the world at large, where the primary sector still holds a dominant share (EEA, 2005).

Over the past two decades, the growth of the industrial sector was insignificant. Between 1991/92 and 2003/04, the sector was growing, on average, by 6.1% per annum. A similar rate was recorded by the manufacturing sector, whereby it grew at an average rate of 7.1% per annum within the specified period. Moreover, the dwarf manufacturing sector generated a value added (at factor cost) worth less than US dollars 300 million annually - the maximum recorded being US dollars 280 million in 2001. This implies a per capita production of less than five dollars per year, and hence the inevitable dependence on imports for even basic manufactured goods. Moreover, being dependent on agriculture and imports for its inputs, growth over the years has been marked by a cycle of fluctuation (EEA, 2004).

Regarding the structural linkages of the manufacturing sector with the rest of the domestic economy, internally loose as well as unbalanced forward and backward linkages with other economic sectors characterized it. In terms of raw material inputs, the manufacturing sector is more linked to the external economy than to its own and the rest of the domestic economy. According to EEA (2004), the degree to which the manufacturing sector satisfies its raw material demand from internal sources is about 55 percent, depending on the external sector for nearly the remaining half. The problem is more serious when we consider the linkage with the agricultural sector in which the domestic manufacturing sector supplied only 1.3% of the manufactured goods demand of the agricultural sector. Assessing the manufacturing sector in terms of employment creation, the sector employed about 94,310 Ethiopians in 2001, which was only 2.7 percent of the total employment in the overall manufacturing sector

[2] In this study Manufacturing Industry refers to those large and medium scale manufacturing industries which use power driven machinery and employ 10 persons and above, according to Central Statistical Agency (CSA) definition.

(medium and large scale, small scale, cottage and the informal) sector of the country (CSA, 2001).

Overall, the Ethiopian manufacturing industry is characterized by poor performance in terms of employment creation, in terms of contribution to the overall national income, in terms of the type of goods produced, and so on. It is widely believed that one of the major reasons for this poor performance is the low level of productive efficiency of the sector.

One of the signals for the low level of efficiency is the change in the total number of firms after the reform in 1991 when compared with the size of employment. According to EEA (2004), despite the fact that the total number of firms has increased in this period, labour employment has not shown almost any change. The likely reason suggested for the poor growth in employment is that firms are not operating at their full capacities, which is highly related with the inefficiency among the manufacturing industries. During early 2000's, the Ethiopian manufacturing industries are producing at half of their capacities, which also lead to poor resource utilization and lower level of production according to various CSA publications.

The low level of manufactured exports and its insignificant contribution to the country's foreign exchange earnings is a reflection of the inefficiency of the sector. According to EEA (2004), from 1996-2002, the share of the manufactured export to the total exports of the country figured, on average, only about 10 percent. The overwhelming majority of manufacturing firms produce for domestic consumption which is due to, at least partly, the lack of competitiveness of the sector in the international markets, which in turn is due to the low level of efficiency within the firms.

According to the same report, the productivities of labour and capital have been declining from time to time. For instance, between 1996 and 2002, labour productivity has declined from 4,580 dollars per worker per year to 3,460 dollars. Over the same period, it has declined on average by 3.6 percent per annum. The same is true for capital productivity whereby within the same period it has declined from 1,080 dollars per unit of capital to 540 dollars. It is obvious that, at least, in the case of industries where productivities are not only low but also declining, competition even in the domestic market would be relatively very difficult. This fall in productivity also implies increasing unit cost of production and deterioration in efficiency.

In view of this, the study generally aims at measuring the technical [In] efficiency in each of the industrial groups and to show if there are possibilities to increase output

in the sector without changing the existing level of inputs and technology environment. More specifically, it assesses the determinants of technical [In]efficiency in the Ethiopian Manufacturing Industries and look into whether each industrial group has improved its technical efficiency overtime.

At large, the study tests two hypotheses: 1)The Ethiopian manufacturing industries are characterized by technically inefficient way of production so that the conventional (average) production function is not an appropriate production function to represent the production technology of each industrial group and 2) the inefficiency within each of the industrial group is attributable to their firm specific characteristics.

The rest of the paper is organized as follows: Section two reviews thoroughly the fundamentals of technical efficiency and its measurement techniques. The data and the methodology employed are discussed in section three. In section four, the empirical results are presented, followed by the conclusion and policy recommendations in section five.

2. Analytical Framework

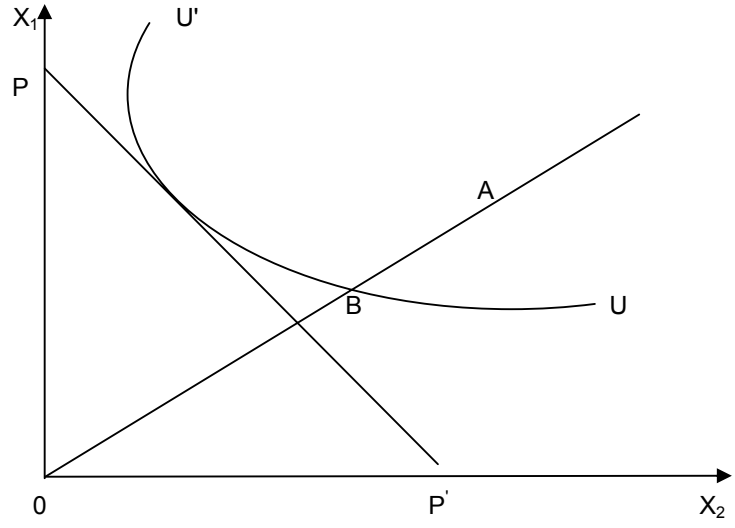
2.1 The Concept of Technical Efficiency

The issue of technical efficiency has received considerable attention due to, among other things, its output augmenting or input conserving impacts. Technical efficiency is defined as the ability of a firm to produce a certain level of output with a given level of inputs. A producer is said to be technically inefficient 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 efficient industry could produce the same output with less of at least one input, or could use the same inputs to produce more of at least one output. Farrell (1957) also noted that if economic planning is to concern itself with particular firms, it is important to know how far a given firm can be expected to increase output by simply increasing its efficiency, without absorbing further resources. Therefore, technical efficiency is considered an important determinant of productivity growth and international competitiveness in any economy. It is also considered an important factor, which contributes to the stability of production.

Assuming a firm with a known frontier production function which exhibits constant returns to scale and which uses only two inputs X_1 and X_2 to produce output Y, the

concept of technical efficiency is further elaborated through graphing the frontier as the efficient unit isoquant *UU'* as shown in Fig. 1 below:

Figure 1: Technical Efficiency



Source: Jha, R. and Sahin, B.S. (1993)

Suppose a firm uses quantities of inputs, defined by point A, to produce a unit of output. The technical inefficiency of that firm could be represented by BA, which is the proportional reduction in all inputs that could theoretically be achieved without any reduction in level of output produced. This is usually expressed in percentage terms by the ratio $\frac{BA}{OA}$. The technical efficiency (TE) of a firm is then given by:

$$TE_i = \frac{OB}{OA} \qquad \textbf{(1)}$$

It will take a value between zero and one, and hence provides an indicator of the degree of technical inefficiency of a firm. A value of one indicates the firm is fully technically efficient. For instance, at point B the firm is technically efficient because it lies on the efficient isoquant. Hence, points on the frontier are efficient points while those above the frontier are inefficient.

If the production frontier of the firm were known, the technical inefficiency of any particular firm could be assessed by comparing the position of the firm relative to the frontier. In practice, however, only observations of the input levels employed and the output levels achieved are available from which the production frontier must be empirically constructed. This leads to the measurements and associated econometric models for analyzing technical efficiency.

2.2 The Measurement of Technical efficiency

Frontier Approaches for Efficiency Measurement

Although there are different approaches[3] for measuring the efficiency of firms, frontier approaches are the widely applicable methods for efficiency measurement. Moreover, frontier production functions have been the subject of considerable econometric research during the last two decades. The development of frontier approach opened wide range improvements in the area of measuring of efficiency (Forsund et al., 1980). The word frontier may meaningfully be applied either to the maximum possible output which can be produced from given quantities of a set of inputs or the minimum level of cost at which it is possible to produce some level of output, given input prices or the maximum profit that can be attained given output and input prices. Currently, the frontier function is widely utilized to analyze efficiency for a variety of reasons. First, it is consistent with the underlying economic theory of optimizing behavior. Second, deviations from a frontier have a natural interpretation as a measure of the level of efficiency with economic units pursues their technical or behavioral objectives. Third, information about the structure of the frontier and about the relative efficiency of economic units has many implications (Bauer, 1990) (Cited in Awoke, 2001).

Frontier approaches are mainly composed of two components: deterministic and stochastic. Further, deterministic frontiers are sub-divided into non-parametric, parametric and statistical frontiers.

Deterministic Non-Parametric Frontiers

According to Forsund et al. (1980) the starting point for any discussion of frontiers and efficiency is the work of Farrell (1957), who provided definitions and a computational framework for technical and allocative inefficiencies. Farrell's approach is non-parametric in the sense that he simply constructs the free disposal convex hull

[2] Other approaches include techniques like partial and total productivity, production function and profit function for efficiency measurement.

of the observed input-output ratios by linear programming techniques. This is thus supported by a subset of the sample with the rest of the sample points lying above it. This procedure is not based on any explicit model of the frontier or the relationship of the observations to the frontier. The technical inefficiency of an observation is then measured relative to this frontier.

The principal advantage of this model is that no functional form is imposed on the data. However, it has two major weaknesses: First, its assumption of constant returns to scale is restrictive, and its extension to non-constant returns to scale technologies is cumbersome. Second, the frontier is computed from a supporting subset of observations from the sample, and is therefore particularly susceptible to extreme outliers and measurement error (Forsund et al., 1980).

Because of the advantage, this approach is extended, proved and applied by Farrell and Fieldhouse (1962), Seitz (1970, 1971), Todd (1971), Afriat (1972), Dugger (1974) and Meller (1976) (cited in Forsund et al., 1980).

Deterministic Parametric Frontiers

Although the first Farrell's non-parametric approach has won few adherents, a second approach, which is also proposed by him, was proved to be more fruitful. He proposed computing a parametric convex hull of the observed input-output ratios to determine a production function that obeys constant returns to scale. He recommended the Cobb- Douglas from for the sake of expressing the frontier in a simple mathematical form. Although the mathematical expression of the Cobb-Douglas from is simple, Farrell was aware of the unnecessary assumption of constant returns to scale. Unfortunately, Farrell did not follow up on his own suggestions, and it was over a decade before anyone else did it.

Aigner and Chu (1968) were the first to follow Farrell's suggestion. They specified a homogenous Cobb-Douglas production function and required all observations to be on or beneath the frontier. Their model is specified as:

$$\ln Y = \ln f(x) - U \qquad \textbf{(2)}$$

$$\ln Y = \alpha_0 + \sum_{i=1}^{n} \alpha \ln X_i - U, \quad U \geq 0$$

Where Y_i is the i-th firm output; $f(X)$ is a suitable functional from (e.g. Cobb-Douglas or translog) of inputs vector X_i for the i-th observation and of α is a vector

unknown parameters, and U_i is firm specific technical inefficiency which forces Y to be less than or equal to $f(X)$.

The elements of the parameter vector $\alpha = (\alpha_0, \alpha_1, \alpha_2, ..., \alpha_n)'$ may be estimated either by linear programming (minimizing the sum of the absolute values of the residuals, subject to the constraint that each residual be non-negative) or by quadratic programming (minimizing the sum of squared residuals, subject to the same constraint). Therefore, the technical efficiency of each observation can be computed directly from vector of residuals, since U represents technical inefficiency.

The principal advantages of the parametric approach over the non-parametric approach are the ability to characterize frontier technology in a simple mathematical form and the ability to accommodate non-constant returns to scale. This does not mean that the parametric approach is free from shortcomings. One of the shortcomings is that it imposes a limitation on the number of observations that can be technically efficient. For instance, when the linear programming algorithm is used in a homogenous Cobb-Douglas case, there will be only as many technically efficient observations as there are parameters to be estimated. The other limitation is, as in the case of non-parametric approach, the estimated frontier is extremely sensitive to outliers. The absence of statistical properties of the estimates is also another limitation of this approach. That is, mathematical programming procedures produce 'estimates' without standard errors, t-ratio, etc. This is because no assumptions are made about the regressors or the disturbances in (2), and without some statistical assumptions, inferential results cannot be obtained (Forsund et al., 1980).

Deterministic Statistical Frontiers

Making some assumptions can make deterministic parametric frontiers amenable to statistical analysis. It was Afriat (1972) who initially proposed this model. He developed a deterministic statistical model as follows:

$$Y_i = f(X)e^{-U} \quad \text{.....(3)}$$
$$\ln(Y_i) = \ln[f(x)] - U$$

Where Y_i, $f(X)$, X_i, and $U_i \geq 0$ are as defined in (2). From $U_i \geq 0$ it follows $0 \leq e^{-u} \leq 1$. In this model the observations on U are assumed to be independently and identically distributed (iid) and X is assumed to be exogenous (independent of

U). It should be stressed that the choice of a distribution of U is important because the maximum likelihood estimates (MLE) depend on it in a fundamental way, i.e., different assumptions for the distributions lead to different estimates.

Different people have proposed different distributions for U . For instance, Afriat (1972) proposed a two-parameter beta distribution for U and that the model be estimated by the maximum likelihood estimation technique. Richmond (1974) and Schmidt (1976) have proposed a gamma distribution and an exponential distribution for U , respectively (cited in Forsund et al., 1980).

The use of maximum likelihood in the frontier setting is not without weaknesses. The main weakness of this estimation technique is that there do not appear to be good a priori arguments for any of the distributions stated above. The other problem related with maximum likelihood is that the range of the dependent variable (output) depends on the parameters to be estimated which violates one of the regularity conditions invoked to prove the general theorem that maximum likelihood estimators are consistent and asymptotically efficient.

An alternative method of estimation is provided by Richmond (1974) (cited in Forsund et al., 1980) which is based on the ordinary least squares method, called Corrected Ordinary Least Squares (COLS). This method provides consistent estimates by shifting the COLS constant parameter estimate upward until no residual is positive. The difficulty with COLS technique is that, even after correcting the constant term, some of the residuals may still have the 'wrong' sign so that these observations end up above the estimated production frontier. This makes the COLS frontier a somewhat awkward for computing the technical efficiency of individual observations. Another difficulty with the COLS technique is that the correction to the constant term is not independent of the distribution assumed for U .

In addition to the above-mentioned difficulties related with estimation, deterministic statistical frontiers assume all firms share a common family of production, cost and profit functions, and all variations in firm performance is attributed to variations in firm efficiencies relative to the common family of frontiers. The notion of a deterministic frontier shared by all firms ignores the very real possibility of that a firm's performance may be affected by factors entirely outside its control (such as poor machine performance, input supply breakdowns, and so on), as well as by factors under its control (inefficiency). Therefore, to lump the effects of exogenous shocks together with the effects of measurement error and inefficiency in a single one-sided error term and to label the mixture 'inefficiency' is questionable.

Stochastic Frontiers

The stochastic frontier production function, which was independently proposed by Aigner, Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977), involves unobservable random variable associated with the technical inefficiency of production of individual firms in addition to the random error in deterministic statistical frontiers (Battese and Coelli, 1995). The error term in the stochastic frontier models is composed of a systematic component which captures the effects of measurement error, other statistical 'noise' or random 'shocks' outside the control of the production unit and a one-sided error component which captures the effects of inefficiency relative to the 'best' stochastic frontier. The presence of the variable, which captures a firm's inefficiency solves the bounded-range problem encountered in frontier model and the presence of the statistical noise allows the frontier to be stochastic.

The stochastic model may be written as:

$$Y_i = f(X,\alpha)\exp(V-U)\,..\qquad \textbf{.(4)}$$

Where $Y_i, X_i, \alpha, U_i \geq 0$, $f(X)$ as defined in (2) and V is the statistical 'noise'.

In this model, the stochastic production function is $f(X)\exp(V), V$ having some systematic distribution to capture the random effects of measurement error and exogenous shocks, which cause the placement of the deterministic part $f(X)$ to vary across firms. Technical inefficiency relative to the stochastic production frontier is then captured by the one-sided error component $\exp(-U), U > 0$. The condition $U > 0$ ensures that all observations lie on or beneath the stochastic production function.

The basic assumption of the model is that V and U are independent and X is exogenous. Using this assumption we can obtain direct estimates of the stochastic production frontier model using either maximum likelihood or COLS methods (Forsund et al., 1980). It is important to note that whether the model is estimated by maximum likelihood or by COLS, the distribution of U must be specified. Aigner et al., (1977) and Menusen and Van den Broeck (1977) considered exponential and half-normal distributions for U and Stevenson (1980) has shown how the half-normal and exponential distributions can be generalized to truncated normal and gamma distributions, respectively (cited in Forsund et al., 1980).

Many empirical studies involving both cross-sectional and time-series data have assumed that the firm effects have half-normal distribution (i.e., $\mu = 0$). If the value of μ is zero or negative, then the distribution of the firm effects is such that there is highest probability of obtaining firm effects in the neighborhood of zero. In this case, the majority of firms would have high technical efficiencies. However, if the value of μ is positive, then a relatively larger number of firms would have firm effects, which were significant positive values and such firms would have smaller values of technical efficiencies.

Until the early 1980's the major criticism towards stochastic frontiers was that there was no way of determining whether the observed performance of a particular observation compared with the deterministic frontier is due to inefficiency or to a random variation in the frontier. In other words, it was not possible to decompose individual residuals into their two components and to estimate technical inefficiency by observation. However, after the appearance of the paper by Jondrow, et al. (1982) a solution was suggested for the problem mentioned above. They suggested that the conditional distribution of U_i given E_i can be used to obtain an estimator of U_i since E_i contains information about U_i. They further suggested that either the mean or the mode of this distribution can be used as a point estimator on U_i and they showed how to derive these estimators given the distributions of U_i and V_i (Battese et al., 1989).

Stochastic frontier models have been applied to a variety of data sets because of their advantages over the deterministic frontiers through incorporating the two error components. Furthermore, the main attraction of the stochastic frontier model is the possibility it offers for a richer specification, particularly in the case of panel data. The model also allows for, among other things, a formal statistical testing of hypothesis and the construction of confidence intervals. Because of all these aspects, this model seems most attractive and this study employed the model using firm's panel data to predict technical efficiency.

Production Frontiers and Panel Data

The majority of previous empirical studies, which used frontier models, have been using cross-sectional data because of the assumption that error terms are independently distributed across observations. In addition, with cross-sectional data it is required to make parametric assumptions about the distribution of the residual and the inefficiency term in order to separate the residual from inefficiency. Schmidt and

Sickles (1984) indicated that stochastic frontier models using cross-sectional data suffer from three serious difficulties.

First, the technical inefficiency of a particular firm (observation) can be estimated but not consistently. We can consistently estimate the (whole) error term for a given observation, but it contains statistical noise as well as technical inefficiency. The variance of the distribution of technical inefficiency, conditional on the whole error term, does not vanish when the sample size increases.

Second, the estimation of the model and the separation of technical inefficiency from statistical noise require specific assumptions about the distribution of the technical inefficiency term (e.g., half- normal) and the statistical noise (e.g., normal). It is not clear how robust one's results are to these assumptions. Another way to emphasize this point is to note that the evidence of technical inefficiency is the skewness of the production function error, and not anyone will agree that skewness should be regarded as evidence of inefficiency.

Third, it may be incorrect to assume that inefficiency is independent of the regressors. If a firm knows its level of technical inefficiency, for example, this should affect its input prices.

All the three problems are potentially avoidable if one has panel data; say T observations on each of N firms. The technical inefficiency of a particular firm can be estimated consistently as $T \to \infty$. This is because adding more observations on the same firm yields information not attainable by adding more firms. The other advantage of panel data is that one need not make such strong distributional assumptions as are necessary with a single cross-section. Panel data also permits the simultaneous investigation of both technical change and technical efficiency change overtime, given that technical change is defined by an appropriate parametric model and the technical inefficiency effects in the stochastic frontier model are stochastic and have the specified distribution. As a result, more recently attention has been given to apply frontier production functions in the analysis of panel data on firms involved in production.

Different people have developed various types of panel data models in relation to stochastic frontier production functions. Among them, Schmidt and Sickles (1984) specified a model to measure stochastic frontier production function using panel data assuming the inefficiency to be time-invariant. Their model is written as:

$$Y_{it} = \beta_i + \sum_j \beta_j X_{jit} + V_{it} \qquad \textbf{(5)}$$

$$\beta_i = \beta_0 - U_i$$

Where $i(i = 1,2,...,N), t(t = 1,2,...,T)$ and $j(j = 1,2,...,K)$ represents firm, time and input respectively; Y_{it} is log of output, X_{it} is vector of log of inputs, V_{it} is the white noise component and U_i is the non-negative time-invariant technical inefficiency. The assumption of constant efficiency overtime presumes that weaknesses attributable to firms themselves are inherently in their very nature and their impact is invariant with time. The model can be estimated using the within estimator treating $U_i \geq 0$ as fixed. A dummy variable for each firm can be introduced to the model or OLS can be applied to the within transformed data. During this, the intercept will be recovered as the means of the residuals to each firm. The within estimator allows U_i and X to be correlated. The estimator of β_0 then can be obtained as the max (β_i). From this, it is apparent that $U_i (U_i = \beta_0 - \beta_i)$ will be zero at point where $\beta_0 = \beta_i$ and the corresponding firm in the sample is fully efficient.

The within estimator will not provide the estimated values of time-invariant regressor coefficients. The generalized least squares (GLS) and maximum likelihood estimator (MLE) methods give the estimates assuming the U_i, with some specific distribution, are random and uncorrelated to the regressors.

Cornwell et al., (1990) extended the generalized Schmidt and Sickles (1984) approach to relax the assumption of time-invariant on U_i by allowing time-varying efficiency for each firm. The model can be written as:

$$Y_{it} = \beta_{it} + \sum_j \beta_j X_{jit} + V_i \qquad \textbf{(6)}$$

$$\beta_{it} = \theta_{i1} + \theta_{i2} t + \theta_{i3} t^2$$

Within estimator, GLS or MLE methods can be applied to estimate the model. Firm specific effects, β_{it}, are regressed on a constant, time and time-squared. Their estimates will be consistent as T gets larger. The model allows the frontier intercept to vary overtime and the efficiency level to vary over firms and over time.
A more flexible formulation of technical inefficiency model for panel data was proposed by Kumbhakar (1990). It is written as:

$$Y_{it} = \beta_{it} + \sum_j \beta_j X_{jit} + V_{it} - U_{it} \quad \textbf{.(7)}$$

$$U_{it} = \gamma(t)U_i = (1 + \exp(bt + ct^2))^{-1} U_i$$

Where the firm effects are represented as a product of a deterministic part, $\gamma(t)$, which is an exponential function of time and a time-invariant random effect, U_i. Appropriate distributional assumption on the technical inefficiency component is needed in order to get the required estimates using MLE methods. The need for a restrictive distributional assumption on the technical inefficiency component is considered as the main disadvantage of the model.

Battese and Coelli (1992) developed a stochastic frontier production function model for panel data by expressing firm effects as a product of exponential function of time and time- invariant, U_i, as follows:

$$Y_{it} = \beta_0 + \sum_j \beta_j X_{jit} + V_{it} - U_{it} \quad . \quad \textbf{(8)}$$

$$U_{it} = \eta_{it} U_i = (\exp(-\eta(t - T)))U_i$$

Where η is an unknown parameter to be estimated and $U_i, i = 1,2,...,N,$ is independently and identically distributed non-negative random variable, obtained by truncation (at zero) of the normal distribution with unknown mean, μ, and unknown variance δ^2.

The advantage of this model is that if $\eta > 0$, then as t increases U_{it} will decrease monotonically which means that as the firm proceeds overtime, its inefficiency level monotonically decreases and the firm proceeds towards the frontier. Similarly, if $\eta < 0$, then inefficiency increases overtime. Therefore, the testable hypothesis offered by the model is that efficiency monotonically decreases or increases overtime. However, the hypothesis of fluctuating efficiency cannot be tested in this model.

In a similar approach, Battese and Coelli (1995) defined the technical inefficiency effect, U_{it}, in stochastic frontier model as:

$$U_{it} = Z_{it}\delta + W_{it} \quad .. \quad \textbf{(9)}$$

Where Z_{it} is a (1 X M) vector of explanatory variables associated with technical inefficiency of production of firms overtime; δ is an (M X 1) vector of unknown coefficients; and W_{it} are unobservable random variables, which are obtained by truncation of the normal distribution with mean zero and unknown variance, δ^2, such that the point of truncation is, $-Z_{it}\delta$ i.e., $W_{it} \geq -Z_{it}\delta$. These assumptions are consistent with U_{it} being a non-negative truncation of the $N(Z_{it}\delta, \delta^2)$.

This model is used in this study for the simultaneous estimation of the parameters of the stochastic frontier and the model for technical inefficiency effects using maximum likelihood estimation technique.

3. Data and Methodology

3.1 Source of Data and Coverage

The study uses firm level data on large and medium scale industries and the main source of data is the annual survey of large and medium scale manufacturing industries conducted by Central Statistical Authority (CSA). Both raw data and data from various statistical bulletins published by the authority are used in the study. Since the raw data set is in terms of value at current price, it is converted to constant price by deflating using appropriate deflators. An implicit sectoral deflator is used to deflate gross value of production, wages and salaries and industrial cost, while investment deflator is used to deflate capital (or fixed assets). The study covers those large and medium scale manufacturing industries at national level during the survey period 1998-2002.

In this study, among the manufacturing industries that are categorized under different industrial groups, nine industrial groups are considered in the study, which constitute about 89 percent of the total manufacturing industries in country. These industries together employed around 94 percent of the workers in the manufacturing sector. In terms of gross value of production, they produce around 88 percent of the total production in the sector. Furthermore, 99 percent of the capital of the sector is also employed in these industries (CSA, 2003). The grouping of the industries is based on two-digit ISIC (International Standard Industrial Classification) although the survey report of CSA follows both the two-digit and four-digit classifications.

The main criteria employed in delineating divisions and groups (the two-digit and four digit categories) include the characteristics of the activities producing units, which are strategic in determining the degree of the units and certain relationships in an

economy. The major aspects of the activities considered are the character of the goods and services produced, the uses to which the goods and services are put, the inputs, the process and the technology of production. In delineating the divisions of ISIC, attention was also given to the range of kinds of activities frequently carried out under the same ownership or capital control and to potential differences in scale and organization that exist between enterprises. Additional criteria used in establishing divisions and groups were the pattern of categories at various levels of classification in national classifications (UN, 1990).

Based on this United Nations criterion, the Ethiopian large and medium manufacturing industries are divided into different industrial groups of which 9 of them are included in this study as stated earlier. These include food processing, beverages, textile, leather, wood & furniture, paper & printing, chemical, rubber & plastics and non-metallic mineral industries. The selection of firms within each sub-sector is based on balanced panel data requirement such that those firms with complete observation and which are operational in the study period are covered.

The industrial groups, the number of firms considered in the study in the group and their respective share is reported in Table 1.

Table 1: Number of Firms Covered in the Study within Each Industrial Group

	Industrial Group	№ of Firms	Percent
1	Food Processing	84	23.27
2	Beverages	16	4.43
3	Textile	38	10.53
4	Leather	30	8.31
5	Wood and Furniture	58	16.07
6	Paper and Printing	39	10.80
7	Chemicals	32	8.86
8	Rubber and Plastics	21	5.82
9	Non-Metallic Minerals	43	11.91
	Total	361	100

Source: Author's Computation

3.2 Methodology

The panel data model developed by Battese and Coelli (1995) is used for measuring the technical efficiency of firms using a stochastic frontier production function. Provided the inefficiency effects are stochastic, the model also permits the estimation of both technical change in the stochastic frontier and time-varying technical inefficiencies. Moreover, the parameters of the stochastic frontier and the inefficiency

models can be estimated simultaneously, given appropriate distributional assumptions associated with cross-sectional data on the firms included in the study.

They formulated the stochastic frontier production model as follows:

$$Y_{it} = f(X_{it} : \beta) + E_{it} \qquad \textbf{(10)}$$

Where Y_{it} denotes the production at t-th observation $(t = 1,2,...,5)$ for the i-th firm $(i = 1,2,..,N)$, X_{it} is $(1XK)$vector of values of known functions of inputs of production and other explanatory variables associated with the i-th firm at the t-th observation, β is a $(KX1)$ vector of unknown parameters to be estimated, E_{it} is specified as $E_{it} = V_{it} - U_{it}$ where V_{it} is the statistical noise and U_{it} is technical inefficiency.

In the above model $f(X_{it} : \beta)$ represents a certain production technology, which could be specified as Cobb-Douglas (C-D), constant elasticity of substitution (CES), translog, etc. Nowadays, flexible functional forms such as the translog form are usually recommended rather than the restrictive Cobb-Douglas form. Furthermore, the translog function is the only one of the flexible functional form, which is readily used for direct estimation of the production function.

This study do not focus on the pros and cons of the two functional forms given above. Rather, the likelihood ratio test[4] is performed to identify which production technology will better represent the technology of each of the industrial group included in the study[5]. Therefore, the empirical models that we used for estimation of technical

[4] The likelihood ratio statistic, λ , is defined as follows:

$$\lambda = -2\ln[L(H_0)/L(H_1)] = 2[\ln L(H_1) - \ln L(H_0)]$$

Where $L(H_0)$ and $L(H_1)$ are the maximum values of the likelihood function over the null and alternative hypotheses, H_0 and H_1 respectively. If the null hypothesis that defines the constrained parameter space is true, then λ is asymptotically distributed as χ^2 or as mixed χ^2 with K degrees of freedom where K is the number of restrictions imposed by the null hypothesis. The restrictions imposed by the null hypothesis are rejected when λ exceeds the critical value (Samad and Patway, 2003).

[5] See section 4 for the test whether C-D or translog production function better represents the technology of each industrial group in the study.

efficiency of manufacturing industries in the study are both C-D and translog frontier production functions which are given as follows:

$$\ln Y_{it} = \alpha_0 + \sum_{i=1}^{5} \alpha_i \ln X_{it} + E_{it} \quad \textbf{(11)}$$

$$\ln Y_{it} = \alpha_0 + \sum_{i=1}^{5} \alpha_i \ln X_{it} + 1/2 \sum \sum_{j} \beta_{ij} \ln X_{jt} + E_{it} \; . \quad \textbf{(12)}$$

Where Y_{it} is Gross Value of Production (in Birr) for the i-th firm, $(i = 1,2,..,N)$, in the t-th observation $(t = 1,2,...,5)$; X_{it} and X_{jt} are vectors of inputs such as capital (in Birr), labour in terms of wages and salaries paid, and industrial cost (in Birr) for the i-th firm in the t-th year of observation; α's and β_{ij}'s are unknown parameters to be estimated; and E_{it} is as defined in (10).

Given the C-D and translog frontier production functions and the assumptions of each of the models, prediction of the technical efficiency of i-th firm at the t-th observation is based on the conditional expectation of U_{it} which is given by:

$$TE_{it} = \exp(-U_{it}) \quad \textbf{(13)}$$

Where U_{it}s are non-negative random variables, which are assumed to be independently distributed with mean μ_{it} and variance δ^2.

To determine why some industries are less efficient than others, the technical inefficiency model for each industrial group is specified as follows:

$$\mu_{it} = \delta_0 + \delta_1 SIZ_{it} + \delta_2 SIZSQR_{it} + \delta_3 AGE_{it} + \delta_4 AGESQR_{it} + \delta_5 LOCT_{it} + \delta_6 OWNR_{it}$$

$$\delta_7 INCT_{it} + \delta_8 TIM_{it} \quad \textbf{(14)}$$

Where μ_{it} is as defined above, δ_i's unknown parameters to estimated and the variables $(SIZ, AGE,..., TIM)$ are as defined in the following sub-section.

The method of maximum likelihood is used for simultaneous estimation of the parameters of the stochastic frontier and the model for the technical inefficiency effects using the computer program, FRONTIER 4.1c, Coelli (1994). The likelihood

function of the model is expressed in terms of the variance parameters, $\delta^2 = \delta_V + \delta_U^2$ and $\gamma = \frac{\delta_U^2}{\delta_V^2 + \delta_U^2}$. The parameter, γ, measures the discrepancy between the frontier attributable to technical inefficiency. It has a value between zero and one. The value of zero indicates that the non-negative random variable, U_{it}, is absent from the model. The value of one shows the absence of statistical noise or exogenous shocks from the model and hence low level of firm's production compared to the best practice (the maximum output) of the other firm that is totally a result of firm specific technical inefficiency.

Definitions of Variables

Those variables that are included in equations 11, 12, and 14 are defined as follows:
Gross Value of Production (GVP): is a combination of sales value of all products of the establishment, the net change between the beginning and end of the reference period in the value of finished goods and the value of work in progress, the value of industrial services rendered to others, the value of goods bought and resold without any transformation or processing and other receipts.

Fixed Capital (CAP): represents those assets of the establishments with a productive life of one year or more. It shows the net book value at the beginning of the reference year plus new capital expenditure minus the value of sold and disposed machineries and equipment and depreciation during the reference period.

Labour (LAB): labour is proxied by the amount of wages and salaries paid to the workers in each sub-sector. This is done because the heterogeneity of labour is not only in terms of biological make-up of the workers but also in terms different attributes like education and work experience. Therefore, wages and salaries are presumed to better consider such differences and better represents the extent of labour input use. This variable includes all payments in cash or in kind made to the workers during the reference year in connection with the work done for the establishments

Industrial Cost (INCT): includes the cost of raw materials, fuels, electricity and other supplies consumed and cost of industrial services rendered by other firms.

Size and Size Squared (SIZ and SIZSQR): size of the firm is proxied by the number of workers engaged in the reference year. Size squared is included in the model to allow for U-shaped relationship between firm size and technical efficiency in the sense that the marginal impact of increased size diminishes overtime.

Age and Age Squared (AGE and AGESQR): in the inefficiency model, firm age is included to capture the effect of experience on the technical efficiency of manufacturing industries. Like size squared, age squared is included in the model because of the strong diminishing returns in the learning-by-doing process so that the gains in technical efficiency from experience are eventually exhausted (Lundvall and Battese, 1999).

Location (LOCT): 1 if the firm is located around Addis Ababa, 0 otherwise. This variable is included in the inefficiency model to examine whether the location of a firm within each sub-sector matters in determining the technical efficiency of firms.

Ownership (OWNR): 1 if the firm is privately owned totally or partially, 0 if the firm is totally owned by the government. An inclusion of this variable will help us to consider if there is any difference on the impact of technical inefficiency due to the different types of ownership within each sub-sector.

Incentive (INCT): represents the amount of incentive paid to workers in the form of commissions, bonuses, professional and hardship allowances, food, lodging, and medical benefits, pension, life and causality insurance schemes, etc. the payment is either in cash or in kind during the reference period.

Time (TIM): Time (1, 2, 3, 4 and 5) is included in the inefficiency model to examine the effect of time on technical efficiency of firms in each sub-sector.

4. Empirical Results

4.1 Tests of Different Hypotheses

It is worthwhile to discuss some of the tests carried out before going to the discussion of the results. Four types of tests are undertaken and the first one is related to whether the technology of each industrial group included in the study is better represented by Cobb-Douglas or translog production functions.

In Table 2, the null hypothesis that the Cobb-Douglas production technology is a better representation for the firms in each sub-sector than the translog is rejected for all sub-sectors, except for leather and chemical industries. The log-likelihood ratio tests indicate that the rest seven industrial groups are better represented by the translog production technology than otherwise.

Table 2: Hypothesis Testing on the Stochastic Frontier Cobb-Douglas and Translog Production Functions for each Industrial Group

Industrial Groups	Log-Likelihood	Value of λ	Critical Value*	Decision
$H_0 = \beta_{11} = \beta_{12} = ... = \beta_{33} = 0$				
Food Processing	-329.17	39.56	12.59	Reject H_0
Beverages	-89.23	102.42	12.59	Reject H_0
Textile	-191.30	63.62	12.59	Reject H_0
Leather	-110.91	8.78	12.59	Accept H_0
Wood & Furniture	-146.13	34.42	12.59	Reject H_0
Paper & Printing	-192.01	47.44	12.59	Reject H_0
Chemical	-100.02	-47.46	12.59	Accept H_0
Rubber & Plastics	-80.27	60.94	12.59	Reject H_0
Non-Metallic Minerals	-135.48	18.44	12.59	Reject H_0

Table 3 Hypothesis Testing on the Distribution of U_{it}

Industrial Groups	Log-Likelihood	Value of λ	Critical Value*	Decision
$H_0 : \mu = 0$				
Food Processing	-328.66	38.54	3.84	Reject H_0
Beverages	-39.86	3.68	3.84	Accept H_0
Textile	-159.85	0.72	3.84	Accept H_0
Leather	-111.35	0.88	3.84	Accept H_0
Wood & Furniture	-130.07	2.40	3.84	Accept H_0
Paper & Printing	-168.28	-0.02	3.84	Accept H_0
Chemical	-101.69	3.34	3.84	Accept H_0
Rubber & Plastics	-49.87	0.14	3.84	Accept H_0
Non-Metallic Minerals	-127.99	3.46	3.84	Accept H_0

Source: Author's Computation

* The critical values correspond to 5 percent level of significance.

Another test which checks whether the technical efficiency levels for the firms in each sub-sector are better estimated using a half normal or a truncated normal distribution of U_{it} is shown in Table 3. The table indicates that only the technical efficiency levels for the firms in food processing industries are better estimated with the truncated

normal distribution of U_{it} while the technical efficiency levels for those firms in other sub-sectors are better estimated with half normal distribution of U_{it}.

Table 4: Hypothesis Testing on Deciding Whether Technical Inefficiency is absent from the Model or not

Industrial Groups	Log Livelihood	Value of λ	Critical Value*	Decision
$H_0 : \gamma = \delta_0 = ... = \delta_8 = 0$				
Food Processing	-361.86	104.94	18.31	Reject H_0
Beverages	-82.45	85.18	16.92	Reject H_0
Textile	-190.51	61.32	16.92	Reject H_0
Leather	-150.37	78.04	16.92	Reject H_0
Wood & Furniture	-203.60	147.06	16.92	Reject H_0
Paper & Printing	-180.98	25.40	16.92	Reject H_0
Chemical	-143.41	83.44	16.92	Reject H_0
Rubber & Plastics	-59.83	19.92	16.92	Reject H_0
Non-Metallic Minerals	-147.94	39.90	16.92	Reject H_0

Source: Author's Computation

* The critical values correspond to 5 percent level of significance

The null hypothesis that technical inefficiency in each sub-sector is absent from the model is also tested given either Cobb-Douglas or translog stochastic production function. The log-likelihood ratio tests shown in Table 4 for each sub-sector indicate that the null hypothesis that technical inefficiency is absent is rejected for all the sub-sectors. This result suggests the existence of technical inefficiency among the firms in Ethiopian manufacturing sector and thus the inappropriateness of the average production function which assumes all the firms are fully technically efficient.

Finally, as shown in Table 5 the null hypothesis that the inefficiency effects are not a function of the explanatory variables or factors which are attributable to the technical inefficiency existing among the Ethiopian manufacturing industries is rejected for all sub-sectors confirming that the joint effect of these variables on technical inefficiency is found to be statistically significant.

Table 5: Hypothesis Testing on the Joint Significance of the Explanatory Variables Included in the Inefficiency Model

Industrial Groups	Log-Likelihood	Value of	Critical Value*	Decision
$H_0 = \delta_1 = ... = \delta_8 = 0$				
Food Processing	-355.27	91.76	15.51	Reject H_0
Beverages	-64.81	49.90	15.51	Reject H_0
Textile	-189.24	29.39	15.51	Reject H_0
Leather	-140.26	57.82	15.51	Reject H_0
Wood & Furniture	-155.59	51.04	15.51	Reject H_0
Paper & Printing	-180.76	25.16	15.51	Reject H_0
Chemical	-128.80	54.22	15.51	Reject H_0
Rubber & Plastics	-59.48	19.22	15.51	Reject H_0
Non-Metallic Minerals	-140.99	26.00	15.51	Reject H_0

Source: Author's Computation

* The critical values correspond to 5 percent level of significance

4.2 Production Function

As opposed to other production function models efficiency studies concentrate on the specification of the error term for prediction of technical efficiency while the estimation of elasticity as characteristics of production process is only secondary interest. Due to this, the maximum likelihood estimates of the coefficients of the production function are not of immediate interest to this study also. Therefore, we tried to give some explanations to the coefficients of the variables for both the Cobb-Douglas and translog stochastic production functions.

For those sub-sectors, i.e. leather and chemical industries, where the production technology is represented by Cobb-Douglas production function the relationship between the traditional input variables and the level of output turned out to have expected signs. However, the parameter estimates of all the production inputs are found to be statistically significant at 5 percent significance level only for leather industries whereas in chemical industries it was only industrial cost that is found to be significantly affecting the level of production. The other two input variables, capital & labour, are not statistically significant at the conventional 5 and 10 percent significance levels. On the other hand, in those sub-sectors where the production

technology is represented by the translog stochastic production frontier, most of the parameter estimates are statistically significant at both 5 and 10 percent significance levels even though some parameter estimates are not found to be significant at both significance levels. From the parameter estimates that are found to be statistically significant, some of the coefficients turned out to have unexpected relationships with the level of output.

For instance, as shown in Table 6, in beverage industries the impact of labour on the level of output produced is found to be negative. This could be due to a large amount of labour that is employed on a relatively small amount of capital. Capital is also found to have a negative relationship with the level of production in paper & printing industries which could be as a result of old and technologically backward machineries used by the industry. In textile industries, industrial cost (or raw material) is observed to have an inverse relationship with the level of output produced. The possible explanation for this result could be an over commitment of raw materials to the production of different types of products in the industry.

In flexible functional forms, like translog production function, this kind of unexpected results could be observed also due to the multicollinearity problems often associated with such flexible functional forms. In a production function analysis, correlation between some of the explanatory variables is expected. Collinearity among economic variables is an inherent and age-old problem leading to problems of multicollinearity. Some have, therefore, suggested that multicollinearity is not necessarily a problem unless it is very high (Gujarati, 1995). In efficiency estimation, since the primary interest is to predict the degree of technical efficiency, some degree of multicollinearity can be tolerable.

Table 6: Maximum Likelihood Estimates for the Parameter of the Cobb-Douglas or Translog Stochastic Frontier Production Functions for the Nine Industrial Groups

Variable	Food Processing	Beverages	Textile	Leather	Wood and Furniture
Frontier Function					
Constant	1.87** (0.95)	-5.95* (2.18)	11.07* (1.41)	0.67 (0.47)	2.60* (0.47)
CAP	0.075 (0.10)	2.04* (0.72)	0.80* (0.14)	0.176* (0.046)	0.095 (0.06)
LAB	-0.06 (0.18)	-2.44* (0.62)	0.925* (0.344)	0.128* (0.039)	0.30** (0.17)
INDC	0.74* (0.21)	2.31* (0.51)	-0.645* (0.27)	0.73* (0.039)	0.30** (0.16)
(CAP) *(CAP)	0.072 (0.076)	0.092** (0.056)	0.0056 (0.0088)	-	0.0066* (0.0019)
(CAP) *(LAB)	0.0018 (0.019)	-0.06 (0.058)	-0.062* (0.02)	-	0.0035 (0. 015)
(CAP)*(INDC)	-0.016 (0.018)	-0.30* (0.04)	-0.075* (0.013)	-	-0.022** (0.012)
(LAB)*(LAB)	0.087* (0.019)	0.18* (0.033)	0.002 (0.024)	-	0.068* (0.023)
(LAB)*(INDC)	-0.10* (0.022)	0.0074 (0.042)	0.096* (0.029)	-	-0.14* (0.049)
(INDC)*(INDC)	0.04* (0.016)	0.062* (0.025)	0.057* (0.018)	-	0.095 (0.03)*
Inefficiency Model					
Constant	-12.31* (1.42)	-	-	-	-
SIZ	0.013* (0.0025)	0.033* (0.0088)	-0.092* (0.002)	-0.018* (0.0068)	-0.041* (0.011)
SIZSQR	-0.00002* (0.000004)	-0.00004* (0.000012)	0.0000026* (0.0000006)	0.000019* (0.000007)	0.00008* (0.00003)
AGE	0.57* (0.082)	-1.49* (0.36)	0.12* (0.047)	-0.20* (0.073)	-0.063* (0.022)
AGESQR	-0.0069* (0.001)	0.057* (0.019)	-0.055* (0.002)	0.014* (0.0042)	0.0005* (0.00024)
LOCT	-0.026 (0.21)	0.039 (0.65)	-1.26* (0.44)	1.15 (0.80)	0.69* (0.22)
OWNR	0.26 (0.25)	-4.29* (1.31)	-0.16 (0.48)	-2.12** (1.09)	-0.25 (0.24)
INCT	-0.57* (0.08)	-2.89** (1.46)	-0.83* (0.27)	-1.04* (0.40)	0.00019 (0.00018)
TIM	0.76* (0.093)	1.01* (0.327)	-0.32* (0.11)	0.57* (0.23)	0.28* (0.076)
Variance Parameters					
$\delta^2 = \delta_u^2 + \delta_v^2$	1.69* (0.156)	1.59* (0.27)	1.14* (0.15)	1.12* (0.26)	0.52* (0.078)
$\gamma = \delta_u^2 / (\delta_u^2 + \delta_v^2)$	0.92* (0.012)	0.96* (0.0094)	0.92* (0.03)	0.87* (0.04)	0.82* (0.04)
Log-Likelihood	-309.39	-39.86	-159.85	-111.35	-130.07
Mean TE	0.76	0.76	0.62	0.74	0.80
Observations	84	16	38	30	58

Table 6 Cont'd

Variable	Paper and Printing	Chemical	Rubber and Plastics	Non-Metallic Minerals
Frontier Function				
Constant	9.62* (1.72)	1.40* (0.32)	-1.25 (1.09)	1.02 (0.76)
CAP	-1.04* (0.30)	0.038 (0.027)	0.15* (0.053)	0.067 (0.093)
LAB	0.73** (0.45)	0.052 (0.045)	0.18* (0.022)	0.15 (0.16)
INDC	0.097* (0.026)	0.87 (0.04) *	0.67 (0.44)	0.85* (0.18)
(CAP) *(CAP)	0.018 (0.026)	-	0.035 (0.022)	0.0017 (0.003)
(CAP) *(LAB)	0.052 (0.043)	-	0.28 (0.35)	0.047* (0.013)
(CAP)*(INDC)	0.039 (0.041)	-	0.56 (0.86)	-0.047* (0.014)
(LAB)*(LAB)	0.032 (0.048)	-	0.037 (0.065)	-0.027** (0.015)
(LAB)*(INDC)	-0.16* (0.044)	-	-0.12* (0.045)	0.0014 (0.018)
(INDC)*(INDC)	-0.35 (0.37)	-	-0.30* (0.045)	0.018 (0.014)
Inefficiency Model				
Constant	-	-	-	-
SIZ	-0.044* (0.019)	-0.069* (0.017)	0.0042* (0.0016)	-0.014* (0.0044)
SIZSQR	0.000072* (0.000032)	0.00014* (0.000039)	-0.000003 (0.000002)	0.00003* (0.000008)
AGE	-0.097** (0.057)	0.29* (0.094)	0.05 (0.039)	-0.17* (0.052)
AGESQR	0.0052 (0.0038)	0.0057 (0.004)	-0.0012** (0.00068)	0.0011 (0.0008)
LOCT	0.04 (0.12)	-3.94* (0.88)	-0.47** (0.25)	-0.29 (0.34)
OWNR	-1.23** (0.69)	-1.55* (0.70)	-0.29 (0.31)	0.34 (0.31)
INCT	-0.39 (0.38)	-1.24* (0.43)	-0.00017** (0.00009)	0.19* (0.067)
TIM	0.185** (0.115)	-0.45* (0.18)	0.11** (0.063)	0.11 (0.097)
Variance Parameters				
$\delta^2 = \delta_u^2 + \delta_v^2$	0.83* (0.21)	1.86* (0.32)	0.20* (0.06)	0.84* (0.11)
$\gamma = \delta_u^2 / (\delta_u^2 + \delta_v^2)$	0.72* (0.093)	0.95* (0.014)	0.48* (0.16)	0.87* (0.027)
Log-Likelihood	-168.28	-101.69	-49.87	-127.99
Mean TE	0.75	0.74	0.80	0.77
Observations	39	32	21	43

Source: Author's Computation

Notes - Figures in Parentheses are standard errors.

- Significance levels of 5 and 10 percents are indicated by * and ** respectively.

4.3 Prediction of Firm Level Technical Efficiencies

The results of maximum likelihood estimates, as shown in Table 6, indicate that there are significant inefficiency effects associated with production, which is in line with the test presented in Table 4. This is evident from the estimates of the discrepancy parameter γ which are 0.92, 0.96, 0.92, 0.87, 0.82, 0.72, 0.95, 0.48 and 0.87 for food processing, beverages, textile, leather, wood & furniture, paper & printing, chemical, rubber & plastics and non-metallic mineral industries respectively. This means that around 92, 96, 92, 87, 82, 72, 95, 48, and 87 percent of the discrepancies between the observed output and the frontier output levels are due to technical inefficiency. This implies that Ethiopian manufacturing industries are characterized by inefficient way of production. Moreover, the very high value of γ indicates that much of the shortfall of observed output from the frontier output is due to technical inefficiency, i.e. due to those factors within the control of the firm rather than statistical 'noise' or external 'shocks'.

Once it is proved that there exists a significant level of technical inefficiency among Ethiopian manufacturing industries, prediction of the level of technical efficiency for the firms in each sub-sector would be important. Constructing an index of technical efficiency provides a good picture of the extent of variation in its level among firms, which will have important implications for the industrial policy formulation in the country. Based on this, the frequency distribution of the predicted technical efficiencies for each industrial group or sub-sector is discussed with the help of Tables 7 to 15.

As shown in Table 7 below the predicted technical efficiency values for food processing industries vary from 14 to 94, 51 to 95, 6 to 95, 2 to 88 and 2 to 87 percent in 1998, 1999, 2000, 2001 and 2002, respectively. This indicates the existence of high variation in technical efficiency of firms in the sub-sector. It is also observed that the variation is increasing during the study period.

During the early periods of the study, some firms were able to operate at an efficiency level of 90 percent and above while at the end of the study period any of the firms in the industry fail to score this efficiency level. The number of firms, which were operating at efficiency level of 40 percent and below have been increasing during the study period. This shows the increase in technical inefficiency of firms under the existing level of inputs and technology environment.

Table 7: Frequency Distribution of Technical Efficiencies in Food Processing Industries

Percent of Firms (%)					
Efficiency Levels	**1998**	**1999**	**2000**	**2001**	**2002**
≤ 0.40	1.20	0.0	7.10	3.60	9.50
0.40-0.50	1.20	0.0	0.0	2.40	3.60
0.51-0.60	1.20	2.40	3.6	3.60	2.40
0.61-0.70	1.20	1.2	3.6	10.70	11.90
0.71-0.80	36.90	32.10	44.0	52.4	64.30
0.81-0.90	56.00	60.70	38.1	27.4	8.30
≥ 0.91	2.40	3.60	3.60	0.0	0.0
Mean	0.80	0.81	0.74	0.74	0.68
Maximum	0.94	0.95	0.95	0.88	0.87
Minimum	0.14	0.51	0.06	0.02	0.02
Std. Deviation	0.10	0.06	0.16	0.14	0.18
Number of Firms	84	84	84	84	84

Source: Author's Computation

The sample averages of technical efficiencies for firms in food processing industries are found to be 80, 81, 74, 74 and 68 percent in 1998, 1999, 2000, 2001 and 2002, respectively. These figures also indicate that average technical efficiency of firms relative to the frontier level has been decreasing during the study period. A panel mean technical efficiency of 76 percent for food processing industries indicates that there exists a 24 percent difference between the observed level and the frontier output level that could have been obtained using the existing level of inputs and technology.

The predicted technical efficiency values for beverage industries vary from 40 to 76, 49 to 93, 5 to 89, 1 to 92 and 48 to 95 percent in 1998, 1999, 2000, 2001 and 2002, respectively. Table 8 shows a higher variation is observed in 2001 and low variation is observed in 1999. In 1999 and 2002 there was no firm, which was operating at an efficiency level of 40 percent and below while 6.3 percent of the firms in both years were operating at an efficiency level of 91 percent and above. The converse is true in 1998 and 2000 where no firm has scored over 90 percent level of efficiency while 6.3 percent of the firms in beverage industry scored 40 percent and below in both years.

Table 8: Frequency Distribution of Technical Efficiencies in Beverage Industries

Percent of Firms (%) Efficiency Levels	1998	1999	2000	2001	2002
≤ 0.40	6.3	0.0	6.3	6.3	0.0
0.41-0.50	6.3	6.3	6.3	6.3	6.3
0.51-0.60	6.3	12.5	6.3	0.0	0.0
0.61-0.70	12.5	6.3	6.3	12.5	12.5
0.71-0.80	12.5	25.0	25.0	18.8	31.3
0.81-0.90	56.3	43.8	50.0	50.0	43.8
≥ 0.91	0.0	6.3	0.0	6.3	6.3
Mean	0.76	0.77	0.74	0.74	0.78
Maximum	0.89	0.93	0.89	0.92	0.95
Minimum	0.40	0.49	0.05	0.01	0.48
Std. Deviation	0.15	0.14	0.22	0.22	0.11
Number of Firms	16	16	16	16	16

Source: Author's Computation

The sample average technical efficiencies for beverage industries are found to be 76, 77, 74, 74 and 78 percent in 1998, 1999, 2000, 2001 and 2002, respectively. This shows that their average technical efficiencies were decreasing during the early years of the study period while it was increasing at the end of the study period. The industry was relatively highly efficient in 2002 and less efficient in 2000 and 2001. Like the food processing industries, the panel mean technical efficiency is found to be 76 percent which implies that with the existing level of production inputs and technology, those firms in the beverage industry could have improved their technical efficiency by 24 percent so that they could be able to produce at the frontier level of production.

For firms in the textile industry the variation in terms of predicted efficiencies is higher as compared to the food processing and beverage industries. For instance, the minimum variation during the study period is observed in 2002 which was around 25 percent while in both sub-sectors that are discussed earlier the maximum variation observed is lower than this figure. It was in 2000 that a maximum of 29 percent variation is observed whereby a firm with minimum efficiency score was only 2 percent while the maximum was as high as 91 percent.

The distribution of efficiency score for textile industries is also skewed towards the two extreme efficiency levels whereby 23.7, 26.3, 26.3, 31.6 and 18.4 percent efficiency levels are observed in 1998, 1999, 2000, 2001 and 2002, respectively in the range of 40 percent and below while 39.5, 26.3, 28.9, 34.2 and 36.8 percent efficiency levels in those years considered earlier are observed in the range between 81 and 90 percent.

Table 9: Frequency Distribution of Technical Efficiencies in Textile Industries

Percent of Firms (%)					
Efficiency Levels	**1998**	**1999**	**2000**	**2001**	**2002**
≤ 0.40	23.7	26.3	26.3	31.6	18.4
0.41-0.50	2.6	15.3	13.2	0.0	7.9
0.51-0.60	2.6	5.3	5.3	2.6	0.0
0.61-0.70	7.9	0.0	2.6	13.2	7.9
0.71-0.80	23.7	23.7	21.1	15.8	23.7
0.81-0.90	39.5	26.3	28.9	34.2	36.8
≥ 0.91	0.0	2.6	2.6	2.6	5.3
Mean	0.64	0.60	0.58	0.62	0.68
Maximum	0.90	0.91	0.91	0.92	0.96
Minimum	0.03	0.07	0.02	0.01	0.03
Std. Deviation	0.27	0.26	0.29	0.27	0.25
Number of Firms	38	38	38	38	38

Source: Author's Computation

As shown in Table 9, in terms of average technical efficiency of firms in textile industries, the values as compared to food processing and beverage industries are found to be lower in such a way that the average technical efficiencies scores are only 64, 60, 58, 62 and 68 percent in 1998, 1999, 2000, 2001 and 2002, respectively. In 2002 where the mean technical efficiency is relatively the highest, the variation in technical efficiencies among firms is found to be the lowest. A 62 percent mean technical efficiency for the panel indicates that those firms in the textile industry are far below from the frontier output level by an amount of 38 percent, which could have been improved with proper utilization of the available resources and the existing technology.

Table 10: Frequency Distribution of Technical Efficiencies in Leather Industries

Percent of Firms (%)					
Efficiency Levels	**1998**	**1999**	**2000**	**2001**	**2002**
≤ 0.40	23.7	26.3	26.3	31.6	18.4
0.41-0.50	2.6	15.8	13.2	0.0	7.9
0.51-0.60	2.6	5.3	5.3	2.6	0.0
0.61-0.70	7.9	0.0	2.6	13.2	7.9
0.71-0.80	23.7	23.7	21.1	15.8	23.7
0.81-0.90	39.5	26.3	28.9	34.2	36.8
≥ 0.91	0.0	2.6	2.6	2.6	5.3
Mean	0.84	0.78	0.72	0.67	0.70
Maximum	0.95	0.91	0.94	0.92	0.84
Minimum	0.67	0.55	0.11	0.02	0.03
Std. Deviation	0.06	0.08	0.17	0.21	0.16
Number of Firms	30	30	30	30	30

Source: Author's Computation

The estimates of predicted technical efficiency for firms in the leather industry vary from 67 to 95, 55 to 91, 11 to 94, 2 to 92 and 3 to 84 percent in 1998, 1999, 2000, 2001 and 2002, respectively. As shown in Table 10 the highest variation is observed in 2001, which was around 21 percent while the lowest is observed in 1998, which was around 6 percent. Even though there was less variation in 1998, no firm was able to operate at an efficiency level of above 90 percent where as in the rest of the years few firms were able to operate at this efficiency level.

For firms in the leather industry the mean technical efficiency levels relative to the frontier level are found to be 84, 78, 72, 67 and 70 percent in 1998, 1999, 2000, 2001 and 2002, respectively. This implies that the actual level of output on average is 16, 22, 28, 33 and 30 percent less than the frontier output level during the production year in that order. The panel mean technical efficiency is obtained to be 74 percent which indicates that 26 percent of the differences between the actual level of output and the frontier output level is resulted due to technical inefficiencies.

In wood and furniture industries the variation in terms of predicted efficiencies is lower as compared to other sub-sectors discussed earlier. The maximum amount of variation observed was around 15 percent in 2002 while a minimum amount of 8 percent variation is observed in 2002. In this sub-sector, most firms were operating at an efficiency level of 70 percent and above while only a few number of firms operate at an efficiency level of 50 percent and below during the study period. At the beginning of the study period, none of the firms were operating at an efficiency level of 50 percent and below where as few firms were operating at this efficiency level at the end of the study period.

Table 11: Frequency Distribution of Technical Efficiencies in Wood and Furniture Industries

Percent of Firms (%) Efficiency Levels	1998	1999	2000	2001	2002
≤ 0.40	0.0	1.7	1.7	3.4	1.7
0.41-0.50	0.0	0.0	1.7	1.7	3.4
0.51-0.60	3.4	3.4	5.2	5.2	5.2
0.61-0.70	1.7	6.9	5.2	10.3	8.6
0.71-0.80	20.7	25.9	20.7	24.1	36.2
0.81-0.90	46.6	44.8	46.6	36.2	29.3
≥ 0.91	27.6	17.2	19.0	19.0	15.5
Mean	0.84	0.81	0.81	0.78	0.77
Maximum	0.95	0.93	0.94	0.95	0.95
Minimum	0.56	0.37	0.40	0.38	0.03
Std. Deviation	0.08	0.11	0.11	0.13	0.15
Number of Firms	58	58	58	58	58

Source: Author's Computation

Table 11 shows there is a consistent decline in mean technical efficiency of wood and furniture industries whereby it declines from 84 to 81 percent in 1999, 81 to 78 percent in 2001 and 78 to 77 percent in 2002 though it remained constant between 1999 and 2000. In 1998, where the mean technical efficiency of firms in wood & furniture industries was the highest, the variation in terms of efficiency scores among the firms is found to be the lowest. The converse is true in 2002 where the mean technical efficiency of firms is the lowest while the variation is found to be the highest. In this sub-sector, the panel mean technical efficiency is around 80 percent which implies that firms in wood and furniture industries could have increased their output levels by 20 percent with the available resources and without changing the existing technology.

The estimates of predicted technical efficiency values for paper and printing industries vary from 43 to 94, 8 to 91, 31 to 92, 23 to 91 and 7 to 90 in 1998, 1999, 2000, 2001 and 2002, respectively. As shown in Table 12, the variation among firms with respect to efficiency scores ranged from 13 to 18 percent which shows that the variation across the study period is somehow similar and not fluctuating over time. In 1998, where we observed the lowest variation, no firm was operating at an efficiency level of 40 percent and below where as in 2002, where the variation reaches at a relatively higher level, no firm could attain an efficiency level of above 90 percent.

Table 12: Frequency Distribution of Technical Efficiencies in Paper and Printing Industries

Percent of Firms (%)					
Efficiency Levels	**1998**	**1999**	**2000**	**2001**	**2002**
≤ 0.40	0.0	2.6	5.1	10.3	5.1
0.41-0.50	5.1	2.6	5.1	2.6	10.3
0.51-0.60	2.6	5.1	5.1	10.3	7.7
0.61-0.70	17.9	17.9	10.3	12.8	7.7
0.71-0.80	15.4	10.3	17.9	7.7	17.9
0.81-0.90	51.3	59.0	53.8	53.8	51.3
≥ 0.91	7.7	2.6	2.6	2.6	0.0
Mean	0.79	0.77	0.75	0.73	0.73
Maximum	0.94	0.91	0.92	0.91	0.90
Minimum	0.43	0.08	0.31	0.23	0.07
Std. Deviation	0.13	0.16	0.16	0.18	0.18
Number of Firms	39	39	39	39	39

Source: Author's Computation

During those years considered in the study, a consistent decline in mean technical efficiency is also observed in this sub-sector like wood and furniture industries. The

decline was from 79 to 77 percent 1999, 77 to 75 percent in 2000 and 75 to 73 percent in 2002 though it remained constant between 2001 and 2002. In 1998, where the variation is found to be the minimum, the amount of mean technical efficiency scored is found to be the maximum. On the other hand, in 2001 and 2002 where the variation is relatively higher, the amount of mean technical efficiency scored is found to be the lowest. For paper and printing industries, the panel mean technical efficiency is found to be 75 percent, which implies there exists a 25 percent difference between the observed level of output and the frontier output level that could have been obtained using the existing level of inputs and technology.

In chemical industries, the level of predicted technical efficiency vary from 45 to 91, 3 to 91, 3 to 91, 3 to 95 and 46 to 91 percent during the production years of 1998, 1999, 2000, 2001 and 2002. The variation in terms of predicted technical efficiencies is found to be the highest in 2000 and 2001 while it is the lowest in 1998. Only about 3.1, 6.2, 12.5, 9.4, and 3.1 percent of the firms operated at a technical efficiency level of 50 percent & below in those years considered earlier, where as about 40.6, 40.6, 40.7, 46.9 and 50 percent of the firms operated at a technical efficiency level of above 80 percent during the production years in that order.

Table 13: Frequency Distribution of Technical Efficiencies in Chemical Industries

Percent of Firms (%)					
Efficiency Levels	**1998**	**1999**	**2000**	**2001**	**2002**
≤ 0.40	0.0	3.1	12.5	6.3	0.0
0.41-0.50	3.1	3.1	0.0	3.1	3.1
0.51-0.60	3.1	0.0	3.1	6.3	0.0
0.61-0.70	25.0	25.0	21.9	9.4	15.6
0.71-0.80	28.1	28.1	21.9	28.1	31.3
0.81-0.90	37.5	37.5	34.4	37.5	46.9
≥0.91	3.1	3.1	6.3	9.4	3.1
Mean	0.76	0.74	0.71	0.73	0.78
Maximum	0.91	0.91	0.91	0.95	0.91
Minimum	0.45	0.03	0.03	0.03	0.46
Std. Deviation	0.11	0.16	0.20	0.20	0.10
Number of Firms	32	32	32	32	32

Source: Author's Computation

Table 13 shows that the mean technical efficiency levels for firms in chemical industries are found to be 76, 74, 71, 73 and 78 percent in 1998, 1999, 2000, 2001 and 2002, respectively while the mean panel mean technical efficiency is found to be 74 percent. This shows that about 24, 26, 29, 27 and 22 percent differences between the observed and the frontier levels of output are due to technical inefficiency during

the study period. Compared to other years of production, chemical industries performed less in 2000 where high variation among firms in technical efficiencies was also observed.

Predicted technical efficiency scores in rubber and plastics industries ranged from 48 to 96 percent in 1998, 59 to 96 percent in 1999 and 54 to 95 percent, 26 to 96 percent and 42 to 92 percent in 2000, 2001 and 2002, respectively. In this sub-sector, a relatively high variation in technical efficiency scores is observed in 2001 and a relatively low variation is observed in 1999. Table 14 shows during those periods where minimum variation is observed, i.e. 1999 and 2000, no firm was operating at an efficiency level of 50 percent and below where as during the period where the variation is relatively higher, i.e. 2001, few firms were operating at the efficiency level considered earlier. During the early periods of the study, the number of firms, which were operating at an efficiency level of above 80 percent, was around 77 percent and this number has been declining during those 5 years considered in the study and reached around 14 percent at the end of the study period.

Table 14: Frequency Distribution of Technical Efficiencies in Rubber and Plastics Industries

	Percent of Firms (%)				
Efficiency Levels	**1998**	**1999**	**2000**	**2001**	**2002**
≤ 0.40	0.0	0.0	0.0	4.8	0.0
0.41-0.50	9.5	0.0	0.0	4.8	9.5
0.51-0.60	0.0	14.3	14.3	4.8	19.0
0.61-0.70	4.8	4.8	23.8	23.8	28.6
0.71-0.80	19.0	38.1	28.6	33.3	28.6
0.81-0.90	42.9	38.1	28.6	23.8	9.5
≥ 0.91	23.8	4.8	4.8	4.8	4.8
Mean	0.81	0.77	0.73	0.71	0.67
Maximum	0.96	0.96	0.95	0.96	0.92
Minimum	0.48	0.59	0.54	0.26	0.42
Std. Deviation	0.13	0.10	0.11	0.16	0.13
Number of Firms	21	21	21	21	21

Source: Author's Computation

Similarly, the mean technical efficiencies of rubber and plastics industries has been declining during the study period whereby it was around 81 percent in 1998 and reached 77 percent in 1999 and then declined to 73 percent in 2000. The decline continued and reached 71 in percent in 2001 and finally it became 67 percent in 2002. This shows that during those five years considered in the study, firms in rubber industries could not keep their efficiency level as it was and they were losing it

overtime. An 80 percent of panel mean technical efficiency score also indicates that there is a chance for rubber industries to improve their output levels by 20 percent using the available resources and technology environment.

Technical efficiency predictions in non-metallic mineral industries vary from 20 to 90, 51 to 94, 49 to 89, 56 to 95 and 3 to 92 percent in 1998, 1999, 2000, 2001 and 2002, respectively as shown in Table 15. The variation in terms of predicted technical efficiency ranged from 9 percent in 2001 to 16 percent in 2002 during the study period. During the period of minimum variation, i.e. 2001, all firms were operating above 50 percent efficiency level whereas during the period a relatively higher variation, i.e. 2002, around 4.7 percent of the firms were operating even at an efficiency level of 40 percent and below. Overall, during those periods considered in the study, most firms in non-metallic mineral industries have been operating above 70 percent technical efficiency levels.

Table 15: Frequency Distribution of Technical Efficiencies in Non-Metallic Mineral Industries

	Percent of Firms (%)				
Efficiency Levels	**1998**	**1999**	**2000**	**2001**	**2002**
≤ 0.40	2.3	0.0	0.0	0.0	4.7
0.41-0.50	2.3	0.0	2.3	0.0	0.0
0.51-0.60	2.3	9.3	11.6	2.3	4.7
0.61-0.70	9.3	16.3	20.9	7.0	9.3
0.71-0.80	27.9	27.9	37.2	30.2	25.6
0.81-0.90	55.8	44.2	27.9	48.8	51.2
≥ 0.91	0	2.3	0.0	11.6	4.7
Mean	0.78	0.77	0.74	0.81	0.77
Maximum	0.90	0.94	0.89	0.95	0.92
Minimum	0.20	0.51	0.49	0.56	0.03
Std. Deviation	0.13	0.11	0.10	0.09	0.16
Number of Firms	43	43	43	43	43

Source: Author's Computation

Looking into the mean technical efficiency scores of non-metallic mineral industries during each production year, there would have been a production gain of 22, 23, 26, 19 & 23 percent in 1998, 1999, 2000, 2001 and 2002, respectively if the firms could have produced at the 'best' practice output level. A panel mean technical efficiency of 77 percent also implies that there exists a 23 percent difference between the observed level of output and the frontier output level that could have been increased using the existing level of inputs without changing the production technology.

Generally, the existence of technical inefficiency across firms and the inability of most of the firms to score an efficiency level of more than 90 percent level imply that a lot can be done to expand the production level at the existing level of inputs and technology. Hence, it is required to identifying and corrects those factors which are attributable to the existing inefficiency levels.

4.4. Factors Affecting Technical Inefficiency

The technical efficiency level of manufacturing industries is discussed. However, technical efficiency scores have limited utility for policy and management purposes if empirical studies do not investigate the sources of technical inefficiency. Therefore, it will be very important to identify those factors, which are attributable to the technical inefficiencies among the firms in each sub-sector.

Even though, variations in technical efficiency arise from different practices or techniques, it was found difficult to incorporate all factors, which are expected to affect the technical inefficiency of each sub-sector due to problems related with data. In this study, eight variables (size and size squared, age and age squared, location of a firm, type of ownership, amount of incentive paid to workers and the year of observations involved) are included, which are assumed to influence the technical efficiency level of those firms in each of the sub-sectors.

Based on the estimation results given in Table 6 the size of a firm is found to have a positive and significant relationship with technical efficiency for most sub-sectors, except for food processing, beverages and rubber and plastics industries. This result is supported by the most widely argued relationship between firm size and technical efficiency which states that a firm growth leads to a more efficient way of production. Lundvall and Battese (1999) explained this as a selection process in which efficient firms grow and survive, while inefficient firms stagnate or exit the industry. The other argument towards this positive relationship is that there is positive gain in efficiency due to economies of scale. A positive relationship between firm size and technical efficiency is also reported by Taye (1996), Pitt and Lee (1981) and Lundvall and Battese (1999).

Even though most arguments support that there is a positive relationship between firm size and technical efficiency, the negative relationship found in food processing, beverage and rubber & plastics industries is not something unrealistic. This could be due to the fact that technical efficiency of small firms may be higher as a result of their being exposed to more competition than larger firms.

In the inefficiency model, the square of firm size is also included and the result indicates that there is a significant negative relationship between size squared and technical efficiency for those sub-sectors where the relationship between firm size and technical efficiency is found to be positive. On the other hand, for food processing, beverage and rubber & plastics industries where firm size and technical efficiency are negatively related, the relationship between size squared and technical efficiency is positive for the three sectors and the relationship is also found to be significant, except for rubber and plastics industries. This result shows that those firms in textile, leather, wood & furniture, paper & printing, chemical and non-metallic mineral industries do not continue to benefit from increasing their firm size in terms of improving their technical efficiency. This means that as the size of a firm increases the technical efficiency of that specific firm increases only up to a certain point and it will start to decline marginally. However, the magnitude of the decline in technical efficiency is found to be close to zero for all industries.

For food processing and beverage industries, the positive relationship between size squared and technical efficiency indicates that growth of a firm will reduce the level of technical efficiency up to a certain point and it will start to have a positive impact on technical efficiency of a firm after a certain level of firm growth. However, like the other sub-sectors this effect is also found to be insignificant (close to zero) in terms of its magnitude for food processing and beverage industries.

It is evident from Table 6 that firm age is positively related to technical efficiency and statistically significant in beverage, leather, wood & furniture, paper & printing and non-metallic mineral industries. This implies that older firms are more technically efficient than those firms that are new. This is probably due to the learning-by-doing process, which occurs through production experience. It is also argued that new firms are unaware of their abilities and require more time to decide on their optimal level of production. According to Assefa and Metambalya (2002), the least efficient firm will exit the industry overtime and the technically more efficient ones will remain. So, firms become more efficient because of growing stock of experience in the production process. Taye (1996) also reported a similar result for firms up to 5-8 years of age in Ethiopian manufacturing industries.

On the other hand, a negative relationship between firm age and technical efficiency is observed for food processing, textile, chemical and rubber & plastics industries and the relationship is found to be statistically significant, except for rubber & plastics industries. Perhaps, this relation could be because when an innovation is introduced younger firms in these sub-sectors generally easily adopt it, while older firms may have to delay their adoption as it may become too expensive and costly to scrap the old technology. This implies that efficiency may decrease with age because older

firms tend to employ capital of an earlier vintage leading to inefficient production routines and practices. Pitt and Lee (1981) also found a negative relationship between firm age and technical efficiency in Indonesian weaving industries. The study, which was undertaken by Hill and Kalirajan (1993) (cited in Lundvall and Battese, 1999) also reported a similar result.

Like size squared, age squared is also included in the inefficiency model to see the effect of an indefinite increase of firm age on technical efficiency. For those sub-sectors where the relation between firm age and technical efficiency is found to be positive, the statistically significant negative coefficients of age squared suggest that technical efficiency does not necessarily increase indefinitely as the age of a firm increase. Learning-by-doing may provide better opportunity for firms to improve their technical efficiency but the gains in technical efficiency from experience become smaller and smaller overtime and may be eventually entirely exhausted.

In food processing, textile and rubber & plastics industries, a positive and significant relationship between age squared and technical efficiency is observed. This implies that those firms in these sub-sectors could gain in efficiency due to an increase in age of the firm after sometime. The relationship is negative for chemical industries but it is found to be statistically insignificant.

The impact of location of a firm on improving technical efficiency is also assessed and firms in textile, chemical and rubber & plastics industries, which are located around Addis Ababa, tend to be more technically efficient than those firms outside Addis Ababa. This may be due to the fact that proximity of a firm to the capital city will enable the firm to have a better access to the necessary raw materials for production, a relatively abundant skilled manpower, easy access to information and export market which could enhance the technical efficiency of that specific firm. However, it is observed that firms in wood and furniture industries tend to be less technically efficient when they are located around Addis Ababa. Perhaps, this could be for the reason that most of the firms in this sub-sector are relatively small producers of furniture products whereby the main sources of timber for furniture production are the rural areas of the country, which are very far from Addis Ababa. Therefore, a firm's location around Addis Ababa could adversely affect the technical efficiency of wood & furniture industries.

For food processing, beverage, leather, paper & printing and non-metallic mineral industries, the impact of location of a firm on technical efficiency is found to be statistically insignificant. In other words, based on the maximum likelihood estimates firms in these sub-sectors do not benefit in terms of improving their technical efficiencies by locating their industries around Addis Ababa.

It is evident from the result (Table 5.5) that privately owned firms are found to be more technically efficient than those firms that are owned by the government in beverage, leather, paper & printing and chemical industries. For these sub-sectors, when firms are privately owned, there will be a gain in efficiency due to the competition that occurs among the firms which makes them to properly utilize the available resources. This in turn leads to an improvement in technical efficiency. For food processing, textile, wood & furniture, rubber & plastics and non-metallic mineral industries type of ownership and technical efficiency do not have any statistically significant relationship.

Workers are expected to be motivated by the amount of incentive paid in the form of bonuses, commissions, professional and hardship allowances, etc and thereby increase the technical efficiency of firms. This is true for food processing, beverage, textile, leather, chemical and rubber & plastics industries. A statistically insignificant relationship between the amount incentive paid and technical efficiency is observed for wood & furniture and paper & printing industries. The amount of incentive paid to workers is found to bring about an adverse effect on the level of technical efficiency for firms in non-metallic mineral industries.

Finally, the effect of time on technical efficiency during the study period is investigated and the result indicates that it is only for textile and chemical industries that the technical efficiency has been increasing over the study period. For the rest of the industries, except for non-metallic mineral industries, the result shows that the deterioration in technical efficiency over the study period is significant. In other words, these industries could not keep their technical efficiency level and their capacity of utilizing the available resource has been declining overtime. For non-metallic mineral industries, the relationship between technical efficiency and time is found to be statistically insignificant.

5. Conclusion and Policy Recommendations

In any production process, improving internal efficiency is one of the most important avenues for increasing the level of output. Given current global developments and liberalized market conditions, the survival of less efficient firms is highly questionable if they become less competitive. In light of this, the study has examined the technical efficiency levels of Ethiopian manufacturing industries and tried to identify those factors which contribute to the different inefficiency levels existing among the sub-sectors considered in the study.

A total of 361 firms are categorized under nine industrial groups based on ISIC classification and the industrial groups. A Cobb-Douglas or translog stochastic frontier production function involving the traditional production inputs of capital, labour and industrial cost (or raw material) was specified. The panel data model developed by Battese and Coelli (1995) was employed for the purpose of predicting the level of technical efficiency and identifying those factors which are attributable to the technical inefficiency that existed among the firms simultaneously.

The likelihood ratio test attests that while the Cobb-Douglas production function is a good representation only for the production technology of leather and chemical industries, the translog production function is found to be a good representation for the rest of the industries. Moreover, it is proved that the technical efficiency levels for each of the firms in all sub-sectors are better estimated using a half normal distribution for U_{it} rather than a truncated normal distribution, except for food processing industries. The likelihood ratio test strongly rejects the hypothesis that technical inefficiency is absent from the model for all sub-sectors. The null hypothesis that the inefficiency effects are not a function of the explanatory variables is also rejected for all sub-sectors.

The technical efficiency level for firms in each sub-sector was predicted and the result shows that there exists technical inefficiency in all sub-sectors with a relatively higher variation among the firms. This result is also supported by the rejection of the null hypothesis that the discrepancy between the observed and the frontier output levels is due to external factors outside firms' control for all sub-sectors. For most of the sub-sectors the discrepancy parameter, γ, is found to be above 80 percent which shows that most of the discrepancy between the observed and frontier level of outputs is due to internal technical inefficiency rather than external factors.

Mean technical efficiency levels were also predicted in line with the estimation of technical efficiencies and textile industries performed less in terms of mean technical efficiency while wood & furniture and rubber & plastics industries have performed well, relatively. The mean technical efficiency of the other industries falls between 62 and 80 percent.

The study also tried to identify those factors which contribute to the existing level of technical inefficiency and a total of 8 variables were investigated for this purpose. Among these variables, size of a firm tended to have a positive and significant relationship with technical efficiency for textile, leather, wood & furniture, paper & printing, chemical and non-metallic mineral industries. Based on the result, it was also observed these industries would not continue to benefit in terms of technical

efficiency through increasing their firm size indefinitely. For food processing, beverage and rubber & plastics industries, the relationship between firm size and technical efficiency is found to be negative and statistically significant. However, the decline in technical efficiency due to firm growth in food processing and beverage industries will be reverted after some time and it will start to show a positive impact in improving technical efficiency. The relationship between size squared and technical efficiency in rubber & plastics industries is found to be statistically insignificant.

The effect of firm age on technical efficiency of firms was also examined and it was found that for beverage, leather, wood & furniture, paper & printing and non-metallic mineral industries operation of a firm for a relatively longer period brought about a positive impact on technical efficiency. On the other hand, an opposite relationship is observed for food processing, textile, chemical and rubber & plastics industries though the relationship is statistically insignificant for rubber & plastics industries. Since it is difficult to expect experience of a firm will increase technical efficiency indefinitely, age squared was also included to capture this non-linear relationship. The coefficients of age squared also showed that there is a non-linear relationship between firm age and technical efficiency for all sub-sectors, expect in chemical industries.

Proximity of a firm to Addis Ababa is found to be an important factor in terms of improving technical efficiency only for textile, chemical and rubber & plastics industries. Firms in wood & furniture industries, on the other hand, seem to be less efficient because of their location around Addis Ababa due to reasons related to supply of raw materials. In other sub-sectors, proximity of firm to Addis Ababa is not crucial in determining technical efficiency of firms. The other outcome of the study indicates that private ownership only helped beverage, leather, paper & printing and chemical industries to improve their technical efficiency. A statistically insignificant relationship between type of ownership and technical efficiency was observed for the rest of the industries.

The amount of incentive paid to workers tended to have a significant impact on increasing technical efficiency of firms in most sub-sectors, i.e., food processing, beverage, textile, leather, chemical and rubber & plastics industries. However, for wood & furniture and paper & printing industries the relationship turned out to be insignificant. With regard to the effect of time on technical efficiency, the result indicates that the technical efficiency of firms over the study period was increasing only for textile and chemical industries. In other industries technical efficiency tended to decline over the study period, except in non-metallic industries on which the relationship is found to be statistically insignificant.

Based on the results of the study discussed in the preceding section, it is possible to forward some policy recommendations to enhance the efficiency of the manufacturing sector of Ethiopia and thereby to increase the contribution of the sector to the overall economy though the recommendations may not be conclusive.

Technical efficiency growth of a firm is found to be an important factor in most sub-sectors. Since firm growth is highly related with economies of scale, the government has to play a supportive role through provision of credit, implementing appropriate policies to enhance their competitiveness in the international market so that they can export their products, constructing the necessary infrastructure for smooth marketing system and looking for effective strategies for capacity building. However, caution should be taken not to increase growth of firms beyond the optimal level. For those sub-sectors where experience (proxied by age) has a positive impact towards improving technical efficiency, the policy should be geared towards assisting those firms which are relatively new through providing relevant trainings and other technical supports so that they can cope up with the experienced firms. On the other hand, for those sub-sectors where experience brought about a negative impact, the assistance should be towards introducing new technology and encouraging firms to replace their old technology with the new one.

Only a few sub-sectors are benefited due to location of their firms around Addis Ababa in terms of improving their technical efficiency. The gain in technical efficiency due to firm's location around Addis Ababa is significant only for a few sub-sectors. This could possibly indicate that there is no difference in technical efficiency of firms because firms are located around the capital city for most sub-sectors. However, for those sub-sectors where the location of a firm around Addis Ababa is important in determining technical efficiency, regional governments has to close the gap through infrastructure development like road transport and telecommunications, facilitating marketing channels and implementing appropriate industrial policies which makes the industries more efficient.

The slow pace of privatization has to be accelerated for those sub-sectors where the gain in technical efficiency is positive when a firm is owned privately because of the competitive environment created among the firms. This in turn will help the firms utilize their resources efficiently and thereby increase their technical efficiency. For most of the industries the amount of incentive paid to workers either in cash or in kind brought about a positive contribution in improving technical efficiency. Therefore, the industries have to design effective incentive payment strategies to motivate their workers and improve the level of technical efficiency.

References

Afriat, S.N. (1972), "Efficiency Estimation of Production Functions", *International Economic Review*, Vol. 13, no. 3: 568-589

Aigner, D. J. and Chu, S. F. (1968), "On Estimation the Industry production Function", *American Economic Review*, Vol. 58 Nos. 3-4:826-839

Assefa, A. and Matambalya, F.A.S.T. (2002), "Technical Efficiency of Small- and Medium – Scale Enterprises: Evidence from a Survey of Enterprises in Tanzania", *Eastern Africa Social Science Research Review*, Vol. XVIII, No. 2: 1-28

Awoke, T. (2001), "An Application of Stochastic Frontier in Estimating the Technical Efficiency of Small Cereal Crop Producers: The Case of Seven Peasant Associations (PAS), in the Amhara Region", M.SC. Thesis, Addis Ababa University.

Baltagi, B. H. (2002), "Econometric Analysis of Panel Data", John Wiley & Sons Ltd., 2nd ed.

Battese, G. E. and Coelli, T. J. (1988), "Prediction of Firm-Level Technical Efficiencies with a Generalized Frontier Production Function and Panel Data", *Journal of Econometrics*, Vol. 8: 387-399

_____(1992). "Frontier Production Functions, Technical Efficiency and Panel Data: With Application to Paddy Farmers in India", *Journal of Productivity Analysis*, Vol. 3: 153-169

_____(1995). "A model for Technical Inefficiency Effects in A Stochastic Frontier Production Function for Panel Data", *Empirical Economics*, Vol. 20: 325-332

Battese, G. E., Coelli, T.J. and Colby, T.C. (1989), "Estimation of Frontier Production Functions and the Efficiencies of Indian Farms Using Panel Data from ICRISAT's Village Studies", *Journal of Quantitative Economics*, Vol. 5: 327-348

Central Statistical Authority (2001), Report on Large and Medium Scale Manufacturing Industries Survey, Statistical Bulletin –248, Addis Ababa.

_____(2003), Report on Large and Medium Scale Manufacturing Industries Survey, Statistical Bulletin –281, Addis Ababa.

Coelli, T. (1994), A Guide to FRONTIER Version 4.1. A Computer Program for Stochastic Frontier Production and Cost Functions Estimation

Cornwell ,C., Schmidt, P. and Sickles, R.C. (1990), "Production Function with Cross-Sectional and Time- Series Variation in Efficiency Levels", *Journal of Econometrics*, Vol. 46: 185-200

Ethiopian Economic Association (EEA), (2004), "Report on the Ethiopian Economy: Industrialization and Industrial Policy ", Vol. III.

_____ (2005), "Report on the Ethiopian Economy", Vol. IV.

Farrell, M.J. (1957), "The Measurement of Productive Efficiency ", *Journal of the Royal Statistical Society*, Series A, CXX, Part 3: 253-290

Forsund, F. R., Lovell, C. A. K. and Schimdt, P. (1980), "A Survey of Frontier Production Functions and of Their Relationship to Efficiency Measurement", *Journal of Economics*, Vol. 13: 5-25

Green, A. and Mayes, D. (1991), "Technical Inefficiency in Manufacturing Industries", *The Economic Journal*, Vol. 101, No. 406: 523-538

Gujarati, D.N. (1995), Basic Econometrics, 3rd ed.

Jha, R. and Sahin, B.S. (1993), "Industrial Efficiency: An Indian Perspective", Wiley Eastern Limited, New Delhi, India.

Jondrow, J., Knox Lovell, C. A., Materov, I. S. and Schimdt, P. (1982) "On Estimation of Technical Inefficiency in the Stochastic Production Function Model", *Journal of Econometrics*, Vol. 19: 233-238

Kumbhakar, S.C. (1990), "Production Frontiers, Panel Data and Time Varying Technical Inefficiency", *Journal of Economics*, Vol. 46: 201-211

Pitt, M.M. and Lee L-F (1981), "The Measurement and Sources of Technical Inefficiency in the Indonesian Weaving Industry", *Journal of Development Economics*, Vol. 9: 43-64

Samad, Q. A. and Patway, F. K. (2003), "Technical Efficiency in Textile Industry of Bangladesh: An Application of Frontier Production Function", *Information and Management Sciences*, Vol. 14, no. 1:19-30.

Lundvall, K. and Battese, G.E. (1999), "Firm Size, Age and Manufacturing Firms", *The Journal Development Studies*, Vol. 36, No. 3: 146-163

Schmidt, P. and Sickles, R-C (1984), "Production Frontier and Panel Data", *Journal of Business and Economic Statistics*, Vol. 2: 367-374

Taye, M.(1996)," Age-Size Effects in Productive Efficiency: A Second Test of the Passive Learning Model", *Center for the Study of African Economies*, Institute of Economics and Statistics, University of oxford.

United Nations Statistical Papers (1990) "International Standard Industrial Classification of All Economic Activities", Series M No. 4, Rev. 3.

ETHIOPIAN ROAD TRANSPORT DEVELOPMENT: PROBLEMS, CHALLENGES AND CONSTRAINTS

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Abstract

Ethiopia is one of the land locked country in Africa. This implies that the country's socio economic development is expected to rely on the road transport in conveying goods and services throughout the country. Despite these facts, the sub sector is trapped by so many complex structural and non structural problems. The government and private sector are not working together in the right ways. The country in general has no comprehensive transport policy and strategy. There is poor development of public transport and little attention is given to environmental protection. There is serious trend of motorization in which the used vehicles are extremely dominating. The traffic safety problem is ringing in every citizen's mind.

1. Introduction

Transport permeates the whole of civilized world, like the arteries and veins in the human body. Transport services take people to places where they want to go and deliver goods to places where people require them.

The importance of transport in general can be described in various ways. Among others its utility can be summarized as:

a. To survive in a competitive world, nations need transport to bring raw materials and also carryout finished products in and out of the country
b. In reaping the benefits of locational optimization and economies of scale, industry needs a system of efficient transport to connect to industries (production agents to market place)
c. Transport is the means of fulfilling the need to get a work, to the shop and to contract other people.
d. Efficient transport links are vital for state security and identity

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Functionally, transport meant to move people or goods from one place to another. This is the main operating objective if it is accomplished properly.

Majority of the transport operation services in almost all countries of the world is provided by one mode of transport, namely road transport. The importance of road transport is more significant in the case of developing countries. The road transport can be used at the small scale level to satisfy the need for conveying goods and people in a given country or location.

2. Some general characteristics of road transport mode.

The road transport mode is named from the infrastructure (facilities) that the vehicles use. The road is specifically designed and surfaced highways for the passage of wheeled vehicles, each vehicle being controlled and guided independently by a driver.

Some of the aims of road development institution include:

- Trying to avoid long distance road traffic and particularly heavy goods vehicles from large numbers of towns (cities) so that they are relieved of dirty, noise and danger or/care associated with traffic.
- Creating and maintaining a comprehensive strategic trunk route network to promote economic growth, linking remote and less prosperous areas of the country to the national network.
- To make sure that all major ports are connected to the major trunk network to promote the growth of the export trade.

From road transport service side, the road users are of numerous in nature. The road users include motor vehicles (private automobile, bus freight vehicles, and motor cycles etc) and non motorized vehicles like bicycles, pedestrians, carts and others. Furthermore, the road transport services can be categorized in to urban road transport and interurban or rural transport modes.

Because of their nature, all modes of transport have their own strengths and weaknesses. Beside this, some constraints are more severe in one of the transport modes.

Even though the road transport has a number of advantages, naturally, it has a number of disadvantages. Some of these include:

- The size of the load is restricted by legislation which limits on vehicle size and weight, not by the prevailing technology and economics as with other modes.
- The distance traveled in one day is the function of driver's working hours limitations which are also controlled by legislation (maximum permitted road speeds)
- Roads are not exclusively used by one form of transport and congestion can occur which interfaces with schedule planning and time keepings.

3. Significant roles of road transport in Ethiopia

Road transport plays vital roles in the effort to uplift the economy. It facilitates more the conveying of passengers and freight from origin to the destination.
Compared to other transport modes, road transport facilitates and is more accessible:

- To accelerate product exchanges
- To speed up distributions of industrials and agricultural products
- To promote supply of raw materials
- To ease liaisons of people
- To support defense forces
- To help trade and tourism expansion, etc.

Generally, dynamic transport sector is a decisive factor, without which it is impossible to reach the goal of national socio-economic development.

In Ethiopia road transport is growing and becoming the dominant sector over the other modes for the last couple of decades. Presently, the share of road transport sector accounts for about 90 % revealing that the massive transport is becoming carried out through it in the country (Transport Authority, 2005/6 strategic planning).

With regard to road safety, the accident happening in LDCs is high by the time it is decreasing in advanced countries. In Ethiopia, for instance, different reports revealed that, on average, per 10,000 vehicles a death for 170 people takes place every year (internet African traffic safety). This makes the country to be one of the few countries with high accident fatality in spite of less population of vehicles in the country. The main factor for such significant problems of road safety in this country is mainly the problem with the human factor, mainly the drivers' ethics and capability rather than mechanical problems.

Despite the large area of the country, the length and coverage of standardized full weather condition roads in this country is very small. Until the last two years, we have a total of about 36000KM in which the coverage of asphalted road is very insignificant, only about 12-13% of all road system.

The recent average annual growth of the road is found to be only 1.7%. On the other hand, the vehicle imported into the country is increasing in alarming rate, on average, at 6% growth every year for the last 15 years. The human inputs factors, issuance of new driving licenses increases every year with an average of 0.8%-1%. In terms of magnitude, the average licenses issued every year is about 60,000 (sixty thousand) in the country.

The road transport sub sector is also characterized by backward management system, old vehicles, lack of skilled man power on the sector, disintegrated transport sector institutions (among regions and between regions and federal) relationship and communication. But one of the good things that we observe since recent years is the commitment of the federal and regional government is huge investment in the road construction.

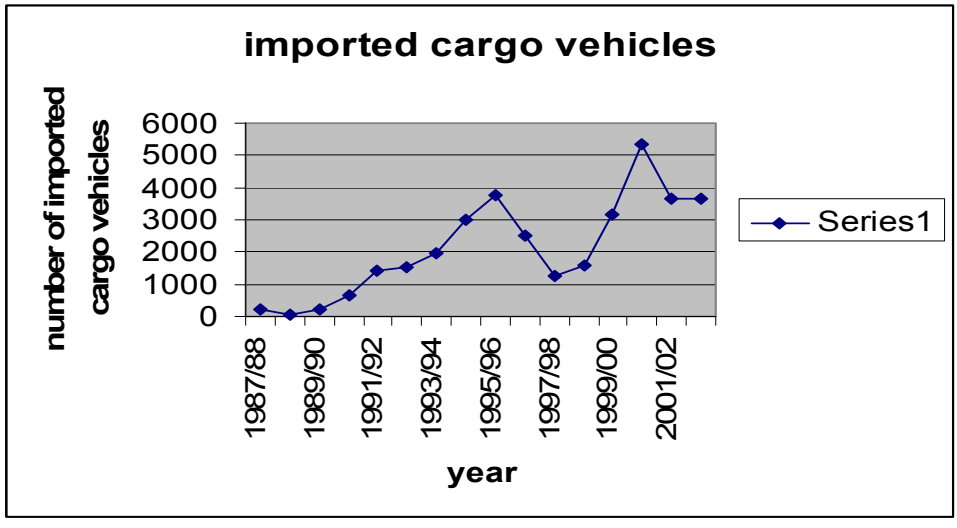
The majority of the vehicles in this country have low capacity of carrying capacity, both passengers and freight. For instance, 95% of passenger's vehicles (including private automobile) have the capacity of less than 12 seats. On the other hand, out of the freight vehicles exist in this country 66% of them have a carrying capacity of less than 120 quintals. Out of these, majority of them have between 16-120 quintals.

Table1: Imported freight transport vehicles

Year	Less than 19 Qt	20- 90 Qts	More than 91 with trailer and without	Liquid cargo vehicles	Total
1987/88	-	74	71	86	231
1988/89	2	33	73	71	79
1989/90	24	146	17	16	203
1990/91	199	425	32	7	663
1991/92	423	716	283	23	1445
1992/93	217	985	270	32	1504
1993/94	243	969	621	138	1971
1994/95	416	1327	1078	184	3005
1995/96	651	1791	1286	139	3777
1996/97	308	1205	844	144	2501
1997/98	254	600	366	39	1259
1998/99	197	616	476	312	1604
1999/00	309	941	1379	544	3173
2000/01	528	2070	2633	91	5322
2001/02	381	2040	1181	46	3648
2002/03	316	3277	1608	46	3648
Average annual new vehicle	292	1076	764	131	
% share since 1992	**12**	**48**	**35**	**5**	**100**

Source: Transport Authority, 2003 statistical abstract)

Figure 1: Imported Cargo Vehicles



Source: Calculated from above data

In general, presently, a total of about 200, 000 vehicles exist and working in this country. Out of this figure, 70% of them are private cars and the other passengers' vehicles. Concerning freight transport vehicles, between the periods 1988-2002, the growth rate of population of vehicles in this country was about 38% per annum.

From passengers side, the public transport change can be seen differently in urban public and inter urban public transport service provision. If we see the situation during the period 1992-2003, the service coverage of inter-urban public transport was showing significant progress.

In terms of urban public transport, the expansion of service is very limited only in Addis Ababa and with some efforts in Bahir Dar, Adama and Dire Dawa. Generally, the trend shows a confined service expansion in the country. It also shows that there is little attention given to expand new urban public modes except the old models of ordinary taxis and city buses.

The Ethiopian road transport is characterized by growing number of imported vehicles from year to year. In 1989, the numbers of imported vehicles were 112 at a national level. This figure has risen to 7427 in year 2003/04 and 6953 in year 2004/5. But the larger proportion of these vehicles (75%-78%, according to the world motorization standard), are private automobiles and out of these, majority of them are used vehicles. This shows the increasing trend of motorization, which has negative impact on our environment and allocation of scarce resources like foreign currency and petroleum fuel.

Table 2: Urban Anbessa Bus public transport service

	Addis Ababa		Jimma	
	Passengers in (1000)	**Distance traveled in (million)**	**Passengers in (1000)**	**Distance traveled in (million)**
1991/92	108479	8598	2091	290
1992/93	102816	8743	1674	313
1993/94	98233	8390	1807	355
1994/95	74587	5847	1761	320
1995/96	53890	4646	1384	262
1996/97	100936	8855	1265	306
1997/98	162764	15337	1396	322
1998/99	190394	18387	1312	305
1999/00	208243	19642	1230	311
2000/01	200384	18853	1108	250
2001/02	186065	18911	1407	232

Source: Transport Authority, 2003 statistical abstract)

The proportion of motor vehicles to the population of the country is extremely low compared to other African countries. According to different sources, the number of vehicles per 1000 people is only 2.2, whereas, in Kenya 13, in Namibia 85 vehicles per 1000 persons and in South Africa the figure has reached 143. This figure of the vehicles in Ethiopia is contrary to the rate (degree) of traffic accident that takes place. Despite the fact that we have low number of road vehicles we are approaching to be the first country in terms of traffic accident rate in Africa and the World.

Table 3:-The magnitude of road traffic accident in Ethiopia

	Type of accident	**Years of traffic accident**								
		1996/7	**1997/8**	**1998/99**	**1999/00**	**2000/1**	**2001/2**	**2002/3**	**2003/4**	**2004/5**
1	Light injury	2080	2444	2173	2120	2134	2196	2365	2705	2731
2	Heavy injury	1618	1762	1642	1771	1697	1712	1790	2072	2368
3	property damage	6512	7783	6560	6666	6684	7188	8563	10569	10822
4	*Death (or fatality)*	*1314*	*1313*	*1283*	*1274*	*1261*	*1659*	*1888*	*2111*	*2176*
	Sum	***11524***	***13302***	***11658***	***11831***	***11776***	***12755***	***14606***	***17457***	***16099***
	Percentage share of death	***11.4***	***9.8***	***11***	***10.8***	***10.9***	***13***	***12.9***	***12.1***	***13.5***

Source: Transport Authority, 2003 statistical abstract) and calculated

The traffic accident rate in this country is growing at alarming rate especially since 1996/97. in 1996/97 the registered traffic accident was, 11524, but after eight and nine years, the figure reached 17457, in year 2003/4. Out of these registered accident figures, the traffic accident with fatality has increased by 12% per annum on average. In Africa, Ethiopia is second next to Central African Republic, having 195.1 traffic accident rates per 10000 vehicles. The prevalence of extremely alarming traffic accident is creating large socio economic costs in actual and opportunity costs.

4. Critical problems, constraints and challenges of Ethiopian road transport sub sector

Since Ethiopia is a one of the poorest developing country, we can easily observe enormous socio economic problems and constraints. Some of the main structural and operational problems of the road transport sub sector include the following:

i. Absence of sectoral and or sub sectoral policy and comprehensive strategy.
ii. Slow changes of adopting to free market mechanism because of the impact of 17 years command and centralized approach of management and operation system in the mind of transport government institutions and operators.
iii. Shortage of transport management and planning professionals in the sector. This constraint is significantly reflected on the management and designing of strategic and system development.
iv. Low load factor of transporters (especially freight transport) and seasonal over tracking or shortage. There is seasonal unbalanced demand and supply of the freight and transporters. And also the limited area concentration (mal distribution of freight vehicles and /or cargos throughout the country).
v. Absence of and unbalanced distribution of terminals and facilities especially standardized garages, temporary parking areas, warehouses and so on. There are few concentrations of garages and warehouses in Addis Ababa and Adama.
vi. Absence of dry port (inland ports) for loading and unloading of all types of cargoes.
vii. Lack of genuine competitions among the transport operators- associations and companies and weak emerging trend of modern transport companies in the form of Share Company or PLC.
viii. Even though government is striving to extend modern standardized asphalted roads in the country, still the distribution is not proportional and percentage distribution is very low.
ix. Significant problems in relation to **road safety** because of poor quality human factor development, mainly training and provision of driving skill.

x. Absence of integrated transport system, management and communication among the federal and regional transport offices.
xi. Poor attention to the development of non motorized transport modes and their facilities.
xii. Slow and weak development and expansion of public transport. There is no initiation (effort) to introduce new types of public (mass) transport like train, trolley buses etc.
xiii. Non- or un-proportional concentration or distribution of transport vehicles in the country. There is concentration of vehicles only in few areas mainly around Addis Ababa and Adama.
xiv. Higher percentage of used vehicles importation and domination of old vehicles in the country causing the service to be unreliable and unsustainable.
xv. Poor attention to the environmental protection from operators and government institutions sides.
xvi. Low capacity of government institutions at regional and federal levels and the operators.
xvii. Structural problems and conflicts of some issued regulations among federal and regional transport offices.
xviii. Poor attitude of the operators towards giving genuine customers (passengers oriented services)
xix. Prevalence of non-uniformed traffic controlling regulations among regions and also the regulations are not updated from time to time depending on the actual situation of the country. The community in general has poor knowledge about the traffic rules and regulations. Poor implementations and initiation of realizing traffic rules and regulation from the traffic enforcing institutions sides (stakeholders).
xx. Problems of lack of information and data about the sub-sector, and the existing ones are not updated and are mostly distorted and they are not at the required standards. Weak information network between federal offices and regions.
xxi. Slow investment trend in road transport compared to non transport sectors by private sector.
xxii. Absence of efficient logistics system as a whole in the management and operation of sub sector

5. Conclusions and recommendations.

Identifying problems can be considered to be going half way to solutions. Therefore all stakeholders are expected to give attention to reduce the existing problems and constraints that exist in the sub sector.

1. Sectoral and sub sectoral policy and strategy should be prepared at federal and regional levels.
2. Awareness raising for transport operators and government office workers about modern transport management is critically important.
3. At least one logistics and transport management higher institute should be established at national level. And other higher institutions should incorporate transport management specialization at BA and above level.
4. All stakeholders, especially government offices and operators should give attention to safety and environmental protection.
5. The government should issue a regulation that can limit the age of used vehicles imported in to the country.
6. Integrated transport system should prevail among regions and federal institutions.
7. The ministry of transport and communication and the transport authority should develop a sectoral data base and information center.
8. The community, urban centers and sectoral institutions should give attention to the development of non motorized transport modes.
9. There should be focus on modernizing public transport both in inter-urban and intra-urban transport modes.
10. The sector should be investment friendly through which modern technology and attitude can be injected.
11. There should be a radical structural change from present associations-dominated operators' environment to modern company operators.
12. The regional and federal institutions should develop modern logistics that enhance the movement of goods and services, like local dry cargo port, terminal and parking areas
13. The operators should be tuned towards the attitude of providing genuine and standardized customers services.
14. The government should design and enhance the proportional distribution of road infrastructure for all.

References

agores L. (1986). Transportation and Traffic Engineering Handbook, USA

Kadiyali, L. R. (2004). Traffic Engineering and transport planning, Khanna publishers, Delhi, India

Ministry of / Infrastructure/ transport and communication (February 2004). Annual statistical bulletin, Addis Ababa, Ethiopia.

Papacostas G. C. and P. D. Prevedouros (2001) Transportation Engineering and planning, 3rd ed., USA.

Rallis, Tom (1987). Intercity Transport, Unwin brothers' ltd, Great Britain.

Temesgen Aklilu (August 2006). (EEA), The role of transport sector in the Ethiopian economic development. (Economic Focus Bulletin under published).

THE LAW AND PRACTICE OF DECISION-MAKING IN THE WORLD TRADE ORGANIZATION: DEMOCRACY AND DEVELOPMENT AT CROSSROADS

Getahun Seifu[1]

Abstract

The international legal order during the post-World War II created a favorable condition for international trade notably by introducing the principle of non-discrimination. It significantly liberalized trade by reducing the amount of tariff and non-tariff barriers on international trade and enabled countries (big or small, important or insignificant, rich or poor) to trade with reduced barriers and without discriminating each other. This happened because countries realized that they would be better-off by expanding trade. This was the underlying reason for developing countries and least-developed countries (LDCs) to join the system, which ended up in establishing the World Trade Organization (WTO) in 1995. Undeniably, they benefited from the non-discrimination principle.

The WTO is a sizeable organization with 149 memberships, over three-quarters of which are developing countries and LDCs. It has expanded the scope of GATT, which originally dealt only with goods, to include several sub-sectors such as agriculture, trade-related investment measures, sanitary and phyto-sanitary measures and technical barriers to trade. It also introduced new rules on trade in services and trade-related aspects of intellectual property rights (TRIPS). It is attempting to expand further to encompass more to cover other fields related to trade such as labor, investment, competition and transparency in public procurement.

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Currently, 32 (21.5%) of the WTO members are LDCs. Their membership is expanding. Eight additional LDCs, including Ethiopia, are in the process of accession. The objectives of economic and social development through trade are enticing especially for the poverty-stricken in the third world. However, the difference in the level of economic development of members in the GATT/ WTO resulted in inequality in absorbing the advantages offered by the system. This gave rise to the need for the introduction of the Generalized Systems of Preference (GSPs) for preferential treatment of developing countries as well as LDCs.

The WTO Agreement articulates under Article IX (1) that WTO follows the GATT practice of decision-making by consensus and, failing such, decisions could be taken by votes (simple-, two-thirds-, three-fourths majority, or unanimous votes, as the case may be). As reaching consensus proved to be very difficult, developed countries especially the United States, the European Union, Canada and Japan (otherwise known as "Quads") developed informal/secret meetings with the prime purpose of agreeing on an issue in a small "inner circle" and attempting to have it adopted by the rest of the membership. The LDCs do not take part in such meeting.

Trade is essential for LDCs as it deals with crosscutting issues for their development. However, despite the MFN as well as preferential treatments and contrary to their increase in number, their share in international trade continues to decrease. This raises a big question: why? As Stiglitz and Charlton remark that trade may be necessary for development, but it is not sufficient. In the right circumstances, trade liberalization creates opportunities for development but other factors determine the extent to which those opportunities are realized[2]. These "other factors" could be taking full part in the operation of the system. This shows how the entire system is undemocratic, skewed and tilts too much towards developed countries. As a consequence, members are losing hope in the system. For these reasons, it is high time to consider reviewing the decision- making process in the light of the "aid-for-trade" agenda underway.

[2] Joseph Stiglitz and Andrew Charlton, *Aid for Trade: A Report to the Commonwealth Secretariat* (March 2006), 3 (Emphasis added).

1. Introduction

The multilateral trading system has created favorable conditions for liberalization of international trade notably by introducing the principle of non-discrimination. This liberalization significantly reduced the amount of tariff and non-tariff barriers on international trade and enabled countries (big or small, important or insignificant, rich or poor) to trade with reduced trade barriers. Undeniably, all Members have benefited from this.

The World Trade Organization (WTO), established in 1995, is a sizeable organization with 150 Members, over three-quarters of which are developing countries and least developed countries (LDCs). It expanded the scope of the General Agreement on Tariffs and Trade (GATT), which originally dealt only with goods, to include several sub-sectors such as agriculture, trade-related investment measures, sanitary and phyto-sanitary measures and technical barriers to trade. It also introduced new rules on trade in services and trade-related aspects of intellectual property rights (TRIPS). It is attempting to expand further to cover other fields related to trade such as labor, investment, competition and transparency in public procurement, which otherwise could be referred to as the "Singapore Issues".

International trade is essential as it deals with crosscutting issues for development. WTO's objectives of economic and social development through trade are enticing especially for those Members that are poverty-stricken. This justifies the need for ensuring their full and effective participation in the system and fighting poverty. It is a matter of public knowledge that developing countries and LDCs are not benefiting from the international trading system to the extent they expected. In this regard, the annual reports of the United Nations Conference on Trade and Development on LDCs confirm that they are not benefiting from the multilateral trading system and warn that if the trend continues, they would likely be the 'main locus' of extreme poverty by 2015 (see below). This begs a question: why? The answer is short:

"Trade may be necessary for development, but it is not sufficient. In the right circumstances, trade liberalization creates opportunities for development but *other factors* determine the extent to which those opportunities are realized." (Stiglitz and Charlton, 2006: 3)

These "other factors", which are quite important to make international trade work for all, would certainly embrace taking full part in the day-to-day operations, particularly the decision-making process of the system. Sadly, however, the law and the practice of decision-making in the WTO are different and the practice totally disregards and

excludes them from participation. It deliberately favours developed countries and allows them to conduct every decision only in their interest disregarding the obvious legal provisions.

This research looks into the undemocratic and skewed decision-making practice of the WTO. Thus, the first part of this research provides an overview regarding the relevance of international trade for development. The second part discusses the most important features of the WTO and demonstrates the influence of the WTO in liberalizing international trade. It attempts to depict how the WTO impacts Member States to liberalize their trade. This leads to the third part that analyses the law and practice of decision-making in the WTO. It focuses on the legal provisions on decision-making in the WTO and the 'practice' of decision-making with particular emphasis on 'informal meetings' to build consensus. Accordingly, it discusses how the practice of consensus developed to the complete exclusion of voting; and how the entire system functions. The legal and some economic implications of this practice to developing countries and LDCs will be dealt with in part four. The author wishes that studies on the exact economic impacts or costs of such exclusion of developing countries and LDCs from the decision-making process would be taken up in the future by economists. Finally, the last part contains conclusions.

2. Brief Overview to the Development of the WTO Legal System

Countries have traded among themselves for centuries. It is self-evident that a country cannot produce sufficient quantities of everything it needs while another country produces more than its needs. It is well established that "there is a crucial link between the nature and extent of a country's foreign trade and the rate and pattern of its general economic development."[3](Findlay, 1973:1 and Freeman 1971:4). Therefore, the fundamental question here is not whether trade helps countries in their developmental endeavors but how it could effectively be utilized for a meaningful share. To materialize this, countries started formalizing their trading relationships and concluded bilateral as well as multilateral trade agreements since centuries back (Jackson, 1997: 35, Mattli, 1999: 1 and Trebilcock and Howse, 2005:1).[4] Among the multilateral efforts for such formalization is the attempt to establish an International

[3] Freeman argues: "Nations trade because it is beneficial to do so, beneficial in the sense that it permits economic units (firms, households, governments) to exchange goods and services they can produce relatively more cheaply for those goods and services that they desire but could only produce for themselves at a higher cost."

[4] Jackson traces the origin of international cooperation to discipline national actions affecting international trade to the time of the Middle Ages.

Trade Organization (ITO) in 1947, immediately after the end of WWII, though the effort proved unsuccessful. However, it aided in the creation of a strong legal regime on international trade known as the GATT between 23 signatories, which came into effect on 1 January 1948. The WTO evolved from GATT and became a full-fledged organization on 1 January 1995.

The strong relationship between trade and development is evident from the preamble of the Marakesh Agreement Establishing the World Trade Organization (WTO Agreement, 1995) as well. The WTO aims, according to the preamble, at raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand in the economies of its Member States. The preamble also indicates that expanding the production of and trade in goods and services, and developing an integrated, more viable and durable multilateral trading system will complement this. No doubt, these objectives could be taken for the ultimate objectives of joining the international trading system speaking in terms of economics. In order to achieve this, the WTO operates, as reiterated in the preamble, by requiring its Members to enter into reciprocal and mutually advantageous arrangements directed to the substantial reduction of tariffs and other barriers to trade and to the elimination of discriminatory treatment that hinder free trade. This reduction and elimination of discriminatory tariffs entailed measures such as the lowering of import tariffs, elimination of import quotas, commitments to abolish export subsidies and easing other national laws and regulations.

More importantly, the WTO Agreement as well as the agreements under it recognize the need for positive efforts to support developing countries as well as LDCs so that they secure a share in the growth in international trade commensurate with the needs of their economic development *(Ibid*, para. 2 of the Preamble), and compete on par with their developed counterparts in the multilateral trading system. What constitutes “commensurate” to secure a fair share in the growth of international trade with the needs of one's economic development is at best nebulous. Roughly speaking, it refers to the discrepancy in the level of development of Members as could be reflected in their capacity to utilize the opportunities proffered by the system. Thus, it underscores the need for some Members to be treated more favorably and receive a support proportional to the needs of their economic development.

3. The Salient Features of the WTO Legal System

There are many public international organizations dealing with international economic issues one way or another. The Economic, Cultural and Social Council of the United Nations, the United Nations Conference on Trade and Development, the International

Monetary Fund, the World Bank and the World Intellectual Property Organization are just a few examples. The WTO, with an ever-expanding competence, is the only most prominent organization targeting the gradual liberalization of trade among the international community. In what follows, the major distinguishing characteristics of the WTO and its legal system will be presented with the view to vindicating its very intricate and influential nature.

In the organizational structure of the WTO, the highest decision-making body is the Ministerial Conference (the Conference). According to Article IV, the Conference is composed of representatives of all Member States and meets at least once every two years. It is granted with the authority to take decisions on all matters concerning the WTO. Under the Ministerial Conference there is the General Council, which is empowered to carry out the day-to-day functions of the WTO. The General Council is composed of representatives of all the Members and during the intervals between meetings of the Conference, it is delegated with all the Conference's functions. As stated under Article IV (3) and (4), in addition to conducting regular work on behalf of the Conference, the General Council convenes in two particular forms as appropriate: (1) to discharge the responsibilities of the Dispute Settlement Body (panels and the Appellate Body) as provided for in the Understanding on Rules and Procedures Governing the Settlement of Disputes (commonly known as the Dispute Settlement Understanding); and (2) to discharge its responsibilities as a Trade Policy Review Body as provided for in the Trade Policy Review Mechanism.

The General Council delegates its responsibility to three subsidiary councils (Council for Trade in Goods; Council for Trade in Services; and Council for Trade-Related Aspects of Intellectual Property Rights) and several committees designated with special purposes by the Conference. The councils[5] and the committees with special designation operate under the guidance of the General Council in their respective areas of specialization. The committees designated with special mandate are the Committee on Trade and Development; the Committee on Balance-of-Payments Restrictions; the Committee on Budget, Finance and Administration; the Committee on Trade and Environment **(**WTO, 2002: 411); the Trade Negotiation Committee

[5] The Council for Trade in Goods, with committees and a working party under it, oversees the functioning of the multilateral trade agreements in Annex 1A: GATT 1994 and the Understandings under it, Agreement on Agriculture, Agreement on Sanitary and Phyto-sanitary Measures, Agreement on Technical Barriers to Trade, Agreement on Trade-related Investment Measures, Agreement on the Implementation of Article VI of the General Agreement on Tariffs and Trade 1994, Agreement on Pre-shipment Inspection, Agreement on Rules of Origin, Agreement on Import Licensing Procedures, Agreement on Subsidies and Countervailing Measures, and Agreement on Safeguards; the Council for Trade in Services, with a committee and working parties under it, oversees the functioning of the General Agreement on Trade in Services (GATS); and the Council for Trade-Related Aspects of Intellectual Property Rights (TRIPS) oversees the functioning of the Agreement on TRIPS.

(WT/MIN (01)/DEC/1, 2001, para 45)[6]; and the Committee on Regional Trade Agreements, which carry out functions assigned to them by the WTO Agreement and any additional functions assigned to them by the General Council. The Committee on Trade and Development, for instance, is specially assigned to periodically review the special provisions in the multilateral trade agreements in favor of Members that are LDCs and report to the General Council for appropriate action. These committees operate by breaking up into working parties (in cases of accession), working groups such as the working group on trade and technology and negotiating groups such as the negotiating group on rules (See WTO, 2005:103 for a diagram of WTO structure). Furthermore, there are informal groupings based on ground such as regions, level of development, and area of interest. Each of the organs has its own working procedures and internal rules. In principle, membership in these organs is open to representatives of all Members except the proceedings of the panels and the Appellate Body, which are the dispute settlement arms of the WTO as discussed below. It would, therefore, not be an exaggeration to say that the institutional framework of the WTO is highly complicated when viewed from the limited resources available to developing countries and LDCs.

Trade being a vital transaction in an economy, it becomes inevitable that disputes could arise due to conflicts of interest. For this reason, Members have created a dispute settlement mechanism and the WTO administers it through the General Council in accordance with Article III (3) of the WTO Agreement. This dispute settlement mechanism is the central pillar of the system *(Ibid,* 55). It aims at making the system more effective, secure and predictable. As referred to above, it has panels and an Appellate Body review mechanism[7] with detailed rules and procedures for handling disputes. The dispute settlement process commences upon complaint of a Member and the panels and the Appellate Body have, in several instances, reviewed the consistency of national legislations and policies of Member States with their obligations under the various multilateral trade agreements. This Dispute Settlement Understanding has strict implementation mechanisms for non-compliance with decisions rendered by the panels or the Appellate Body.[8] This has enabled the WTO to control the conduct of Members in respect of the proper implementation of their respective obligations.

The WTO also manages the Trade Policy Review Mechanism as per Article III (4) of the WTO Agreement. This review mechanism enables a regular collective

[6] The Trade Negotiation Committee is established by the Doha Ministerial Declaration in 2001 to organize and carry out all the trade negotiations to be pursued under that Declaration.

[7] *See* Articles 6 and 17 of the Dispute Settlement Understanding.

[8] *See* Articles 21 and 22 of the Dispute Settlement Understanding, where in case of non-compliance with rulings, suspension of concessions is legally envisaged.

appreciation and evaluation of the full range of individual Member's trade policies and practices and their impact on the functioning of the multilateral trading system (WTO, 2002: 383). It carries out periodic reviews on a Member State to ensure the transparency of its domestic system, legal and policy, to the rest of the membership. According to Article XVI (4) of the WTO Agreement, each Member is obliged to ensure the conformity of its laws, regulations and administrative procedures with its obligations under the multilateral trading system. This suggests that the WTO, through the Dispute Settlement Body and the Trade Policy Review Body, has the competence to review the domestic laws, regulations and even administrative procedures of Member States; and if they do not comply, require them to *amend* them and bring them into compliance.

Underscoring the linkage between trade and financial matters, paragraph 5 of Article III of the WTO Agreement grants the WTO with the power to harmoniously work with the International Monetary Fund and the World Bank, which have been working towards greater coherence in global economic policy-making and interdependence, and hence globalization, of the international economy since the 1940s. A Declaration was also adopted at the end of the Uruguay Round of Trade Negotiations in 1994 to facilitate this concern of greater coherence (WTO, 2002: 386). This Declaration, recognizing that the globalization of the world economy has led to ever-increasing interactions between the economic policies pursued by Members, reiterates that the WTO should pursue and develop cooperation with international organizations such as the International Monetary Fund and the World Bank, which are responsible for monetary and financial matters. A former Director-General of the WTO argues "…globalization makes it essential that the WTO coordinate more closely with the International Monetary Fund and the World Bank to ensure that their policies are cohesive and mutually supportive" (Panitchpackdi, 2001: 35). Not surprisingly, thus, the WTO has strong global economic policymaking mandate and is an agent of globalization[9] in the pretext of being a forum for international trade negotiation.

Article III (1) and (2) of the WTO Agreement provides that WTO is run by a Secretariat that has limited functions. The functions of the Secretariat are limited to *facilitating* the implementation, administration and operation of the WTO Agreement and the multilateral trade agreements as well as serving as a *forum* for negotiation concerning matters dealing with these agreements or future negotiations on multilateral trade among Member States. In this regard, paragraph 2 provides:
The WTO shall provide the *forum for negotiations* among its Members concerning their multilateral trade relations in matters dealt with under the agreements in the

[9] There are mixed views as to whether globalisation could be beneficial or not to the international community, particularly to developing countries and LDCs.

Annexes to this Agreement. *The WTO may also provide a forum for further negotiations among its Members concerning their multilateral trade relations,* and a framework for the implementation of the results of such negotiations, as may be decided by the Ministerial Conference. (Emphasis added).

Thus, the Secretariat is not delegated with broad powers in respect of operationalising the multilateral trading system. This limited mandate made the WTO to be referred to as a 'member-driven' organization (WTO, 2005: 101). The WTO Secretariat also confirms that its functions are: "administering WTO trade agreements, handling trade disputes, monitoring national trade policies, technical assistance and training for developing countries and cooperation with other international organizations." (WTO, 2006) Therefore, the WTO, as an organization, does not even enjoy the competence to draft agenda for meetings of the Member States and influence them in any way; it is the Member States that are mandated to take any action in the decision-making process. The Secretariat only provides technical and administrative support required by the Member States that engage in the decision-making process (Narlikar, November 2001: 2).

Another important aspect of the WTO is the way its agreements are accepted. As noted above, the WTO covers a large group of agreements ranging from goods and services to intellectual property and environmental issues while attempting to expand further. Regarding membership to these agreements, the WTO follows what is known as the principle of "single undertaking". This principle requires all the separate agreements under the WTO to be part of a whole as an indivisible package so that they could not be accepted separately. Stated differently, the principle states: "Nothing is agreed until everything is agreed" except for the so-called Plurilateral Agreements[10]. This principle is derived from Article II (2) of the WTO Agreement that articulates that the agreements and associated legal instruments included in Annexes 1, 2 and 3 (the GATT, the General Agreement on Trade in Services and the Agreement on Trade Related Intellectual Property Rights respectively) are its integral parts, binding on all Members. In addition, the second sentence of Article XII (1) dealing with accession mandatorily requires acceptance to the WTO Agreement and the multilateral trade agreements annexed thereto together. This "'take it' or 'leave it' altogether" approach denies countries of making choice to conclude agreements that only benefit their economy. They can only accept *en mass* those agreements that they do not want along with the ones they approve. Denying choice, it entails roughly the same obligation to all Members. This has proved to be too demanding in terms of the volume of reforms of legislations required, implementation finance and expertise

[10] These are the Agreements on Trade in Civil Aircraft, Agreement on Government Procurement, International Dairy Agreement and International Bovine Meat Agreement (the last two expired in 1997).

needed as well as broad liberalization of the fledgling economies of developing countries and LDCs at once.

In sum, the WTO provides substantive codes of conduct directed at the reduction of tariffs and other barriers to trade and the elimination of discrimination in international trade relations (Qureshi, 1996: 5) and ensures their implementation. The question that should be raised at this juncture is how the WTO takes decisions.

3. Decision-Making Process in the WTO Legal System

3.1 Analysis of the Text of the WTO Agreement

The decision-making procedures of the WTO are stipulated under Articles IX, X and XII of the WTO Agreement. While Article IX deals with the regular day-to-day decision-making procedures of the WTO, Articles X and XII address decision-making process in the instances of amendment and accession respectively. In general terms, the WTO adopts four procedures of decision-making. These are decision-making by consensus; unanimous vote; special majority vote; and simple majority vote.[11] Now, let's discuss the legal provisions dealing with these decision-making procedures one after the other.

a) Consensus: The language of the first sentence of Article IX (1) clearly demonstrates that the WTO decision-making process follows GATT's long tradition of consensus. Article XVI (1) reaffirms this practice stating that "…the WTO shall be guided by the *procedures and customary practices* followed by GATT 1947 [Members] and the bodies established in the framework of GATT 1947" except as otherwise provided under the WTO Agreement or the multilateral trade agreements. The formal decision-making process under GATT 1947, according to Article XXV (4) of the GATT, was by a majority of votes cast with the one-member-one-vote principle. Under exceptional circumstances, for waiver of obligations (Article XXV (5) of the GATT) and admission of new Members (Article XXX of the GATT), the Members could take decision by a two-thirds majority. However, this voting procedure was never followed except in a couple of instances of waiver and accession (Ehlermann and Ehring, 2005: 62). Therefore, in much of GATT business, a decided preference

[11] In this regard, Article IX (1) of the WTO Agreement states the general rules for the decision-making procedure as follows:
The WTO shall continue the practice of decision-making by *consensus* followed under GATT 1947. Except as otherwise provided, the matter at issue shall be decided by voting. At meetings of the Ministerial Conference and the General Council, each Member shall have one vote. … Decisions of the Ministerial Conference and the General Council shall be taken by a *majority of the votes cast,* unless otherwise provided in this Agreement or in the relevant Multilateral Trade Agreement. (Emphasis added)

for "consensus" approach was developed to avoid the formal voting (Jackson, 1997: 65).[12]

This practice is elevated in the WTO and given explicit legal status. According to Article IX (1), decision-making by consensus is the rule. A body concerned [in the WTO] shall be deemed to have decided by consensus on a matter submitted for its consideration, if no member, present at the meeting when the decision is taken, *formally objects* to the proposed decision[13]. At first glance, this appears to make the WTO a democratic organization, as any Member could at any stage formally object to or "veto" a decision from being taken. However, one should wonder as to what "formally objects" means? Does it mean a simple showing of hands, or providing a reasoned objection in a written form, or either of the two? The 'formality' aspect makes it explicit that it applies to presenting one's reasons for objection in a written form to the membership for consideration. That is where flaws in the system come to light. Although in theory developing countries and LDCs could use their right to object to consensus, using it every time they have an objection becomes very difficult due to several constraints including human resources. In addition, presenting formal objections with documented reasons could subject them to unexpected reprisal at any future time based on that specific objection document. In this regard, some conclude that countries might find decisions being taken that they do not want (Jackson, 1997: 65).

It is worth noting that, by way of exception, some decisions in the WTO can be taken only by consensus. These exceptions are: (i) decision by the Dispute Settlement Body (Article IX (1), footnote 3) [14]; (ii) request for waiver in respect of an obligation subject to a transition period or a period for staged implementation, such as interim agreements for the formation of a free-trade area or a customs union, that the requesting Member has not performed by the end of the relevant period (Article IX (3), foot note 4); (iii) decision to approve amendments to the Dispute Settlement Understanding (Article X (8), second sentence); and (iv) decision to add a particular multilateral trade agreement to the list of Plurilateral Agreements (Article X (9)). A question that arises is what happens if consensus cannot be reached in these circumstances? The WTO Agreement does not provide other options. Here again, one can see how the weaker Members could be exposed to arm-twisting to reach a consensus, which remains to be the only option. How consensus in general, including

[12] It should be underscored that there is no formal voting to express ones agreement in the consensus procedure. Members not formally objecting are assumed to have agreed.

[13] *See* WTO Agreement, footnote 1 to Article IX (Emphasis added). It should also be noted that Article X (1) also envisages consensus for amendments.

[14] The Dispute Settlement Body adopts a "reverse consensus" procedure i.e., a consensus is required to halt proceedings or reject related proposals or the adoption of reports (See Adamantopoulos, 1997: 55).

under such exceptional circumstances, would jeopardize the interests and rights of developing countries and LDCs and its implications will be explored in depth in the following sections.

b) Unanimous Votes: Recognizing that it is not possible to forge consensus for all matters, the WTO Agreement allows Members to cast votes (apart from those exceptional situations where consensus is the sole option). Article IX (1) demonstrates that the WTO follows a one-member-one-vote rule and every Member[15] shall have one vote. Unanimous vote is required to take amendment decisions on Article IX (decision-making) of the WTO Agreement; Articles I (most-favoured nation treatment) and II (schedule of concessions) of GATT 1994; paragraph 1 of Article II (most-favoured nation treatment) of the General Agreement on Trade in Services; and Article 4 (most-favoured nation treatment) of the Agreement on Trade Related Aspects of Intellectual Property Rights (WTO Agreement, Article X (2)). It should be noted that unanimity is different from consensus. Consensus cannot be unanimity simply because the latter requires all Members to vote in favour of an issue and if that fails decision cannot be taken. Unanimous agreement will be the only and last option. In consensus as well all Members are expected to agree on a matter. Nonetheless, if a Member(s) disagree(s) in the process of building consensus, which is a tedious process of convincing others to agree to a given proposal, there is an obligation to resort to other voting mechanisms. Unanimous voting does not entail such an obligation though there could be attempts to convince others before voting.

c) Special Majority Votes: A failure to reach consensus does not mean that a matter would be decided just by simple majority votes cast[16]. There are levels in majority voting itself. Article IX (1) envisages some specific voting situations where simple majority voting cannot be used. Three-quarters of the WTO Members have to cast vote to adopt an interpretation of the WTO Agreement and any of the multilateral trade agreements. This authority is exclusively given by Article IX (2) to the Ministerial Conference and the General Council to be exercised on the basis of recommendations proffered by the respective councils overseeing the functioning of a specific agreement. By the same majority of three-quarters, the Ministerial Conference may decide to waive an obligation imposed on a particular Member by a multilateral trade agreement after consideration by the relevant Council on Goods, Services or Intellectual Property Rights (Article IX (3) (b)). In the same manner, Article X (3) provides for a three-fourths majority in a case of an amendment that

[15] The European Communities is a Member of WTO, as an independent customs territory, and represents its member states with exactly the same vote, as they would have had had it not been for its membership.
[16] *See* the meaning of simple majority voting below.

alters the rights and obligations of Members and the fate of a Member that has not accepted such an amendment within a period specified by the Ministerial Conference.

On the other hand, Articles X and XII of the WTO Agreement provide for decision-making by two-thirds majority. According to Article X (1), (3), (4) and (5), decisions to amend the provisions of the multilateral trade agreements can be adopted by a two-thirds majority depending on the nature of the provision concerned. And, according to Article XII, a decision to admit a new Member, together with its agreement on the terms of accession, is taken by a two-thirds majority of the Ministerial Conference.

d) Simple Majority Vote: Apart from the specific instances of consensus and unanimity discussed above, if consensus is not reached, Article IX (1) allows Members to take all other decisions by simple majority vote.[17] This gives the impression that the WTO is a democratic and transparent organization. Given that the majority of WTO Members are developing countries and LDCs, if majority votes, at any level, were the frequent means of making decisions, it would be very easy for them to use the WTO system to properly advance their collective interest.

3.2. Analysis of the Practice: The "Green-Room" Meeting and Consensus

Despite all the above varieties of decision-making procedures, the WTO uses only consensus to adopt decisions on the pretext that vote cast would favour only developing countries and LDCs. Some writers remark that WTO "even replaced votes with consensus where votes had existed in the GATT, such as in relation to accession and waivers" (Ehlermann and Ehring, 2005:64, and Sutherland and et al 2004: 63). The philosophy is this: 'not to allow progress to be frustrated by one party's obstinacy, unless it happened to be one of the major trading powers' (Narlikar, 2001:2), and this was evident during the Uruguay Round of Trade Negotiation itself (Schott and Watal, 2000). Nonetheless, consensus makes taking decisions on divisive issues very difficult, as all the Members have to agree and make no formal objection. In such circumstances, if vote cast has to be resorted to, it is obvious that developing countries and LDCs would outvote the rest of the Members. It should be noted, however, that voting has tremendous politics as between developed countries as well. This would be the case with the United States, tough competitor with the European Union, having only one vote as opposed to the European Union's more

[17] Simple majority refers to any number of members greater than half of the membership of the WTO. But it is arguable whether this refers only to members present or to those that are absent from a particular meeting when decision was taken.

than two-dozen votes. This dilemma of how to adopt decisions resulted in small informal meetings, infamously known as the "Green-room Meeting"[18].

The consensus decision-making system worked during the GATT era because (i) there was only small number of participants; (ii) consensus involved only those that have significant interest in an issue; and (iii) most of the developing countries as well as LDCs at that time were 'passive' members (Schott and Watal, 2000 and Michaelopoulos, 1998:2). In other words, the process of consensus building broke down due to the increase in membership and the desire for active participation by the latecomers to the system *(Id)*, particularly developing countries. Thus, the major trading Members, who consider themselves as the guardians of the international trading system, had to design informal procedures[19] to win consensus among all the Members. The WTO Secretariat says that there are a number of groups and alliances though there are no hard and fast rules about the impact of groupings in it (WTO, 2006). According to the Secretariat, some of the most difficult negotiations have needed an initial breakthrough in talks among the four largest Members known as the "Quadrilaterals" or "Quads": Canada, the European Union, Japan and the United States (*Id*). Justifying this, the Secretariat argues that:

These smaller *meetings* have to be handled sensitively. The key is to ensure that everyone *is kept informed* about what is going on (the process must be "transparent") *even if they are not in a particular* consultation or *meeting*, and that they have an opportunity to participate or provide input (it must be "inclusive")…. These meetings can be called by a committee chairperson as well as *the director-general*… So, efforts are made to ensure that the process is handled correctly, with *regular reports back* to the full membership (WTO, 2005: 104). (Emphasis added)

This affirms that the majority of the membership will be kept informed about the result of an inner- circle meeting, which "operates at each level of decision-making of the WTO" (Narlikar, 2001:2). Even worse, such meetings can be called by the Director-General of the WTO, who has only limited functions as per Article III of the WTO Agreement and in violation of his impartial role under Article VI (4). The rest of the Members have to rely on these 'regular' reports from these meetings.

[18] The name 'Green Room' came about as a result of holding 'consultations' or meetings in the office of the Director-General of the GATT Secretariat. Meetings were being held in his room, which happened to be green in colour, and the name of the meeting became named after the colour of his office. Such meetings have also started taking place in Member States, outside of Geneva, with the name "Mini-ministerial Meetings".

[19] Normally, there is no problem with informal procedures. They are in use in both national and international jurisdictions. They could even be taken as practical ways out to achieve an otherwise difficult or impossible decision. The caution required is that they have to be participatory to all interested if they have to properly achieve their goal.

It could be concluded that the "Green-room" meeting is a "behind-the-scenes" meeting that is reserved only for some Members of the WTO. Participation in this meeting is on the basis of self-selection or invitation and there are no objective criteria for that. Those who consider themselves as the major trading powers will always be part of the meeting in addition to leading it, of course, and they will invite those who claim to have significant interest in the particular issue. This latter group of countries are, in theory, selected to represent other countries that could have interest in the result of the meeting as well. The average number of countries that take part in these meetings are around 20; sometimes the number could reach as many as 40 (*Ibid*, 3 and WTO, 2005: 104). Such meetings take place between Canada, the European Union, Japan and the United States along with countries that express vital interest in the discussion and countries that have played leading role in GATT/WTO such as Australia, New Zealand, Switzerland, Norway and possibly one or two transition economy countries; and a few developing countries such as Argentina, Brazil, Chile, Colombia, Egypt, China, India, Kenya, Korea, Mexico, Pakistan and South Africa that get invitation to participate; and more recently Bangladesh as Coordinator of LDCs (*Id* and Schott and Watal, 2000). Some reports show that some LDCs such as Zambia, Rwanda, Senegal and Benin took part in a Mini-ministerial meeting that took place in March 2005 being invited by Kenya because Kenya was the host to that particular meeting (Global Exchange, 2006).

One may ask why developing countries and LDCs should be excluded from the important decision-making process at this early, consultative stage. The main reason appears to be that they only constitute a small share of the international trade in terms of volume (Van Den Bossche and Alexovicova, 2005: 672)[20] and, consequently, it would be adequate if other countries that have similar interest *de facto* represent them. An argument is also heard that, even if they are given the opportunity, most of them, particularly LDCs, do not have Missions in Geneva, the headquarters of the WTO, to attend all WTO meetings (WTO, 2005:95)[21] and their exclusion would not mean anything significant. Even those that have Missions in Geneva do not have sufficient manpower to follow up WTO matters, as their delegates will be accredited to follow-up other institutions such as the United Nations, the International Labour Office, the United Nations Conference on Trade and Development, and the World Intellectual Property Organization. Be that as it may, can it be said that developing countries and LDCs have lesser interest in international trade just because they have lesser share in it? Would lack of Missions and sufficient manpower in Geneva justify

[20] They argue that the share of developing countries and LDCs in international trade is only about 30% as against 70% by developed countries.

[21] The WTO Secretariat states that only about one-third of LDCs Members of the WTO have their Mission in Geneva just due to lack of resources to cover accompanying costs.

bad governance and undemocratic rule? Is it not ironic that even those that have resident Missions in Geneva are being excluded from the decision-making process?

4. Some Implications of the Exclusive Decision-Making Practice

The negotiations in the Green-room Meeting are "in reality full-fledged negotiations"(Lal Das , 2005). The Secretary-General of the United Nations Conference on Trade and Development describes them as "a process in which a group of up to 40 member countries, including many developing countries, try to *reach preliminary agreements* on matters under negotiation, and then present them to the rest of the delegations" (Ricupero, 2001: 42). Afterwards, the preliminary agreements reached in the inner-circle negotiation are communicated to the rest of the Members for adoption. Lal Das (2005) summarizes the process as follows:

Pressures are built on the […] countries that [oppose] the proposal. Depending on the intensity of the opposition, the pressures may be applied on the delegations in Geneva or even bilaterally in the capitals. The usual technique of winning over the opponents one by one is also applied. And finally the hardcore opponents are left with the option of either keeping quiet or withholding consensus in the open meeting. Very often they do not want to incur the political cost of formally opposing a decision at the end, if they are left alone or are in a very small group. The decision is thereby taken in the open meeting by consensus.

This denies the other Members such as the LDCs the opportunity to present their views and alternatives. This is a negative consequence of the opaqueness of the decision-making procedures. This has already developed a feeling of non-inclusiveness and alienation for the majority of the Members, i.e., developing countries and LDCs. Thus the quest for consensus is becoming destructive for the entire system of the WTO. Several decisions such as those on accession[22], regional trade agreements and many others could not be taken just because one Member insists that it would not agree. This hampers countries from taking positive moves to join the system and contribute for its objectives. Even if they become Members, it makes them feel uneasy about it and open their markets unnecessarily meticulously, inviting a dispute to occur.

[22] For e.g. see the accession processes of countries such as China, Russia and Algeria, which took several years.

The WTO is described as "rules-based", a system based on rules that governments negotiated (WTO, 2005: 23). However, it is effectively closing off and excluding developing countries and LDCs from meaningful participation in its proceedings. This can be attacked from different angles. First, the WTO has now 150 Members, of which about ¾ are developing countries and LDCs. From the total membership some 32 countries (about 21.5%) are LDCs (WTO, 2006).[23] As a result of this enlargement and pursuant to the broad liberalization entailed by the "single undertaking", developing countries and LDCs have greater stake in the world trading system and hence greater claim to participate in the decision-making process than before. Second, experience demonstrates that when countries joined the GATT/WTO after it was established, they had to accept and enforce regulatory policies or obligations already developed without their participation. That was profoundly difficult for them to accomplish, as they did not participate in its formulation. That should not be repeated again.

Now that several negotiations on the expansion, amendment and clarification of the rules of WTO are ongoing under the "development round"[24], developing countries and LDCs have enormous interest in full and effective participation to safeguard their interests. Research conducted by international organizations such as the United Nations Conference on Trade and Development (UNCTAD) demonstrate that they are not benefiting from the international trading system as contemplated. In this relation, the 1999 UNCTAD Report on LDCs says that the 1990s had become a decade of increasing marginalization for LDCs. The 48 LDCs, whose population accounted for about 13 per cent of the world's total population in 1997 had a share in world exports and imports that year of only 0.4 per cent and 0.6 per cent, respectively, representing a decline of more than 40 per cent since 1980 (UNCTAD, 13 February 2000). The 2004 UNCTAD Report on LDCs, while admitting absence of any progress, indicates that if this trend continues, the LDCs will be the main locus of extreme poverty in the world economy by 2015 (United Nations, 2004: 2). This flies directly in the face of the objectives and principles of the WTO, as emphasized in its preamble and its sectoral agreements. As a result of this, some delegates are quoted as furiously complaining: "No one combs our hair in our absence" (Blackhurst, August 2000: 4); "the majority of us are galloping in the darkness" (United Nations, 2004: 23) and so forth. Kofi Annan, former Secretary-General of the United Nations, underscores this by saying, "[developing countries and LDCs] have found the result

[23] WTO states that more than twenty countries including eight additional LDCs are in the process of accession to the WTO. The LDCs are Bhutan, Cape Verde, Ethiopia, Laos, Samoa, Sudan, Vanuatu and Yemen. Furthermore, Equatorial Guinea and Sao Tome and Principe, which are also LDCs, are Observers and they have to start accession negotiations within five years of having such a status.

[24] Note that this Round of negotiations is suspended as of June 2006, generally speaking, due to disagreements between developed and developing countries.

disappointing - not because free trade is bad for them, but because they are still not getting enough of it." (Annan, 2001: 21). What needs to be balanced is not the share in international trade but rather the interest behind it, i.e., all the citizens of WTO Members want to be fully employed and improve their life standards. Those lives behind the 70% of international trade do not have a superior interest in the betterment of their life standards than those behind the 30%.

As can be seen from this, developed countries do not observe the rules they adopted but they continue committing themselves more and more. Commitment without realization or proper implementation does not lend a hand in the development endeavours of developing and least-developed countries. Interestingly, some liken this to the story of *Alice in Wonderland* where Alice falls into Wonderland and starts crying (Watkins, 2002: 3). She tells herself to stop but cannot. She gave herself a wealth of advice but very seldom followed it. Developed countries behave in exactly the same manner. They commit themselves to certain types of conduct especially with the view to assisting in the development endeavours of developing and least-developed countries; but fail to follow through. Aristotle, as quoted in Weiss (2002: 68), identified the cause of this problem centuries ago stating expressly that "[t]he task of confronting… all who seek to set up a constitution of a particular kind, is not only, or even mainly, to set it up, but rather to keep it going." Be that as it may, arm-twisting to win consensus in lieu of voting violates the WTO law itself and it is illegal by any standard. Viewed from the very perspective of advanced countries that advocate democratic administration, it is undemocratic, unjust, hypocritical and unreasonable to developing countries and LDCs and stands as a hurdle on their way to development.

5. Conclusion

It is clear that international trade is crucial for economic development and this is well recognized by the WTO Agreement and its sectoral agreements. The emergence of the WTO with an unprecedented extensive competence and coverage, its authority to review the level Members' trade liberalization, and the principle of *en mass* acceptance enormously increases the interest for active participation in the decision-making process.

The consensus decision-making practice of the GATT 1947, which evolved into the WTO decision-making practice, has to reflect these vital facts and developments. The Green-room Meeting, as sometimes referred to as Mini-ministerial Meeting, in which only very few Members participate without any defined criteria for selection, excludes the majority, i.e, developing countries and LDCs, just for fear of being outvoted. This

exclusive practice of decision-making by consensus has caused some tragedies to the multilateral trading system threatening its very existence. Cases in point could the debacles at Seattle (1999) and Cancun (2003) Ministerial Conferences when a group of developing countries and LDCs disrupted the entire process, as they were excluded from discussion on critical areas such as agriculture, which is the mainstay of their lives (Weiss, 2002:70).

The Green-room Meeting and the practice of consensus have also caused overwhelming suspicion over whether the WTO is really a "rules-based" organization and have cast a shadow on the legitimacy of the entire system. Virtually to respond to this demand of marginalization and ensure "the maximum possible level of transparency", several declarations were adopted by the WTO[25]. Nonetheless, no significant steps have been taken thus far.

Obviously, decision-making by consensus cannot be used indefinitely as the only option for the international trading system to function. Therefore, the practice of decision-making by consensus, which has made the system ineffective, has to be rectified on the basis of the law fairly and equitably. If there is a need, the simple majority voting procedure could be amended[26] to introduce further classifications of special majority voting procedures.

[25] *See* paragraph 6 of the Singapore Declaration of 1996. The Doha Declaration of the of November 2001, as affirmed in Cancun (2003) and Hong Kong (2005), recognizes under paragraph 10 the challenge posed by the expanding membership, and confirms the collective responsibility of the members to ensure internal transparency and the effective participation of its members in general and LDCs in particular under paragraph 3.

[26] It should be noted, however, that such amendment decision itself, ironically, requires the consensus of all Members.

References

Adamantopoulos, Konstantinos (1997). *An Anatomy of the World Trade Organization***,** London, Kluwer Law International

Annan, Kofi (2001). "Laying the Foundations of a Fair and Free Trade System*"*, in Sampson, Gary P. (ed.), *The Role of the World Trade Organization in the Global Governance*. Tokyo, United Nations University Press

Blackhurst, Richard (August 2001). "*Reforming WTO Decision-making: Lessons from Singapore and Seattle".* Centre for Research on Economic Development and Policy Reform, Working Paper No. 63

Ehlermann, Claus-Dieter and Ehring, Lothar (2005). "Decision-Making in the World Trade Organization: Is the Consensus Practice of the World Trade Organization Adequate for Making, Revising and Implementing Rules on International Trade?" *Journal of International Economic Law*, Vol. 8, No. 1

Findlay, Ronald **(**1973). *International Trade and Development Theory***,** New York, Columbia University Press

Freeman III, A. Myrick (1971). *International Trade: An Introduction to Method and Theory*. New York Harper & Row Publishers

Global Exchange, *"WTO Mini-Ministerial in Mombassa: Divergence in the Shadow of Palm Trees and Lions*", at <http://www.globalexchange.org/campaigns/wto/1944.html> (visited March 16, 2006)

Jackson, John H. (1997). *The World Trading System: The Law and Policy of International Economic Relations.* Massachusetts The MIT Press

Lal Das, Bhagirath (December 2005). "*Strengthening Developing Countries in the WTO",* < http://www.twnside.org.sg/title/bgl3-cn.htm> (accessed February 28, 2006)

Mattli, Walter (1999). *The Logic of Regional Integration: Europe and Beyond*. Cambridge, Cambridge University Press

Musoti, Victor (2006). "Africa in the First Decade of WTO Dispute Settlement", *African Yearbook of International Law*, Leiden, Marthinus Nijhoff Publishers

Narlikar, Amrita, "WTO Decision-making and Developing Countries" <http://www.southcentre.org/publications/wtodecis/toc.htm> (accessed February 28, 2006)

Panitchpackdi, Supachai (2001). "Balancing Competing Interests: the future of the WTO", in Sampson, Gary P. (ed.), *The Role of the World Trade Organization in the Global Governance,* Tokyo, United Nations University Press

Qureshi, Asif H. (1996). *The World Trade Organization: Implementing International Trade Norms***.** Manchester, Manchester University Press

Ricupero, Rubens (2001). "Rebuilding Confidence in the Multilateral Trading System: Closing the Legitimacy-Gap", in Sampson, Gary P. (ed.), *The Role of the World Trade Organization in the Global Governance*. Tokyo, United Nations University Press

Schott, Jeffrey J. and Watal, Jayashree (March 2000). "Decision-Making in the WTO", Policy Brief 00-2, < http://www.iie.com/publications/pb/pb.cfm?ResearchID=63#note5> (accessed February 27, 2006)

Stiglitz, Joseph E. and Charlton, Andrew (March 2006). "*Aid for Trade: A Report to the Commonwealth Secretariat".*

Sutherland, Peter and et al (2004). "*The Future of the WTO: Addressing Institutional Challenges in the New Millennium*". Report by the Consultative Board to the Director-General Supachai Panitchpakdi, Geneva WTO

Trebilcock, Micheal J. and Howse, Robert (2005). *The Regulation of International Trade*. New York, Rutledge

United Nations (2004). *The Least developed Countries Report 2004: Overview*. Geneva/ New York, United Nations

United Nations Conference on Trade and Development (13 February 2000). TAD/INF/PR/038, at <www.unctad.org/Templates/Webflyer.asp?docID=3035&intItemID=2068&lang=1> (Visited 28 February, 2006)

Van Den Bossche, Peter and Alexovicova, Iveta (September 2005). "Effective Global Economic Governance by the World Trade Organization" *Journal of International Economic Law*, Vol. 8, No 3

Watkins, Kevin, "*Trade, Globalization and Poverty Reduction: Why the Rules of the Game Matter".* Carnegie Endowment for International Peace, Seminar on World Trade and Poverty, Washington, 2 July 2002

Weiss, Friedl (2002). "WTO Decision-making: Is it Reformable?" in Kennedy, Daniel L.M. and Southwick, James D. (eds.), *The Political Economy of International Trade Law*. Essays in Honour of Robert Hudec, Cambridge, Cambridge University Press, Cambridge

WTO (14 November 2001). Doha Ministerial Declaration, WT/MIN (01) DEC/1

_____, Membership and Alliance, available at < http://www.wto.org > (visited February 28, 2006)

_____. (2002). *The Legal Texts: The Results of the Uruguay Round of Multilateral Trade Negotiations*. Geneva, WTO

_____. (2005). *Understanding the WTO*. Geneva, WTO

DEMOGRAPHIC AND SOCIO-ECONOMIC CHALLENGES OF WOMEN PETTY TRADERS IN ARADA AND ADDIS KETEMA SUB-CITIES, ADDIS ABABA

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Abstract

The study aimed to analyze the demographic and socio-economic challenges of women petty traders in the informal sector.

The main sources of the data used in this study were survey questionnaire and focus group discussions. The sample size of this study was 660 women petty traders. In this study uni-variate, bi-variate and multi-variate statistical models were employed.

The study has, on the whole, revealed that the gravity of the identified problems women petty traders faced were lack of working capital, lack of appropriate premise, non-profitability of the business, lack of appropriate credit service, lack of support from government and non-governmental organizations and inadequate skill. Logistic regression model depicted that age between 15-29 years, having large family members, migrants, illiterates, without fixed premise, non-clients of credit services and unable to save money have been the main obstacles for women petty traders.

Therefore, concerned policy makers and institutions that involved in the provisions to empower women give priority to credit service with concessional interest rate and easy repayment installments, providing appropriate premise, and support that enhance their earning capacity were recommended.

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1. Introduction

Petty trading is one of the major activities of informal sector.[2] The majority of the urban poor are women who are engaged in the informal sector in different income generating activities particularly petty trading which includes salvage clothes selling, small local trading, production and sale of local traditional fuel materials, running small retail shops, etc. These diverse activities share the common thread of low status, low wages, long hours of work and often dangerous and insecure conditions (Desta, 2004).

The informal sector represents an important part of the economy and certainly of the labour market in many countries especially developing countries, and thus plays a major role in employment creation, production and income generation. In countries with high rates of population growth and/or urbanization, it tends to absorb most of the growing labour force in the urban areas (Hussmanns and Farhad, undated).

Over the past decade or so, informal work is estimated to have accounted for almost 80 per cent of non-agricultural employment, over 60 per cent urban employment and over 90 percent of new jobs in Africa [Charmes, 2000 cited in ILO, 2002c]. In Sub-Saharan Africa, it accounts for three-quarters of non-agricultural employment, having increased dramatically over the last decade from about two-thirds. For women in Sub-Saharan Africa, it represents 92 per cent of the total job opportunities outside of agriculture and almost 95 per cent of these jobs are performed as self-employed or own-account workers and only 5 per cent as paid employees (ILO, 2002b). Among the regions, countries of West and East Africa, and South Asia tend to have the highest proportion of informal to total employment. In some countries including Ethiopia, there are more women than men in informal employment, even in absolute number (Ibid).

Home-based workers and street vendors are two of the largest sub-groups of the informal workforce. Taken together, they comprise an estimated 10 to 25 percent of the non-agricultural workforce in developing countries and over 5 percent of the total workforce in developed countries. In most regards, these two sub-groups could not be more different. Street vendors are the most visible and most organized group of the informal workforce, whereas home-based workers are the least visible and least organized group. Significantly, women are dominant in both groups: in developing

[2] The informal sector includes activities and works that are less visible and, even, invisible. Less visible informal workers work in small shops and workshops. On the street corners of most cities, towns, or villages, even in residential areas, are countless small kiosks or stalls that sell goods of every conceivable kind (ILO, 2002a).

countries, women represent 30 to 90 percent of street vendors (except in societies that restrict women's mobility) and 35 to 80 percent of home-based workers (Ibid).

In sub-Saharan Africa in particular, street vending predominates in much of the informal economy, with women traders forming the majority in a number of countries (ILO, 2002c). In Ethiopia, large proportions of women in urban areas are employed in petty trading (Nuri, 1992). Women who constitute almost more than half of the population of Ethiopia are important human resources for development efforts of the country. The labor force participation of women in the informal sector is significant than their counter parts. In 1999, women in Ethiopia consisted of 64 percent of urban informal sector. On the other hand, their participation is much lower in formal sector. As the result of this, self-employment has become a major income generating strategy for the urban poor particularly women. Poor Ethiopian women have much potential energy to contribute to economic development (Tsehay and Mengistu, 2002). Therefore, development has to succeed; the untapped potential of women has to be fully exploited (Bogalech, 2004).

According to Nuri (1992), many of those persons engaged in the informal sector are either very young or very old, or females with low education. The jobs in the informal are generally considered as women's work in both rural and urban areas. The major activities carried out in the informal sector are petty trade, domestic services and handicrafts (Alemnesh, 2001).

In Ethiopia, there are a number of constraints that affects negatively the participation of women in economic activities. The major problems that are hindering women's active participation in economic activities such as lack of adequate level of education and training, social and cultural attitudes, lack of information, lack of credit facilities, access to production resources and the policy environment (Nuri, 1992 and Hayat, 1997). Due to these problems the earning capacity of the women particularly those work in the informal sector become limited and their ability to save is also limited.

Both women and men are engaged in petty trading. However, in many countries of Africa petty trading is generally considered as women's work and women particularly in urban areas are accounting for a high proportion of it (Nuri, 1992). In addition, Konjit (1995) stated that trade is a part-time activity for the majority of women in developing countries. It is the same for Ethiopian women. Moreover, women head comprise an estimated one in three urban households in Ethiopia; most make a meager income from petty trading. 87 percent of those households earn incomes of less than 200 Birr a month (Beran, 1997).

According to CSA Report on Urban Informal Sector Sample Survey (2003), in Addis Ababa there are 128, 598 persons engaged in the informal sectors in 2000. Out of these, 65,719 were females i.e., 51.1 percent. The majority of males engaged in trade, hotels and restaurants, manufacturing and community and personal services. However, the majority of females are engaged in trade, hotels and restaurants.

In many ways, the women who enter petty trading are unprepared for the complexities of urban life (Jules-Rosette, 1988). In Ethiopia, the services given by trade, hotels and restaurants among many others include mainly petty trade like 'Gullit'[3], small shops and other retail trade and sales of local drinks and food, where the majority of the operators are women (Nigest, 1998). The burden falls on women as substitute service providers and mangers of the domestic economy (ECA, 1992). The concentration of women within informal sector has impacts particularly on themselves and their families as a whole. The lack of market access, affordable technology and opportunities for the bulk of purchase of materials, as well as the low levels of education of women entrepreneurs are considered to be some of the main problems faced by women engaged in or aspiring to develop or grow their businesses (ILO, 2002a).

Since many women are engaged in the informal sector, issues emerge concerning the contribution of women to economic activities. Moreover, the link between working in the informal economy and being poor is stronger for women than for men. Not only a higher percentage of women than men work in the informal economy but also women are concentrated in the lower-income segments, working in survival activities or as casual wageworkers or home workers. In the higher-income segments of the informal economy, women tend to be engaged in smaller-scale operations with less growth potential compared to those performed by men (ILO, 2002b). The facts stated above show that women involved in petty trading activities, particularly in urban areas, are facing many demographic and socio-economic challenges.

The purpose of this study is to identify the core demographic and socio-economic determinants of women petty traders in relation to their business activities, to describe the degree of problems they faced in relation to their work, to examine the income level generated from their business activities, and to assess their efforts and contributions towards the development endeavor of their household. The paper is organized as follows. Section two presents methodology. Section three deals the results. The final section presents conclusions and recommendations.

[3] *Gullit*: -is one type of petty trade (in most cases retail) activity where the activity is usually carried out in an open air on raised flat surfaces and on the roadside. However, there are some Gullits that have shades made from simple materials such as fabrics canvass, plastics, wood, etc (CSA, 1997).

2. Methodology

A cross sectional study was conducted in Arada and Addis Ketema sub-cities in Addis Ababa in March 2006. From each selected sub-cities five Kebeles were selected based on the concentration of women petty traders. From purposefully selected Kebeles 660 women petty traders were taken randomly. To add depth to the results of the survey, focus group discussion (FGDs) were held in selected Kebeles of the study area. For the purpose of FGDs twelve women petty traders were selected randomly.

The methods of analysis applied in this study were both descriptive and inferential statistics. In the descriptive statistical techniques, percentages were employed in the analysis. Bi-variate and multivariate regression analysis were used to examine differential effects of background characteristics on the dependent variable. In the bi-variate analysis the chi-square test were employed to test whether there is an association between the dependent and independent variables. In the case of multivariate analysis the relationships between the dependent and an independent variable were investigated by controlling the effect of other independent variables in the model.

The independent variables for this study were age, family size, migration status, marital status, educational level, market/work place, credit service, saving, initial capital, working days, market experience and income. The dependent variable was women's work or trading conditions. The challenges that women petty traders faced directly affect their conditions of work or indirectly by affecting their level of income then affect their conditions of work. Work conditions categorized as favorable or unfavorable for women petty traders based on the independent and/or intermediate variable effects.

A structured questionnaire prepared for the survey and FGD guides were used. To undertake the data collection process seventeen interviewers were recruited. They took two days intensive training on the content of questionnaire, interviewing techniques and ethical issues. The questionnaire was pre-tested and necessary modifications were made before the data collection started. Moreover, there were five supervisors who closely followed the process of data collection. The selected women petty traders were divided into two groups and the focus group discussions were held with the assistance of supervisors.

After collecting completed questionnaires from the field the consistency of answers were checked and verification of edited questionnaires were done by going through the whole questionnaires. Finally, the data entry and analysis were done using the SPSS statistical package.

3. Results

3.1 Entrepreneurial history

Most of the women petty traders interviewed, in the survey, belong to the age group of 30-64 years and over half of them had 6-55 years marketing experience. In addition, the respondents have different entrepreneurial history. Therefore, it seems appropriate and important to assess entrepreneurial history of women petty traders. It includes pervious occupation prior to joining petty trading, reasons for participation in petty trading activity, types of petty trading the women engaged, source of initial capital, ownership status and degree of control over their enterprise, purpose of using the loan and saved money.

The survey includes a question regarding pervious occupation before the women joining the business activity. Less than 50% of the interviewed were never participated in any types of occupation before they started the business. This may be an indication that the informal sector is providing employment to many young people who were jobless as a result of less opportunity of having job in the formal sector, especially for women.

According to the survey result, 33.4% of the respondents were housewife prior to joining market trading. About 22.1 % of them did domestic work. In other words, by combining the two, prior to joining the current business activity, more than 50% of the interviewed were housewives and domestic workers. Out of the total pervious occupation of respondents, 20.8% of them were private sector employee. 15.8%, 4.4% and 3.6% of the respondents' pervious occupation were self-employee, unpaid family work and public sector employee, respectively.

Almost half of the respondents' major reason was as means of self-help. The second major reason was to increase or to have their own income that accounts 25.2%. The other reasons were to change occupation prior to joining market trading and to keep themselves busy which accounts 10.6 % and 11.5% respectively. Other reasons mentioned by the respondents were lack of job in the formal sector, lack of support from government and/or non-governmental organizations, and lack of formal education, which accounts 1.8%.

The most important business activity women petty traders engaged in selling vegetables and fruits. It accounts 27.7% of the total sample. Making/selling traditional food items and drinks also the dominant activity that women petty traders engaged. 22.9% of the interviewed engaged in it. The third important activity is selling new/second-hand clothes/shoes/goods that account 20.8%. Based on the survey

result, selling commodities by women petty traders consists 19.4% of the total sample. The least activity women petty traders engaged were selling charcoal or firewood.

The study also identified the major source of initial capital that women market traders obtained. Most of the women petty traders started the business activity from their own saving. It consists 33.8% of the total respondents. The major source of own saving to start-up the market trading was pervious wage employment, sales of asset and inheritance. The pervious wage employments were most of those women own saving for start-up of the business. Whereas, inheritance were the least one to start-up the business. Most probably, the respondents who saved their own starting capital from their previous job are an indication of self-help and empowerment.

The second source of initial capital were borrowing from family, friend or relative that accounts 25.1%. 21.7% of the interviewers' major source was assistance from family, friend and relative. Credit from traders/suppliers and advance from traditional institutions like 'Iddir' and 'Iquib' were 10% and 7.1% respectively. The remaining 2.3% were loan from governmental and non-governmental institutions. Regarding major source of capital, own saving were the most important and loan from governmental and non-governmental institutions were the least.

The survey result revealed that 91.8% of women petty traders were owner of their business activity. The remaining 8.2% were partnership with their husband and parents. The control of income generated from their business mainly by themselves i.e., 77.6%. However, their husband and parents control the income were 5.6% by the former and 2.6% by the later. In fact, 14.2% of the respondents control their income together with their husband. The income generated from their activity control only by them and together with their husband were more than 90%.

Overall, most of the respondents, 87.1% kept no records of their business activity. Some of their reasons were too small transaction and lack of how to keep written records and unnecessary to keep written records even if they knew how to keep it. Of course, the major reasons of not kept written records were too small transaction and few of the respondents' reason were unnecessary of having written records. On the other hand, 12.9% of the interviewer had written records of their business activity. The dominant reasons were to know the profit and loss of the business and to know the improvement or change of their business activity.

In terms of using credit service, only 29.7% of the respondents were able to use credit services. The sources of credit service that the respondents have got from

informal institutions were 87.8%. 46% of them have got credit from traders or suppliers, 29.1% from 'Iquib' and 'Iddir', 12.2% from friend and relative, 0.5% from traditional moneylenders and 12.2% from microfinance institutions. The highest percentage of credit service was from traders or suppliers. It is a reflection of taking credit in terms of goods rather than cash seems the most preferable by them. If it is the case, most of them like to take credit in terms of goods than cash and there is a high probability to invest on their business.

The majority of women who had credit service invested the last loan on their business and used to buy food. Out of the total sample using loan were 196 of this 146(74.5%)[4] invest the loan on their business, 123 (62.8%) used to buy food, 62 (31.6%) used to buy clothes or other household items, 11 (5.6%) give to someone else, 27 (13.8%) keep on hand for emergency, 6 (3.1%) keep on hand to repay the loan, 59 (30.1%) pay interest on the pervious loan and 18 (9.2%) for other purposes such as send to their relatives and parents, and stolen.

Only 27.7% of the respondents were save some amount of money from income generated from their petty trading activity. Those women petty entrepreneur who were able to save some money invested in their business were 76.5%. Some portion of saved money used to repair or build house, for school fee, for medical expenditure and for other purposes like sending for their parents and relatives. The survey result revealed that the majority of them invested the saved money to expand their business and for school fee for their children. 15.8% and 8.7% of them also used the money for medical expenditure and for other purposes.

3.2 Household responsibilities and trading activity of women

As discussed in earlier part, a big fraction of the respondents, 57.4% were married. It is a reflection of the women's obligations to support growing families. In fact, 13.8% of the respondents were single and 28.8% of them were widowed, divorced and separated. Only divorced and separated accounts 15.3%, which is also an indication of household responsibility by the respondents is high.

In terms of reproductive status, the majority of them had more than three children. Moreover, 208 and 41 out of the total respondents had one and two children who are less than six years old, respectively. It also portrays the greater caretaker roles for the women. The study investigated that 58.2% of the respondents most of the time looking the domestic work and 24.7% of them also replied that the domestic work

[4] *NB: Total percent is greater than 100 because of multiple replies.*

looking by their eldest child. 9.1% and 8% of them also had relative and domestic worker respectively.

Regarding respondents' husband current occupation, 31%, 26.5%, 24.1%, 10.6% and 7.9% of their husband were self-employee, private sector employee, public sector employee, looking for work and retired**.** Out of the total sample, 378(57.4%) of the respondents were currently married. Moreover, almost half of the respondents' husband accepted the petty trading activity.

Major supports provided by their husband were overall assistance, bringing goods from suppliers and doing the business together. 105(54.1%), 54 (27.8%) and 24 (12.4%) of respondent's husband provided overall assistance, bring goods from suppliers and doing the business together. The rest 11 (5.7%) of respondent's husband gave moral support. In contrast, 174 (46%) of respondent's husband were not accept their market trading activity. Some of the major reasons of husband non-acceptance regarding their wife's informal trading activity were unable to take care of children, dislike the activity, low income generated from the business activity and health problem related with the activity.

52.3% of the respondents' husband major reason of non-acceptance of their business activity were unable to take care of children. The second important reasons of their husband were dislike the activity that accounts 20.1%. The other reasons were health problem of their wife and low income that consists 17.8% and 6.3%, respectively. The remaining 3.4% of respondents were unable to mention their husband reasons of non-acceptance.

3.3 The major challenges women petty traders faced related with their business activity

In Ethiopia women face different challenges in their effort to participate in economic activities. The study interested to investigate the major constraints that women entrepreneurs faced related with their activity. The direct challenges that most probably affect the productivity of women market traders were the main focus of this study.

Almost 60% of the interviewers were faced with some problem related with their business activity during starting-up the business. The major constraints that the respondents faced during starting-up the business were lack of sufficient own capital, lack of convenient place (land), difficult government regulations, lack of credit, inadequate skill and other.

Out of 389 (58.9%) of the respondents faced problem during start-up the business, 254 (65.3%) faced constraint related with finance and 276 (71%) had lack of convenient work place. Some of the respondents faced constraints like lack of credit service; difficult government regulations and inadequate skill were 148 (38.3%), 142 (36.5%) and 80 (20.6%) respectively. Other main challenges mentioned by the respondents were husband disapproval of their activity and health problem that accounts 10 (2.6%).

Out of the total sample 438 (66.4%) were currently faced challenges related with their activity. Currently, the main constraints that the women faced related with their activity were slightly changed with the problem they faced during start-up the business. Nowadays, 326 (74.4%)[5] out of the women currently face problem had lack of working capital, 314 (71.7%) lack of appropriate work place, 313 (71.5%) un-profitability of the business, 293 (66.9%) lack of credit, 282 (64.4%) difficult government regulations, 266 (60.7%) lack of support from governmental and NGO's, 162 (37%) lack of adequate skill and 21 (4,8%) other problems.

The problem related with being a client of credit services were described by the focus group discussions participants. The problems related with credit service were the highest interest rate, difficult loan repayment schedule and compulsory saving scheme, in which clients are forced to save certain amount of money. This additional burden in already limited capacity of their repayment. The other thing raised in FGD related with credit service was the collateral. One of the participants said that collateral is important both for the credit service providers and the clients. However, the rule requires applicants to provide collateral who must be a government employee and the salary of the person is also an obstacle. This is because getting collateral that is a government employee and the high salary of the person. As the woman is poor it is very difficult to fulfil the collateral requirements.

Only 14.2% of the respondents have got support both from governmental and non-governmental organization. The major support that women traders have got from governmental and non-governmental organizations were provided work place, assist in training, make better access to loan, easing of government rule and regulations and other support.

Those women who had premises and participated in focus group discussion were not like the location of the premises that provided by the city government for their business activity. The major issues that the women entrepreneurs raised in the discussion were lack of appropriate location for their business activity and the credit

[5] *NB: Total percent is greater than 100 because of multiple replies.*

service had its own problem specially the high interest rate and collateral. Due to the lack of convenient premises they forced to work their business in street corners which is not allowed by the city administration. Therefore, one way or the other they are victims of the rules and regulations of the city government. In fact, they perform their business activity for two days per week in the so-called 'Sunday Market'. The income they earned from their business activity by doing for two days per week is not enough to cover the costs of basic needs. Those women participated also believe that they are capable to do the business if the city government allowed them to do it by providing appropriate location.

Regarding membership related with trading activity, 130 (19.7%) of the respondents were member of the association. Less than half of the members of the association have got benefits related with petty trading activity. The benefits the members have got so far were better access to loan, assist in training and providing market place. On the other hand, the women participated in the focus group discussion said that being a member of the association related with their activity is vital but nowadays the compulsory deposit money is very challenging and it limits the benefits to get from the association.

The work or trading activity condition also highly related with the nature of the business. 65.5% of the respondents replied that their work condition is quite a challenge for them. The unsuitability of their activity mainly were difficult to shift to a better sector, high competitive nature of the activity, lack of convenient place, un-profitability of the business, insufficient income to cover costs of the family and unsuitable government rules and regulations.

Out of the respondents who faced the unfavorable trading conditions, 381 (88.2%), 329 (76.2%), 317 (73.4%), 302 (69.9%), 278 (64.4%) and 152 (35.2%) of unfavorable reasons related with their activity were un-profitability of the business, insufficient income to cover family costs, lack of appropriate work place, difficult government rules and regulations, difficult to shift to a better sector and high competitive nature of the business, respectively.

3.4 Multivariate analysis results

In this section, the important determinants of women work (petty trading) condition are examined using Binary logistic regression model. Almost three-fourth of the original observations was correctly classified and the logistic regression model fitted the theoretical predictions at less than 0.05 level of significance. The results of logistic regression show that statistically significant differences existed between favorable

and unfavorable work/trading condition. These factors mainly includes age, family size, migration status, educational level, market/work place, credit service, saving, initial capital, working days, working hours, market experience, and income.

The respondents in age group 15-29, 30-64, and 65 and above years were 35 %, 55% and 10%, respectively. The reference category used here is age 15-29. The interest is to observe the effect of informal trading activity on the youth. The logistic output revealed that favorable work/trading condition among women age group 30-64 years was 2.4 times more likely than women in the age group 15-29 (*EXP (b)=2.380*). The reason probably related with underemployment. Whereas for women in the age group 65 and above shows a higher risk of unfavorable work condition. This is because most of the women age 65 and above are not supposed to expect to have a favorable work/trading condition. In other words, women at the age of 65 and above faced old age problems mainly lack of support.

The respondents who had 1-3 family members were 24.2% while the women with four and more family members were 75.8%. The result of logistic regression confirmed that 39 per cent less likely favorable work condition for women traders with a family size 4-6 than for those who had a household size 1-3 (*Exp (B)=. 612*). This means the probability of facing a favorable trading condition is more for women traders with families up to 3 members. The logistic result for those women who had families with 7 and more members was insignificant.

According to Central Statistic Authority classification, those who live in the area since birth are non-migrants, those who stay in the area 1-5 years are termed as recent migrants and those who stay in the area more than five years are termed as long-term migrants. The majority of the respondents were migrants (both recent and long-term) i.e., 74.8%. The non-migrants were taken as a reference category. The risk of favorable work condition for migrant women were lower by 48 per cent (*Exp (B) =. 523*) compared to that of non-migrant and the difference is statistically significant at $p<0.001$. The possible explanation could be those migrant women in urban areas are less prepared to run the business than non-migrants because migrant women are forced to be engaged in unfavorable work condition to cover the cost of living than non-migrant women.

Level of education measured by number of years of schooling is one of the important indicators of human resource development. Out of the total respondents, 60.8% had never been attending school. 21.5% and 17.2% of them have attended primary and secondary and above level of education, respectively. The result of the logistic analysis for primary level of education show that the odds of facing favorable trading

condition were found to be 1.6 times higher as compared to the reference category (*Exp (B)=1.603*). This implies that as the educational level increases the working conditions also increases. This result is consistent with the research done by Malunga (1998) among women employees in the informal sector in Uganda. However, for those in secondary and above category the relationship was observed to be statistically insignificant. The possible explanation for the observed lower risk of unfavorable trading condition for those who completed primary education is that the trading business requires some skill that is supported by lower level of education.

The market place is one of the important things that needed to run business. The logistic regression result indicated that those women petty traders with a fixed market place were facing a favorable trading condition by 1.9 times more likely than the women petty traders without a fixed market place (*Exp (B)=1.890*). The possible reason for unfavorable trading condition related with a fixed market place could be they are never allowed by the city administration to do their business activity here and there, although, most of the women engaged in the informal trading activity lack market place.

Access of credit service is also the other important thing that the businesswoman probably looking to run her business. Credit service was recorded as non-clients and clients of credit service of which the last group used as a reference category to compare risk of unfavorable trading condition among women petty traders in the city. The net-effect of credit service on favorable trading condition were insignificant when compared to non-clients with the reference category (*Exp (B) =. 872*). Though it is statistically insignificant, the negative effect of non-clients of credit service on favorable trading condition was expected before. Non-clients of credit service were less likely to face favorable trading condition than clients of credit service.

The logistic regression result confirmed that there was significant relation between favorable trading condition and saving. The result revealed that women petty traders who were able to save some amount of money were 2.4 times more likely to have favorable trading condition than the reference category (*EXP (B) =2.407*).The logistic regression result shows that those women petty traders start-up capital 21-45 Birr face favorable trading condition by 58 per cent than the reference category (*Exp (B) =. 419*). The possible reason could be the nature of the business requires small start-up capital. The logistic result for women traders with the amount of initial capital 45 and above Birr were statistically insignificant (*Exp (B) =. 668*).

The output of logistic regression confirmed that trading 6-7 days per week faced a suitable trading condition by 2 times more likely than the reference category (*Exp*

(B)=2.014). In other words, those women working more days in the market are less likely to face the challenges than those women traders working few days in the market. The logistic regression results indicates that there were statistically insignificant for both 1 year (*Exp (B) =. 937*) and 2-5 years (*Exp (B) =1.349*) market experience when compared with the reference category. According to the survey, the amount of income the respondents earned per month ranges 60 to 300 Birr. The result of logistic regression analysis shows that the women petty traders with 141-170 Birr average income per month were 42 per cent (*Exp (B) =. 577*) less likely to face a favorable trading condition than the reference category (more than 170 Birr per month). In the case of women petty traders with monthly average income of 60-105 Birr (*Exp (B) =1.261*) and 106- 140 Birr (*Exp (B) =. 995*) were statistically insignificant when compared with the reference category.

4. Conclusions and recommendations

The study investigated that women petty traders in the city have got little support from governmental and non-governmental organizations. When we take the service provisions provided by governmental and non-governmental organizations, credit/loan service was not that much acceptable by women petty traders. The most important thing that came out during the focus group discussion related with credit service facilities was the issue of collateral and high interest rate. As the result, the women petty traders who used the formal credit facilities were very few. Service provision like providing appropriate premises were also a big issue rose in the focus group discussion. The majority of the respondents had no fixed premise and those who had it also complain about the inappropriateness of the premises provided by the city government.

The income that the women petty traders generated from their business activity is very small. It ranges 60 to 300 Birr per month on average. This implies that women petty traders can earn very small amount of money that is not enough to cover all the monthly expenditures. In addition, few respondents saved very small amount of money they earn from their business activity. Even if their meager income is generated from their business activity, their contribution for the endeavor of their family is of paramount importance. Therefore, the study also confirmed that poor women petty traders are unable to improve their business activity in short run with small level of income and saving ability.

In terms of reproductive activity, most of women petty traders had more than three children. This probably is an indication of the high fertility nature of the women petty traders due to the low use of contraceptives. The burden of having many children

also has impact in one or the other way in their business activity. One of the major reasons of the women petty traders husbands' non-acceptance related with unable to take care of children and dislike the business activity. The contribution of the women as a breadwinner and/or **c**o-breadwinner is as important as their counter parts. Still these women faced a conflict between family and work. The possible reason that they participate in the informal trading activity is its flexibility, which allowed them to balance their family obligations and their business activity.

The women petty traders in the age group 30-64 years were faced a relatively favorable trading condition than the reference category 15-29 years age group. In the case of women in the age group 65 and above years was faced unfavorable trading condition. Regarding number of family members, those women who had large family members were more likely to be in the unsuitable trading condition, other things being equal. There is a negative association between migrant women and favorable trading condition, other things remaining the same.

There is a positive association between primary level education and favorable trading condition when compared with the illiterate one. In the case of secondary and above level of education the relationship was observed to be statistically insignificant. There is a positive association between having fixed premise and favorable trading condition, other things being equal. The women petty traders who were non-clients of credit services were less likely to face favorable trading condition than the clients of credit service. Moreover, those women petty traders who were able to save money faced a favorable work condition than those who were unable to save some money generated from their business activity.

Those women who are working more than five days in the market were less likely face the unfavorable trading condition than women traders who are working five days or fewer days in the market. Regarding women petty traders' market experience, for both one year and two to five years market experience were statistically insignificant when compared with more than five years market experience. There is no statistically significant association between level of income and favorable trading condition.

Overall, the major challenges that determine women petty trading activity were lack of working capital, lack of convenient market place, and lack of affordable credit facilities. In general, poor women concentrated in the informal trading activity with many challenges that need support both by government and non-governmental organizations.

Hence, it is recommended that concerned policy makers and institutions that are involved in the provisions to empower women give priority to:

- The majority of women petty traders were not having fixed work place or premise. As a result, they were unable to register. Since they are not registered, the police felt that their activity on the streets is illegal and obstructing their trading activities. Hence, there is a need for the city government to provide convenient work place or premise for the women petty traders to make their trading activities profitable and ultimately make them eligible for registration;
- Women's work and family life are inter-related in many ways. The kind of work that women are engaged affects not only the individual women but also the family at large. The amount of money the woman earns which in turn affects the access of family members, especially children, to education, health and even to nutritional quality and quantity. Therefore, there is a need of support by the government and non-governmental organizations that improve the level of income for women petty traders;
- Since most of the women petty traders are either illiterates or with primary schooling only, it is not possible to provide them job opportunities in the formal sector. Therefore, there is a need to make their petty trading activities as profitable by providing credit facilities with concessional (affordable) interest rate, with easy repayment installments and without any collateral securities; and
- Finally, more research in other informal economic activities in which women engage should be carried out.

References

Alemnesh Hailemariam (2001), Women in the Informal sector in Ethiopia. Reflections. Documentation of the Forum on Gender, Number 6. Master Printing Press. Addis Ababa.

Bevan, Philippa (1997), Poverty in Ethiopia. A Background Paper. Prepared for the Overseas Development Administration, UK. http://staff.bath.ac.uk/hsspga/ pdfs/ ethiopia97.pdf. Cited in December 2005.

Bogalech Alemu (2004), Women, Reproductive Health and National Development. Population and Development in Ethiopia: A Decade's Overview. Special Issue. Population Media Center. Addis Ababa.

CSA (1997), Report on Distributive and Service Trade Survey. Statistical Bulletin No. 179. Addis Ababa.

_____ (1999), The 1999 National Labour Force Survey. Statistical Report. Addis Ababa

_____ (2003), Report on Urban Informal Sector Sample Survey. Statistical Bulletin 282. Addis Ababa

Desta Lorenso (2004) Challenges in Promotion of Micro and Small Enterprise in Addis Ababa. http://www.addisababacity.gov.et/ Articles_3.htm. Posted to the web October 20, 2004.

ECA (1992), Global Synthesis: Lessons Learned and experiences Gained During the Implementation of Project RAF/87/042 "Improving African Women's Role in the Informal Sector". United Nations Economic Commission for Africa. Addis Ababa, Ethiopia.

Hayat Abdulahi (1997), Constraints to Women Entrepreneurship in the Informal Sector: The Case of Women Traders in Addis Ababa Markets. Research Report (Organization for Social Science Research in Eastern and Southern Africa). Addis Ababa.

Hussmanns, Ralf and Farhad Mehran (Undated), Statistical Definition of the Informal Sector-International standards and National Practices. International Lobour Office. http://www.sdrc.org/informal/huss0772.pdf. Cited in December 2005.

ILO (2002a), Briefing Notes on the Study of Women's Entrepreneurs Development in Ethiopia. By Zewde and Associates Plc. ILO, Jobs, Gender, and Small Enterprises in Africa. National Conference on women Enterprise Development in Ethiopia. Addis Ababa, Ethiopia. http://www.ilo.org/ dyn/ empent/docs/ F977475164/ Briefing%20 Note20 Eth. Pdf. Cited in January 2006.

_____ (2002b), International Labour Conference 90th Session 2002 Report VI. Decent Work and the Informal Economy. Six Item on the Agenda. Geneva, Switzerland.http://www.ilo.org/public/english/ standards/ relm/ilc/ ilc90/ pdf/rep-vi.pdf. Cited in February 2006

_____ (2002c), Women and Men in the Informal Economy: A Statistical Picture. Employment Sector. Geneva, Switzerland. Cited in January 2006

Jules-Rosette, Bennetta (1988), Women's Work in the Informal Sector: A Zambian Case Study. Women, Development and Change. The Third world Experience. M. Francis Abraham and P. Subhadra Abraham (eds). Wyndham Hall Press. U.S.A.

Konjit Kifetew (1995), Women Entrepreneurs in Trade Sectors in Ethiopia. Prospects and Challenges. A Paper presented at the First Annual Conference on Management in Ethiopia with the Theme: Entrepreneurship. Debrezeit, Ethiopia.

Nigest Haile (1998), Women in Micro and Small Enterprises (MSEs) Sector in Ethiopia and the MSEs Development strategy. Paper to be presented for the 2nd Global women Entrepreneurs Trade Fair and Investment forum. Addis Ababa.

Nuri Kedir (1992), Women's Participation in Non-Agricultural Economic Activities in Ethiopia. A Paper Presented for the Workshop on Access to and Control of Resources to Overcome Disparities in Gender and Development. Addis Ababa.

Tsehay Tsegaye and Mengistu Bediye (2002), The Impact of Microfinance Services Among Poor Women in Ethiopia. Occasional Paper no. 6. AEMFI. Addis Ababa, Ethiopia.

Appendixes

Appendix 1: Bi-variate Analysis Result

Chi-square Results for Some Selected Variables, Women Petty Traders in Addis Ababa.

Demographic and Socio-economic Variables	Favorable/Suitable Work Condition (N=660)				χ^2	P-value
	Yes		No			
	No.	%	No.	%		
Age						
15-29	80	34.6	151	65.4	4.781	0.092
30-64	133	36.6	230	63.4		
65^{+}	15	22.7	51	77.3		
Family size						
1-3	70	43.8	90	56.2	8.053	0.018
4-6	90	30.9	201	69.1		
7^{+}	68	32.5	141	67.5		
Migration status						
Non-migrant	77	46.4	89	53.6	13.750	0.000
Migrant	151	30.6	343	69.4		
Educational level						
Illiterate (no schooling)	118	29.4	283	70.6	12.039	0.002
Primary (1-8 grades)	62	43.7	80	56.3		
Secondary and above	48	41.0	69	59.0		
Market/work place						0.000
Yes	115	46.2	134	53.8	23.956	
No	113	27.5	298	72.5		
Credit service						
Yes	86	43.9	110	56.1	10.738	0.001
No	142	30.6	322	69.4		
Saving						
Yes	93	50.8	90	49.2	29.658	0.000
No	135	28.3	342	71.7		
Initial capital						
1-20	133	39.1	207	60.9	12.238	0.002
21-45	37	23.3	122	76.7		
46^{+}	58	36.0	103	64.0		
Working days (per week)						
3-5	97	28.6	242	71.4	10.847	0.001
6-7	131	40.8	190	59.2		
Market experience						
1 year	23	31.9	49	68.1	6.658	0.036
2-5 years	93	41.2	133	58.8		
6-55 years	112	30.9	250	69.1		
Income						
60-105	53	30.6	120	69.4		
106-140	55	33.5	109	66.5	5.131	0.162
141-170	60	33.1	121	66.9		
171^{+}	60	42.3	82	57.7		

Source: Field Survey, 2006

Appendix 2: Multivariate Analysis Result

Results of Logistic Regression by Some Selected Variables, Women Petty Traders *in Addis Ababa.*

Variables	B	Sig.	Exp (B)
Age			
15-29	RC		1.000
30-64	.867	.001	2.380
65^{+}	.179	.677	1.196
Family size			
1-3	RC		1.000
4-6	-.491	.043	.612
7^{+}	-.465	.089	.628
Migration status			
Non-migrant	RC		1.000
Migrant	-.649	.008	.523
Educational level			
Illiterate	RC		1.000
Primary (1-8 grades)	.472	.049	1.603
Secondary and above	-.287	.358	.750
Market/work place			
Yes	.637	.001	1.890
No	RC		1.000
Credit service			
Yes	RC		1.000
No	-.137	.533	.872
Saving			
Yes	.878	.000	2.407
No	RC		1.000
Initial capital			
1-20	RC		1.000
21-45	-.870	.000	.419
46^{+}	-.403	.073	.668
Working days (per week)			
3-5	RC		1.000
6-7	.700	.012	2.014
Market experience			
1 year	-.065	.853	.937
2-5 years	.300	.177	1.349
6-55 years	RC		1.000
Income			
60-105	.232	.543	1.261
106-140	-.005	.998	.995
141-170	-.550	.039	.577
171^{+}	RC		1.000

Source: Field survey, 2006.

NB: B= Regression Coefficient RC= Reference Category. Exp (B) = Odds ratio.

ESTIMATES OF CONSUMER DEMAND PARAMETERS FOR ETHIOPIA[1]

Kassu Wamisho and Bingxin Yu[2]

Abstract

Future growth within Ethiopia's agriculture sector will most likely depend on how well the country can tap into domestic and regional market opportunities for staples and livestock products.

The objectives of the study are to analyze food consumption patterns and to conduct econometric analyses of the food and non-food demand structure in order to examine the potential future and existing demand patterns of basic food staples in domestic market of Ethiopia. The paper employed separate Engle demand equation for each individual commodity and the estimation model follows the Ratio Semi-log Inverse function in the two national Household Income Consumption and Expenditure Surveys conducted in 1995/96 and 1999/2000 respectively. The paper finds that on average cereal consumption expenditure accounted about one-third of the total spending of the poorest quintiles of the household, and over all food consumption shares is around 56 percent. A significant income and expenditure gap exists among the five quintiles household groups in each survey year. In Ethiopia, the value of Marginal budget share is significantly smaller than average budget share for the coarse grains but the reverse is true for livestock products.

The empirical result also shows that expenditure elasticities of most of grains are positive and close to unity however the expenditure elasticity of livestock products are significantly greater than unity. This proves that grains foods consumed in Ethiopia are considered as a normal and livestock products as luxurious good.

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Both budget share and absolute spending analyses seem to suggest that domestic demand for staples in Ethiopia will have to increase rapidly if growth is to be pro-poor. Rapid growth is needed given the huge consumption gaps of staple foods between the rich and the poor.

Key words: Average budget share, Marginal budget share, expenditure elasticities

1. Introduction

The overall picture of agricultural production and productivity growth in Ethiopia has major implications for production, consumption, and trade patterns within the country. Ethiopia is a net importer of most cereal crops except for millet (Table 1). Aggregate imported grains account for 13% of food consumed domestically while exports only 0.3% of total crop production. Given rapid population growth and growing imports for grains, there exists huge potential in domestic demand for food staples (including farmers' own consumption levels).

Agriculture represents the bulk of economic activity in Ethiopia, especially in rural areas. According to the recent country's economic strategy documents, PASDEP, agricultural growth strategy will revolve around a major effort to support the intensification of marketable farm products - both for domestic and export markets, and by both small and large farmers.

This recent shift of paying more attention to market opportunities for supplying food to the local market as well as to international markets do need understanding of consumer behavior and demand prospects for those products. In particular, it would be helpful to identify the products that will be in high local demand in current as well as future market. For agricultural planners to allocate scarce research and extension funds amongst the many foods that can be grown for the domestic market, information about the demand prospects for those foods is required. Examining the demand patterns of both rural and urban households can also help to identify market opportunities by showing which foods have large existing markets, and which foods will be most heavily demanded in future as household incomes change.

Knowledge of the demand structure is essential for intervention to improve the nutritional status of particular individual, household or individual with in the household, country's strategy for food subsidy, and for sectoral and macroeconomic policy analysis (sadulate & De janfery, 1995, pp33).

There are different methods to analyze and estimates the demands for particular item that the household consumes. The average share of the household budget spent on an item and the proportion of households who consume the item are the concepts can be used to measure existing market demand for a particular produces. Marginal Propensity to Consume (MPC) is also among different economic concepts for predicting of future market demand under changing income.

In order to better understand existing and potential future demand for basic food staples in domestic market, a demand analysis of households is taken based on two national Household Income Consumption and Expenditure Surveys (HICES), conducted in 1995/96 and 1999/2000 respectively (see Appendix for survey details). The survey data permit us for both cross-sectional and dynamics comparison. The estimation model follows the ratio semi-log inverse function (RSLI) suggested by King and Byerlee (1978). This model estimates the relationship between household expenditure of a diverse set of commodities and income, controlling household size. MPC are then calculated from coefficients obtained from consumption regression equation. This approach satisfies several unique requirements for the study of income effects. Besides that income (expenditure) elasticity is estimated in the model.

Measures of income typical fails to correspond to the economic concepts of income as individuals mostly underreport their income level. Consequently, one often uses total expenditure in a place of income in the demand analysis, thus in this particular study estimating expenditure rather than income are used to deal with average and marginal budget share as well elasticities. The implications of these demand estimates over how household distribute their income among different items are then discussed.

2. The empirical model

According to economic theory the consumption of an individual will be determined by his income and the prices ruling on the market in conjunction with his preferences. This will incidentally apply to household only if certain unanimity between the several persons normally constituting a household is postulated (Samuelson 1950).

The investigation of the relation between income (or expenditure) and the expenditure on particular items or groups of items, represented by Engle curves. Leser (1963) stated that Engle functions for the various commodity groups studied have the same mathematical form and should satisfy the additivity criterion. The functional form also should be able to be estimated even when a household has zero consumption of

particular foods; otherwise those households have to be dropped from the sample, which can cause sample selection bias (Deaton, 1989).

Income is the most obvious cause of differences between the consumption of different families, and in any case its influence may be lagged (Tobin (1950) so that one may have to work with total expenditure instead. Houthakker (1952) suggested that the gain in statistical precision probably outweighs any theoretical difficulties this may cause; it might even be argued that the total expenditure fits much better into a theoretical scheme which effectively ignores saving. One of the assumptions, according to Houthakker (1952), commonly used in estimating the effect of income on consumption is that prices are the same for all families in a survey. This may be substantially true for most commodities, but for some items, it's not frequently true; because of income effect this may significantly affect all items of expenditure. Houthakker further argued that apparent differences in prices arise if goods are available in a variety of qualities, but this difficulty results only from the necessary incomplete classification of goods, and doesn't violate the hypothesis of equal prices for the same item of consumption

Law of expenditure (Working 1943) stated that the proportion of total expenditure devoted to different purposes tend to be about the same for families of the same total expenditure per person even though the family differ with respect to income, size, and proportion of income saved. As total expenditure per person increases, the proportion of expenditure devoted to food decreases rapidly, moderately and rapidly increases for clothing and, transport, recreation respectively.

Summers (1959) explained that in estimating the parameters of Engle curves, the assumption is made universally that a household's expenditures on the goods and services in its budget depend upon its income (and possibly other variables), but that its income doesn't depend upon its expenditure.

To capture the dynamics of consumption patterns in this particular study, it is necessary to look at the marginal budget share (MBS[1]) of each commodity, which is the share of each additional unit of income likely to be spent on each commodity. Comparing MBS with ABS could help us understand which commodities households would prefer to consume more as their income increases, linking income distribution and demand. MBS measures how a household allocates any additions to its budget, in contrast to the existing division of the budget. For example, if a household's income rose by 100 Birr per year, the marginal budget share for a particular item shows how

[1] MBS and MPC are used here as an interchangeable terms in which both have similar in meaning and usage in this study

many Birr from that 100 Birr would be spent on the item. Hence, the marginal budget share is a good measure of the value of future demand.

The MBS needs to be econometrically estimated using complete household survey data. Since we are more interested in the income effect on demand for individual commodity to examine the impact on rural non farm economy, separate demand equations for each individual commodity are employed for this study. They allow the absence of price data and the implied quality adjustment by commodities, allowing us focus on income effects. Since only information of expenditure was used, the measurement errors tend to be systematic and permits consistent estimation. Problems caused by zero expenditure level for certain commodities could be addressed in model specification. In addition, single demand equations are easy to estimate and provide parsimonious parameterization.

First, the model is flexible enough to present the income-consumption relationship of various commodities over the whole range of income in the sample, especially at extreme levels of income. Second, the RSLI function satisfies the economic restrictions of additivity. In other words, marginal propensities to consume (MPCs) for all commodities will sum to unity as commodities grouping are exhaustive and mutually exclusive. In addition, perfect additivity is confirmed at all income levels, enabling interclass comparisons of consumption patterns (Deaton and Muellbauer, 1980). From empirical point of view RSLI more plausible than the other three types of Engle aggregation equation, for more detail see Prais and Houthakker (1955). Additive functions, such that used here, the expenditure elasticity of a given commodity will be biased toward unity and that size of the biases will be larger the greater the budget share for the commodity in question.

Thirdly, the significance of parameter estimates and goodness of fit are considered in model specification, as the dependent variable is not specified in logarithmic form, which is less adversely affected by zero observations.

The functional form is introduced below;

$$\frac{\overline{C_{ij}}}{\overline{Y_j}} = a_i + b_{1i} \ln \overline{Y_j} + \frac{b_{2i}}{\overline{Y_j}} + u_{ij} \qquad \textbf{(1)}$$

Where $\overline{C_{ij}}$ is per capita total expenditure for commodity i by household j;

$\overline{Y_j}$ is per capita total consumption expenditure by household j

And a_i, b_{1i} and b_{2i} are parameters to be estimated for i^{th} commodity

U_{ij} error term.

To permit greater flexibility with respect to household size, the model was transformed from a per capita form to one which represents consumption for the entire household. This is done first by multiplying both C_{ij} and $\overline{Y_j}$ in the dependent variable by Z_j, the number of people in household j as an independent variable by multiplying both sides of the equation by Y_j, Total consumption expenditure by household j and gives;

$$C_{ij} = a_i Y_j + b_{1i} Y_j \ln \overline{y}_j + b_{2i} N_j + \varepsilon_{ij} \quad \textbf{(2)}$$

Where C_{ij} is total expenditure on good *i* by household *j*

Y_j is total expenditure by household *j*

$\overline{y}_j$ is per capita total consumption expenditure by household *j*

N_j is the number of people in household *j*

a_i, b_{1i}, b_{2i} are parameters to be estimated.

Because the specified function passes through the origin, any zero expenditure level could be included in the estimation. An expression for the marginal propensity to consume derived from this model is respectively;

$$\frac{\partial C_i}{\partial Y} = a_1 + b_{1i} + b_{1i} \ln \overline{y} \quad \textbf{(3)}$$

MBS is allowed to be increasing, decreasing, or constant for a given commodity. The coefficients were defined for different income groups within a country for rural and urban households.

C =0 for $\overline{Y}$ =0, an interesting feature of (3) is that it permits for any commodity group, the simultaneous testing of the two hypothesis: 1) that MPC is constant, and 2) that

elasticity of demand is approximately constant. This is simply done by testing the significance of the partial regression coefficient a_i , b_{1i}

Total expenditure elasticity;

$$\frac{\partial C}{\partial Y} * \frac{Y}{C} = (a_i + b_{1i} + b_{1i} \ln \overline{Y}) \frac{Y}{C} \quad \textbf{(4)}$$

The MPC for commodity i is $\frac{\partial C}{\partial Y} = a_1 + b_{1i} + b_{1i} \ln \overline{Y}$ decreases monotonically when b_{1i} <0, increase monotonically when b_{1i} >0, and constant b_{1i} =0 for all $\overline{Y}$ >1

3. Model results and discussions

While consumer preferences might change over time, experience indicates that household income tends to be a much more important factor in determining a country's consumption patterns and changes. For this reason, we first report household per capita annual total expenditure for each year in Table 2, and the total expenditure is used as a proxy for disposable income. Household per capita income is further grouped according to five population quintile groups for each year and for rural and urban households separately. Each quintile group has roughly 20% of the total population and total population can either be a national total (for the five national quintile groups), a rural total (for the five rural groups) or an urban total (for the five urban groups). We focus on three groups of commodities, teff, coarse grains (maize, barley, sorghum), and livestock products (meat, dairy, and eggs), as displayed in Figure 1 for discussion.

Table 2 summarizes average expenditure level by income quintile for both rural and urban households. Per capita total annual expenditure at the national level dropped from $186 in 1995/96 to $162 in 1999/00. There are significant income and expenditure gaps between rural and urban sectors in each survey. An average urban consumer consumed 68% higher than that of an average rural consumer in 1995/96. Four years later, an average urban consumer was able to spend 87% more than his rural counterpart.

A significant income and expenditure gap also exists among the five quintiles household groups in each year. Within the rural households in Ethiopia, the average consumer in the richest 20% spent 4.7-5.0 times that of the average consumer in the

poorest 20%. The richest 20% had 40.3-42.1% of the total national income (measured by total expenditures), while the poorest 20% had only 8.5% (Table 4). The inequality is more pronounced in urban centers where the expenditure in most affluent households is on average twice higher than of their poor neighbors. Income level is also negatively associated with household size.

First average budget shares (ABS) are calculated for different household groups. The ABS is the share of total current income actually spent on each commodity. Based on ABS, it is found that consumption patterns vary among income quintiles, especially between the lowest four and the highest quintiles. For example, the richest 20% of household food expenditure accounted for 49% and 40% of total spending in 1995/96 and 1999/2000, respectively (Table 5). The remaining 80% of households spent 64-69% of their income on food in the survey years.

Different consumption patterns appear within food spending. Poor households spent more on staple foods, including cereal, pulses, and root crops. On average, cereal accounted for about one-third of the total spending of the poorest quintile of households, and only 15-18% of total spending of the richest quintile of households (Table 5). Same pattern was observed in root crops consumption. Share of root crops in total spending dropped from 10% in the poorest quintile to 3% in the richest quintile. On the other hand, demand for livestock products (including meat, dairy and fish) and processed food followed the opposite patterns. In 1999/2000, an average households in the richest quintile spent 5.1% of total income on livestock products, but a poor household only spend 3.6% of its income on livestock products.

There are also substantial differences among existing patterns of staple food and high-value added food between rural and urban households. Rural households consumed more staple food, higher than their population share in the nation. Particularly in the case of root crops consumption, rural households accounted for 96% of national root crops expenditure in 1999/00, while rural population only accounted for 86% of national total (Table 6). Urban households tended to spend more on livestock and processed food consumption. In 1999/00, urban households accounted for 23% and 39% of total national livestock and processed food consumption, which was far higher than their population share of 13.6% in Ethiopia.
In Ethiopia, the value of MBS is significantly smaller than ABS for the coarse grains. It indicates that for every dollar of increased income, households would spend proportionately less of their new income on coarse grain consumption and more on other commodities. In 1999/00, the MBS of coarse grain consumption is negative, implying a shift of consumption away coarse grains as household income increases (Figure 1(a)).

The dynamics of livestock consumption paint a completely different picture from the dynamics of coarse grain consumption. As depicted in Figure 1(c), the MBS value is much greater than that ABS value in livestock consumption, indicating an increase in demand for livestock products as household income rise. In other words, livestock products often exhibit higher income elasticities than cereals (Table 9). However, it should also be noted that the richest quintile group has a much smaller difference between MBS and ABS, and the value of MBS is even smaller than ABS in urban area in the latter survey. While rich households currently spent much more on livestock products, as shown in Table 5, it does not necessarily follows that their consumption will dramatically grow after a further incomes increase.

Patterns of teff consumption seem to fall in the middle of patterns of coarse grains and livestock consumption, i.e., the value of MBS is generally close or greater than the value of ABS for the low-income groups, but smaller than the value of ABS for the higher income groups (Figure 1(c)). However, the differences between the values of ABS and MBS are much smaller in the teff group, indicating that households tend to spend a similar portion of their income on teff consumption as their incomes increase.

Declines in MBS of some staple crops may generate misconceptions regarding market opportunities. For example, the MBS for teff in 1999/00 dropped from 8.4 to 4.6 at the national level. Does this imply an absolute decline in teff consumption in the country if per capita income rises? To answer this question correctly, we need to analyze the absolute consumption pattern by income groups in addition to looking at the spending share across commodities. According to the HICES data used in this study, the country spent a total of 641 million $US on teff consumption in 1999/00, including products processed with teff. Surprisingly, both rural and urban households in the highest income quintile consumed more teff than those in the other four quintiles (Table 6(c)). As measured by the commodity value, the richest 20% of national households consumed nearly 40% of the teff available in the country in 1999/00 (Appendix Table 6 (c)). On the other hand, the poorest 20% of national households consumed only 7.2% of national teff in value terms.

The national average expenditure on teff consumption was $11.5 per person a year in 1999/00, and $17.1 for the rural households in the highest income quintile. In comparison, a person in an average rural household belonging to the lowest income quintile spent only $4.3 on teff consumption (Appendix Table 6(c)). A similar situation occurs in 1995/96. For instance, the average person in the richest rural household group spent $14.6 on teff while the average person in the poorest rural group spent only $4.3 (Appendix Table 6(c)).

Expenditure elasticity[1] is one of the key determinants of future food and non-food demand, and it is important to have an accurate estimate of expenditure elasticity in order to forecast the medium- to long-term demand for goods and services.

The estimated expenditure elasticities for most of food items is between zero and unity for both rural and urban household in which barley (0.77), teff (0.73), and vegetables (0.70) are close to unity compared to the other food items under consideration. It appeared from this particular study that only sorghum (-3.33) and tobacco (-0.26) are considered as inferior goods. As indicated in Table 9 many of the food items both for rural and urban household group considered as normal good, except teff , and meat is as luxurious goods.

As would be expected, non food items tend to have substantially higher expenditure elasticities than foods. However, items such as water and energy and processed food have estimated elasticities below unity. Expenditure elasticities of household equipments, clothing and personal care and entertainments are significantly greater than unity and these items can all be turned luxuries. Education and health are typically recognized as income-inelastic and their elasticity figures are significantly higher than unity in both urban and rural.

In general in Ethiopia the expenditure elasticities for most grain foods are greater than zero except teff however most of these figure are close to unity for rural than urban households in 1999/2000 as opposed to that grain foods are hypothesized to be inferior goods. Expenditure elasticities figures for commodity group considered in this study exhibited several desirable properties of Engle curve estimation (Table 9).
Both budget share and absolute spending analyses seem to suggest that domestic demand for staples in Ethiopia will have to increase rapidly if growth is to be pro-poor. Rapid growth is needed given the huge consumption gaps of staple foods between the rich and the poor. If growth favors the rich, market opportunities for many staple foods will be limited. Wealthier consumers generally prefer to spend more on high value and processed agricultural commodities and even more on nonagricultural commodities like industrial goods and services. This analysis helps to illustrate that market opportunities for agriculture, especially for staple foods and livestock sectors,

[1] Expenditure elasticity of demand measures the percentage change in demand given a one percent change in category of expenditures and capture quality and quantity effects since as income changes consumer tends to buy more and also buy higher quality goods.
Expenditure elasticity >0 normal goods, i.e., consumers increase their purchases of the good as their incomes rise
Expenditure elasticity <0 inferior goods, i.e., consumers reduce their purchases of the good as their incomes rise
Expenditure elasticity >1luxurious goods, i.e., consumers increase their purchases of the good more than proportionate to the income increase

depend critically on broad-based agricultural growth. This can directly increase the income of the majority of farmers and thus increase their consumption levels. When broad-based agricultural growth is rooted in increased agricultural productivity, food prices can decrease without lowering farmers' incomes. Poor urban consumers will also benefit from cheaper prices, which will undoubtedly further increase aggregate consumption levels.

Mellor (1976) argued that food grain technologies as a major impute for rural development and rural consumption expenditure as a primary means of translating these gains into other sectors of the economy.

As per capita income rises in Ethiopia, there is a shift in the composition of demand by different household income groups for goods and services. Future growth within Ethiopia's agriculture sector will most likely depend on how well the country can tap into domestic and regional market opportunities for staples and livestock products. Because of the important role domestic demand plays in the country's agricultural growth, it is necessary to further examine the dynamics at the micro level using household survey data.

As this study is a cross-sectional analysis, this report does not make it clear whether a structural change has occurred. The model also did not tell us the shift in demand occurred whether it is because of change in price of the products or income change. Estimation results from time series data and complete demand system will reveal further information about structural changes to consumer preferences. However the figures presented in this study is much informative for country demand projection

References

CSA (2000). *Household Income, Consumption, and Expenditure Survey 1999/2000*. Ethiopian Central Statistical Authority (CSA), Addis Ababa: Ethiopia.

CSA (1996). *Household Income, Consumption, and Expenditure Survey 1995/1996*. Ethiopian Central Statistical Authority (CSA), Addis Ababa: Ethiopia.

DEATON, A. (1989). Household survey data and pricing policies in developing countries. The World Bank Economic Review. 3(2): 183-210.

DEATON, A. and MUELLBAUER, J. (1980). Economics and Consumer Behavior. Cambridge University Press, New York.

Houthakker, H.S. (1952). The economics of Family Budgets. Journal of the Royal Statistics Society, University of Cambridge, Department of Applied Economics.

Leser, C.E.V. (1963). "Forms of Engle Functions." Econometrica, Vol. 31, No. 4,

Mellor, John W. (1976). The New Economics of Growth. Ithaca, N.Y.: Cornell University Press.

King, Robert. P and Derek Byerlee. (1978). Factor Intensities and Locational Linkages of Rural Consumption Patterns in Sierra Leon. American Journal of Agricultural Economics.

"Plan for Accelerated and Sustained Development to End Poverty (PASDEP)". 2006. Ministry of Finance and Economic Development, Addis Ababa, Ethiopia.

Prais, Sigbert and Hendrink, Houthakker (1955). "The Analysis of Family Budget". Cambridge: Cambridge University Press.

Samuelson, P. A. (1950). "The Problem of Integrability in Utility theory." Economica, N. S, 17,355

Summer, R. (1959) A note on Least Squares Bias in Household Expenditure Analysis", Econometrica, Vol. 27, No. 1, pp.121-126

Working, H. (1943), "Statistical Laws of Family Expenditures," Journal of the American statistical association, Vol. 38, PP43-56.

Sadoulet, E. and De Janvry, A. (1995). Quantitative Development Policy Analysis. Johns Hopkins University Press, Baltimore.

Tobin, J. (1950) "A Statistical Demand Function for Food in the USA." Journal of R. Statistics. Soc., A, 113, 113.

http://ideas.repec.org/e/ppo36.html

Annex 1: Model Result

Table 1. Pattern of crop production and trade in Ethiopia, 2000-03.

	Annual growth rate (%)				Share (%)	
	production	import	export	food	import in food consumption	export in crop production
Barley	11.0	-15.2	76.0	4.9	1.2	0.0
Millet	-1.1	0.0	88.2	-1.2	0.0	0.8
Maize	1.4	57.5	24.7	1.3	1.2	0.1
Rice	0.3	112.6	0.0	44.3	56.3	0.0
Sorghum	11.6	48.9	10.3	2.9	0.8	0.1
Wheat	4.3	11.1	-17.0	12.6	49.0	0.0
Other cereal	-6.6	452.0	67.8	-4.1	2.4	1.1
Total cereal	2.9	15.1	51.2	3.8	13.4	0.3

Source: Calculated from FAOSTAT, 2006.

Table 2. Per capita annual expenditure by income quintile ($US), Ethiopia

	Lowest quintile	2nd	3rd	4th	Highest quintile	Total
			1995/96			
Urban	97.6	159.6	225.2	323.3	614.7	284.6
Rural	77.3	114.7	147.6	190.4	316.2	169.3
National	78.9	118.8	154.4	203.5	374.3	186.0
			1999/00			
Urban	80.6	128.9	179.0	266.1	702.9	271.5
Rural	67.1	98.5	125.7	161.3	273.5	145.2
National	68.4	101.0	130.3	170.1	342.1	162.4

Sources: Ethiopia HICES, 1995/96 and 1999/00.

Table3. Household size in each survey

	Lowest quintile	*2nd*	*3rd*	*4th*	Highest quintile
			1995/96		
National	6	5	5	4	4
Rural	6	6	5	5	4
Urban	5	5	5	5	3
			1999/2000		
National	6	5	5	4	4
Rural	6	5	5	5	4
Urban	5	5	4	4	3

Table 4. Share of each quintile's total expenditure in the national total (%), Ethiopia.

	Lowest quintile	2nd	3rd	4th	Highest quintile	Total
			1995/96			
Urban	1.5	2.4	3.6	5.0	9.6	22.2
Rural	7.1	10.5	13.6	17.5	29.1	77.8
National	8.5	12.8	16.6	21.9	40.3	100.0
			1999/00			
Urban	1.3	2.2	3.0	4.4	11.7	22.7
Rural	7.1	10.5	13.4	17.2	29.1	77.3
National	8.4	12.4	16.0	21.0	42.1	100.0

Sources: Ethiopia HICES, 1995/96 and 1999/00.

Table 5(a): Share of each quintile's major food expenditure in total expenditure (%), 1995/96.

		cereal	pulses	root crops	livestock products	processed food	food
urban	Lowest quintile	28.6	5.2	1.7	3.0	12.4	61.4
	2nd	25.6	4.8	1.4	3.9	11.3	57.9
	3rd	21.7	4.2	1.4	5.2	12.2	55.4
	4th	18.2	3.6	1.3	6.2	12.1	52.0
	Highest quintile	12.1	2.5	0.9	7.5	12.2	44.5
	Total	17.6	3.5	1.2	6.1	12.1	50.6
rural	Lowest quintile	32.8	5.3	7.1	3.2	5.4	64.2
	2nd	32.1	5.2	5.7	4.4	5.0	63.2
	3rd	29.2	5.3	5.5	4.7	5.7	61.5
	4th	27.9	4.8	4.3	4.8	5.9	59.1
	Highest quintile	21.4	3.6	4.2	5.0	6.5	51.1
	Total	26.7	4.5	4.9	4.7	5.9	57.5
national	Lowest quintile	32.6	5.4	6.7	3.4	6.0	64.4
	2nd	31.2	5.1	5.5	4.2	5.6	62.5
	3rd	28.5	5.2	4.8	4.6	6.3	60.5
	4th	26.9	4.6	3.9	4.8	6.8	58.5
	Highest quintile	18.2	3.3	2.9	5.8	8.7	49.0
	Total	24.7	4.3	4.1	5.0	7.3	56.0

Sources: Ethiopia HICES, 1995/96.

Table 5(b). Share of each quintile's major food expenditure in total expenditure (%), 1999/00

		cereal	pulses	root crops	livestock products	processed food	food
urban	Lowest quintile	30.3	5.8	2.4	3.3	10.5	62.9
	2nd	24.0	4.6	1.8	5.1	11.5	56.3
	3rd	20.2	4.1	1.5	5.0	11.7	51.7
	4th	15.1	3.1	1.1	6.1	10.1	43.1
	Highest quintile	6.6	1.3	0.4	4.6	7.1	24.0
	Total	13.1	2.6	1.0	4.9	8.9	36.8
rural	Lowest quintile	34.0	6.5	11.2	3.7	3.3	69.8
	2nd	32.3	6.7	10.0	3.9	3.6	67.3
	3rd	31.2	6.4	8.3	4.6	3.8	65.3
	4th	28.6	6.8	6.5	5.2	4.0	61.0
	Highest quintile	20.9	4.9	4.8	5.2	4.7	48.7
	Total	27.2	5.9	7.1	4.8	4.1	58.8
national	Lowest quintile	34.0	6.4	10.3	3.6	3.9	69.3
	2nd	31.5	6.5	9.3	3.9	4.3	66.3
	3rd	30.1	6.6	7.5	4.8	4.4	64.1
	4th	27.4	5.9	5.8	5.2	5.1	59.3
	Highest quintile	15.7	3.6	3.0	5.1	6.1	40.3
	Total	24.0	5.2	5.7	4.8	5.2	53.8

Sources: Ethiopia HICES, 1999/00.

Table 6 (a). Food consumption in Ethiopia, 1995/96

		cereal	pulses	root crops	livestock products	processed food	total food	population
National total consumption (million $US)		1,496	422	400	488	713	4,547	
% of each quintile's total spending in national total								
urban	Lowest quintile	1.8	1.8	0.6	0.9	2.6	1.7	2.9
	2nd	2.5	2.7	0.8	1.9	3.8	2.5	2.8
	3rd	3.2	3.5	1.2	3.7	6.0	3.6	3.0
	4th	3.7	4.2	1.6	6.3	8.4	4.7	2.9
	Highest quintile	4.7	5.5	2.2	14.4	16.1	7.6	2.9
	Total	15.8	17.8	6.5	27.2	36.9	20.1	14.5
rural	Lowest quintile	9.4	8.7	12.3	4.6	5.3	8.1	17.1
	2nd	13.7	12.8	14.8	9.2	7.3	11.9	17.1
	3rd	16.0	16.6	18.2	12.8	10.6	14.9	17.1
	4th	19.8	19.5	18.5	16.9	14.1	18.5	17.1
	Highest quintile	25.2	24.6	29.7	29.2	25.8	26.5	17.1
	Total	84.2	82.2	93.5	72.8	63.1	79.9	85.5
national	Lowest quintile	11.2	10.6	13.9	5.7	7.0	9.8	20.0
	2nd	16.1	15.2	17.2	10.8	9.9	14.3	20.0
	3rd	19.2	20.1	19.7	15.4	14.3	17.9	20.0
	4th	23.8	23.5	20.6	21.1	20.5	22.9	20.0
	Highest quintile	29.7	30.6	28.6	46.9	48.3	35.2	20.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES 1995/1996.

Table 6 (b). Food consumption in Ethiopia, 1999/00

		cereal	pulses	root crops	livestock products	processed food	total food	population
National total consumption (million $US)		2,178	471	517	438	471	4,884	
% of each quintile's total spending in national total								
urban	Lowest quintile	1.7	1.5	0.6	0.9	2.7	1.6	2.7
	2nd	2.2	1.9	0.7	2.3	4.8	2.3	2.7
	3rd	2.5	2.3	0.8	3.1	6.7	2.9	2.7
	4th	2.8	2.7	0.9	5.6	8.7	3.6	2.7
	Highest quintile	3.2	3.0	0.9	11.1	16.0	5.2	2.7
	Total	12.4	11.4	3.8	23.1	38.9	15.5	13.6
rural	Lowest quintile	10.1	8.9	14.0	5.4	4.6	9.3	17.3
	2nd	14.1	13.5	18.4	8.5	7.4	13.1	17.3
	3rd	17.4	16.5	19.5	12.7	9.8	16.2	17.3
	4th	20.5	22.4	19.7	18.7	13.1	19.5	17.3
	Highest quintile	25.4	27.4	24.6	31.6	26.3	26.4	17.3
	Total	87.6	88.6	96.2	76.9	61.1	84.5	86.4
national	Lowest quintile	11.9	10.4	15.3	6.4	6.3	10.9	20.0
	2nd	16.4	15.7	20.2	10.0	10.4	15.3	20.0
	3rd	20.1	20.5	21.1	15.8	13.7	19.1	20.0
	4th	23.9	23.9	21.5	22.8	20.5	23.1	20.0
	Highest quintile	27.6	29.6	21.9	45.0	49.2	31.6	20.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES 1999/2000.

Table 6 (c) Mean teff per capita consumption expenditure per year in USD

		1995/96	1999/00
urban	Lowest quintile	3.3	11.7
	2nd	5.8	18.7
	3rd	7.5	24.1
	4th	8.9	28.1
	Highest quintile	11.0	35.6
	total	7.3	23.7
rural	1st	10.9	3.4
	2nd	15.6	5.8
	3rd	21.5	8.3
	4th	26.3	11.7
	5th	36.6	16.6
	total	22.2	9.2
national	1st	3.9	4.0
	2nd	6.6	6.9
	3rd	8.5	9.4
	4th	10.5	13.7
	5th	17.9	21.7
	total	9.5	11.1

Sources: Ethiopia HICES 1995/96 and 1999/2000

Table 6 is estimated from the 1995/96 Household Income Consumption Expenditure Survey and MBS is reported in percentile

Table 7(a). Marginal Budget Share valuated at mean by five quintiles: National

Commodity	*1*	*2*	*3*	*4*	*5*	Mean
Teff	8.9	8.1	1.6	8.3	4.6	6.3
wheat	2.3	3.9	5.4	1.6	0.2	2.7
barley	0.2	-2.0	5.0	-1.2	0.0	0.4
maize	8.5	0.5	3.6	-0.4	-0.5	2.3
sorghum	3.9	8.1	6.2	-3.0	-1.2	2.8
Other cereals	3.8	-0.1	-2.9	2.7	0.4	0.8
Pulse	4.2	7.0	2.1	2.4	0.9	3.3
Oil seed	0.1	0.1	-0.2	0.0	0.0	0.0
Vegetable	2.2	2.1	2.2	2.3	2.5	2.2
Fruits	0.1	0.1	0.3	0.2	0.4	0.2
Spices	3.4	0.5	1.9	2.3	1.9	2.0
Coffee and tea	3.8	2.8	2.8	3.4	1.5	2.9
Chat	0.9	4.5	5.1	1.3	0.2	2.4
Root crops	3.2	3.1	2.3	-3.0	0.0	1.1
Beef meat	1.8	0.7	2.6	2.9	3.9	2.4
Mutton	0.4	0.5	0.8	0.2	0.6	0.5
Bovine	0.3	0.5	0.3	0.8	0.3	0.4
Meat other	0.0	0.0	-0.2	0.2	0.0	0.0
Poultry and egg	0.4	0.1	0.6	0.5	1.0	0.5
Fish	0.2	-0.1	0.1	0.1	0.0	0.0
Milk product	3.7	4.9	1.3	2.2	1.1	2.6
Processed food	4.8	5.6	9.8	10.9	9.8	8.2
Beverage	0.2	0.9	0.7	0.1	0.4	0.5
Tobacco	0.1	0.9	1.0	0.4	0.4	0.5
Hotel and restaurants	2.1	3.5	2.4	3.1	2.3	2.7
Textiles and leather	11.2	12.2	13.0	15.0	14.4	13.1
Health	1.0	0.6	0.9	0.3	0.8	0.7
Educations	0.2	0.2	0.9	0.4	1.4	0.6
Services and others	28.3	30.9	30.6	46.0	52.8	37.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES, 1995/96

Table 7(b). Marginal Budget Share evaluated at mean by five quintiles: Rural

Commodity	*1*	*2*	*3*	*4*	*5*	Mean
Teff	11.5	7.2	9.3	0.3	1.0	5.9
wheat	0.8	4.6	5.2	1.5	0.7	2.5
barley	0.7	1.0	2.1	-1.2	0.7	0.7
maize	8.8	-0.8	-2.1	7.4	0.3	2.7
sorghum	3.3	2.5	1.6	3.2	1.7	2.5
Other cereals	4.3	2.2	9.5	0.1	0.2	3.3
Pulse	6.0	5.9	6.0	2.7	0.9	4.3
Oil seed	0.1	0.3	-0.1	0.1	0.0	0.1
Vegetable	1.9	1.9	0.8	0.8	0.9	1.3
Fruits	0.1	0.0	-0.4	0.0	0.1	0.0
Spices	4.1	1.6	4.9	0.1	0.6	2.3
Coffee and tea	5.4	5.9	3.8	2.2	0.8	3.6
Chat	0.5	6.0	3.9	4.8	2.1	3.5
Root crops	2.1	8.2	-4.1	10.1	2.0	3.7
Beef meat	1.3	1.3	0.7	0.7	1.3	1.1
Mutton	0.4	0.0	0.3	-1.0	0.0	-0.1
Bovine	0.4	-0.2	-0.2	-0.6	0.2	-0.1
Meat other	0.1	0.2	0.0	-0.1	0.0	0.0
Poultry and egg	0.2	-0.1	0.2	-0.6	0.2	0.0
Fish	0.0	0.1	0.0	0.0	0.0	0.0
Milk product	4.6	1.9	-0.5	4.3	1.7	2.4
Processed food	4.9	4.3	5.6	0.8	3.4	3.8
Beverage	-0.3	0.0	0.4	0.5	0.4	0.2
Tobacco	0.3	0.4	0.0	1.4	0.5	0.5
Hotel and restaurants	2.1	5.4	0.8	4.0	2.3	2.9
Textiles and leather	11.5	9.1	18.2	4.8	13.5	11.4
Health	0.9	1.3	0.9	2.1	0.7	1.2
Educations	0.1	0.1	0.0	-0.2	0.0	0.0
Service and others	23.7	30.0	33.0	51.7	63.7	40.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES, 1995/96.

Table 7(c). Marginal Budget Share evaluated at mean by five quintiles: Urban

Commodity	*1*	*2*	*3*	*4*	*5*	Mean
Teff	11.1	4.9	4.9	1.7	3.2	5.2
wheat	3.4	-0.8	4.9	0.8	0.3	1.7
barley	0.3	-1.4	-1.1	0.8	0.2	-0.2
maize	-3.8	-0.1	0.8	-0.6	0.0	-0.7
sorghum	0.9	0.0	-2.6	-2.4	0.1	-0.8
Other cereals	1.9	5.8	4.4	-1.9	0.8	2.2
Pulse	2.9	1.0	0.8	-0.6	0.6	1.0
Oil seed	0.0	-0.1	0.1	0.0	0.0	0.0
Vegetable	2.5	2.3	2.4	1.3	2.1	2.1
Fruits	0.3	-0.1	0.8	0.3	0.5	0.4
Spices	4.4	7.1	3.4	1.5	1.5	3.6
Coffee and tea	3.0	3.2	4.6	0.7	1.2	2.5
Chat	0.8	0.6	2.1	0.2	0.0	0.8
Root crops	0.8	1.9	0.7	0.0	0.4	0.7
Beef meat	2.7	2.9	4.1	4.9	3.0	3.5
Mutton	0.1	2.2	0.0	0.5	0.7	0.7
Bovine	0.0	1.7	0.6	-0.4	-0.1	0.4
Meat other	0.0	0.0	0.0	-0.3	0.0	-0.1
Poultry and egg	0.8	1.1	0.6	0.7	1.1	0.9
Fish	0.0	0.3	0.1	0.0	0.1	0.1
Milk product	1.5	1.7	1.2	1.7	2.0	1.6
Processed food	9.2	16.7	12.5	10.4	7.2	11.2
Beverage	0.1	0.1	0.8	-0.4	0.6	0.3
Tobacco	1.3	0.3	0.1	-0.1	0.8	0.5
Hotel restaurants	2.2	2.3	2.7	5.2	3.7	3.2
Textiles and leather	10.1	14.8	14.6	29.8	21.4	18.2
Health	0.9	1.8	-1.0	0.4	0.8	0.6
Educations	0.9	3.0	0.1	1.1	0.5	1.1
Service and others	41.5	26.6	37.3	44.4	47.5	39.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES, 1995/96.

Table 7 and 8 are Estimated from the 1999/2000 Household Income Consumption Expenditure Survey and MBS is reported in percentile

Table 8(a). Marginal Budget Share evaluated at mean by five quintiles: National

Commodity	*1*	*2*	*3*	*4*	*5*	Mean
Teff	10.1	10.4	6.5	8.2	2.1	7.4
Wheat	5.9	4.3	3.6	-2.8	-0.4	2.1
Barley	4.9	2.6	-0.8	-1.3	-0.2	1.0
Maize	5.5	7.1	-1.3	-3.0	-1.9	1.3
Sorghum	1.7	2.8	0.8	-2.7	-0.6	0.4
Other cereals	2.4	1.5	1.4	-0.8	-0.2	0.8
Pulse	8.4	5.6	4.1	2.8	-0.1	4.2
Oilseed	0.2	0.2	0.4	-0.2	0.0	0.1
Vegetable	1.4	0.9	1.7	1.9	1.2	1.4
Fruits	0.0	0.3	1.7	1.3	0.2	0.7
Spices	4.1	2.9	1.6	0.8	0.8	2.1
Coffee and tea	2.2	0.9	2.8	2.4	0.2	1.7
Chat	1.8	4.1	1.0	0.4	0.1	1.5
Root crops	6.6	-7.1	4.5	4.6	-0.6	1.6
Beef meat	1.6	1.9	0.8	2.2	2.5	1.8
Mutton	0.6	1.0	-0.3	2.6	1.2	1.0
Bovine	0.3	-0.1	1.3	0.4	0.4	0.5
Meat others	-0.2	0.0	0.0	0.2	0.0	0.0
Poultry and egg	0.2	0.2	2.6	0.9	2.6	1.3
Fish	0.0	0.0	0.0	0.0	0.1	0.0
Milk product	1.9	3.3	3.1	1.0	0.1	1.9
Processed food	5.2	6.4	4.7	7.5	5.3	5.8
Beverage	0.2	0.9	1.2	3.2	0.9	1.3
Tobacco	0.2	0.3	0.6	0.2	-0.8	0.1
Hotel restaurants	0.6	1.1	2.1	1.7	2.0	1.5
Textiles and leather	10	15	18	15	10	13.7
Health	0.6	1.6	0.8	3.2	4.6	2.2
Educations	1.0	0.5	0.7	1.0	4.1	1.5
Service and others	22.6	30.8	36.3	48.9	66.7	41.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES, 1999/2000.

Table 8(b). Marginal Budget Share evaluated at mean by five quintiles: Rural

Commodity	*1*	*2*	*3*	*4*	*5*	Mean
Teff	14.6	6.8	7.7	2.7	1.2	6.6
Wheat	2.5	0.5	-1.3	-0.2	0.1	0.3
Barley	-0.2	1.4	0.5	0.0	0.0	0.3
Maize	-3.7	-0.6	-1.0	-0.1	-0.2	-1.1
Sorghum	-1.1	-1.6	-0.1	0.0	-0.1	-0.6
Other cereals	0.4	2.1	0.0	0.0	0.2	0.6
Pulse	4.2	-0.6	0.2	0.2	0.1	0.8
Oilseed	0.0	0.0	0.2	-0.2	0.0	0.0
Vegetable	1.9	4.0	1.9	2.5	0.8	2.2
Fruits	-0.1	0.4	0.4	0.3	0.2	0.2
Spices	2.6	3.8	0.6	1.5	0.3	1.8
Coffee and tea	2.0	0.8	0.0	0.3	0.1	0.7
Chat	0.4	0.9	0.5	0.8	0.2	0.6
Root crops	1.0	2.0	-0.4	0.1	0.1	0.5
Beef meat	3.0	3.3	4.9	2.3	1.8	3.1
Mutton	0.7	1.1	2.0	2.7	0.8	1.5
Bovine	1.1	-0.3	0.8	1.1	0.0	0.5
Meat others	0.1	0.1	0.6	0.3	0.0	0.2
Poultry and egg	0.4	0.3	0.1	1.1	0.2	0.4
Fish	0.0	0.1	-0.1	0.1	0.0	0.0
Milk product	2.5	3.0	0.9	2.9	0.6	2.0
Processed food	12.8	15.4	5.5	7.3	2.3	8.7
Beverage	0.4	0.7	0.7	1.0	0.9	0.8
Tobacco	0.5	0.7	0.6	1.2	1.5	0.9
Hotel and restaurants	0.9	2.2	2.7	2.3	1.8	2.0
Textiles and leather	12.2	16.1	21.1	10.9	9.7	14.0
Health	1.4	1.3	3.7	0.6	1.0	1.6
Educations	1.3	1.0	4.1	4.3	4.8	3.1
Service and others	38.2	35.0	43.2	53.9	71.5	48.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES, 1999/2000.

Table 8(c). Marginal Budget Share evaluated at mean by five quintiles: Urban

Commodity	*1*	*2*	*3*	*4*	*5*	Mean
Teff	5.4	8.2	15.2	-0.3	1.7	6.0
Wheat	5.0	9.8	13.4	4.9	3.0	7.2
Barley	3.4	-0.7	-0.1	1.3	0.8	0.9
Maize	5.9	-2.4	3.7	10.0	-0.7	3.3
Sorghum	2.4	-0.6	-6.6	0.7	-0.3	-0.9
Other cereals	2.1	6.0	3.5	3.2	1.2	3.2
Pulse	6.2	6.2	11.9	4.1	2.0	6.1
Oilseed	0.2	0.2	-0.2	0.3	0.0	0.1
Vegetable	2.2	2.1	1.8	1.5	0.6	1.6
Fruits	0.0	0.3	0.1	1.6	0.3	0.4
Spices	2.6	1.9	3.9	2.5	1.6	2.5
Coffee and tea	2.2	3.6	1.4	1.8	0.4	1.9
Chat	3.6	3.4	-1.9	1.2	0.8	1.4
Root crops	13.8	6.8	-1.6	1.1	-1.1	3.8
Beef meat	0.6	2.1	2.3	2.4	1.4	1.8
Mutton	0.5	0.5	1.4	0.6	0.5	0.7
Bovine	0.9	0.2	1.4	-0.1	1.2	0.7
Meat others	-0.3	0.0	0.0	-0.2	0.0	-0.1
Poultry and egg	0.2	0.2	0.0	1.2	7.4	1.8
Fish	0.1	-0.1	0.1	0.1	0.0	0.0
Milk product	2.5	2.1	1.3	4.3	-0.1	2.0
Processed food	3.4	5.5	6.4	2.2	2.6	4.0
Beverage	0.1	0.0	0.2	1.1	0.1	0.3
Tobacco	0.7	0.9	-0.2	1.0	-1.7	0.1
Hotel and restaurants	0.7	1.2	0.8	0.1	0.6	0.7
Textiles and leather	9.9	13.3	6.1	13.8	10.8	10.8
Health	1.6	1.4	5.2	1.1	7.5	3.4
Educations	1.0	0.3	-0.1	0.9	0.3	0.5
Service and others	23.2	27.8	30.7	37.6	59.1	35.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Ethiopia HICES, 1999/2000.

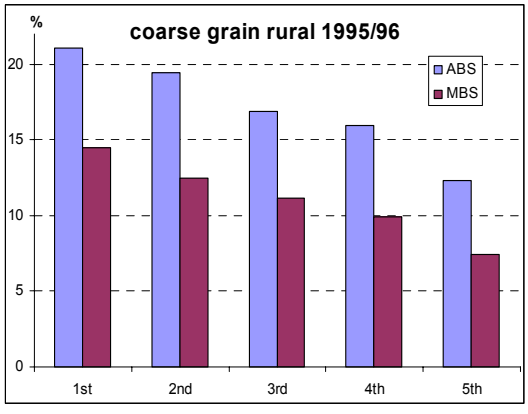
Table 9. Total expenditure Elascities for selected commodities: 1999/2000

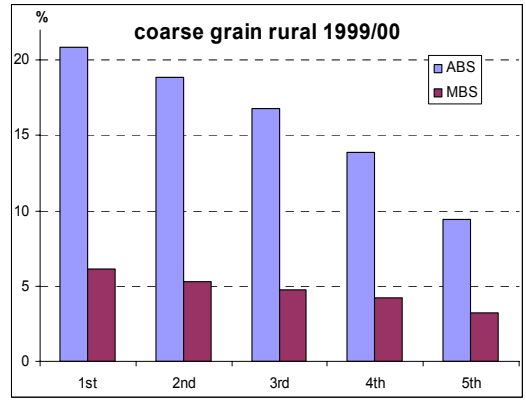
	Rural	Urban	national
teff	1.65	0.73	1.14
Wheat	1.00	0.19	0.79
Barley	0.68	0.77	0.42
Maize	0.61	****[1]	1.93
Sorghum	0.40	-3.33	0.10
Other cereals	0.82	0.28	0.65
Pulse	1.02	0.40	0.84
Oilseed	0.70	0.03	0.52
Vegetable	0.65	0.70	0.69
Spices	1.07	0.65	0.90
Coffee & tea	0.80	0.37	0.67
Chat	1.84	3.06	1.96
Root crops	0.76	0.17	0.34
Beef meat	1.89	1.29	1.43
Milk product	0.66	1.12	0.75
Processed food	1.03	0.65	0.85
Beverage	3.24	3.03	2.47
Tobacco	-1.19	4.45	-0.26
Hotel and restaurants	1.77	1.55	1.46
Textiles and leather	1.61	1.43	1.46
Housing	0.70	1.56	1.22
Water & energy	0.83	0.72	0.79
Household equipments	1.36	1.93	1.55
Personal care and entertainments	1.89	2.11	1.73
Health	3.05	1.67	2.15
Education	1.05	1.93	1.60

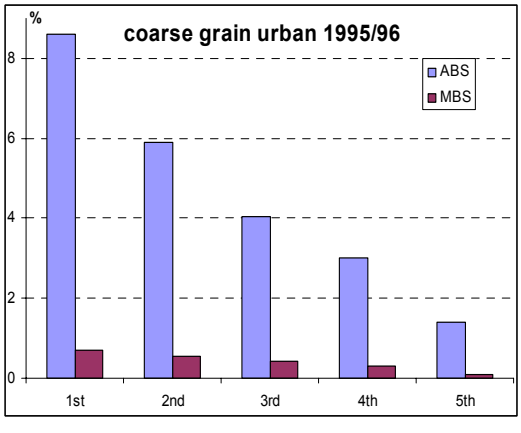
Sources: Ethiopia HICES, 1999/2000.

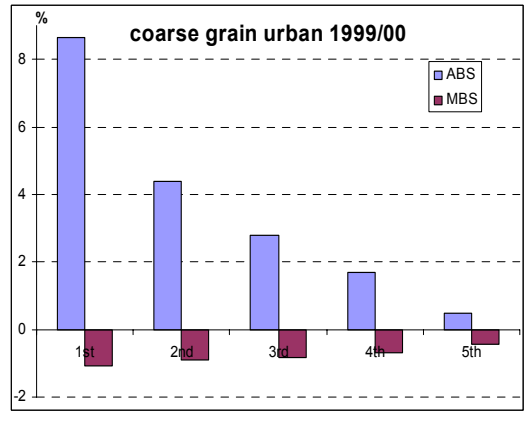
[1] The elasticity figure is unreasonably high to report

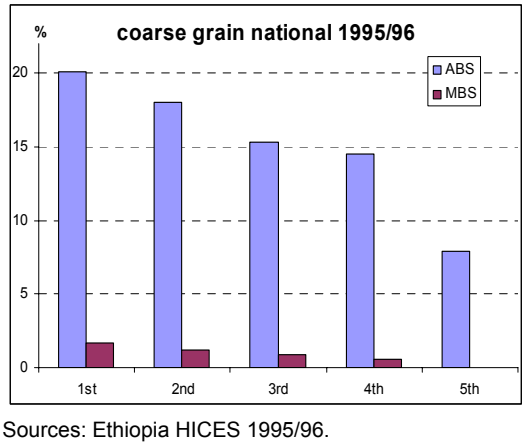
Figure 1(a). Average and marginal budget shares for coarse grains, 1995/96 and 1999/00.

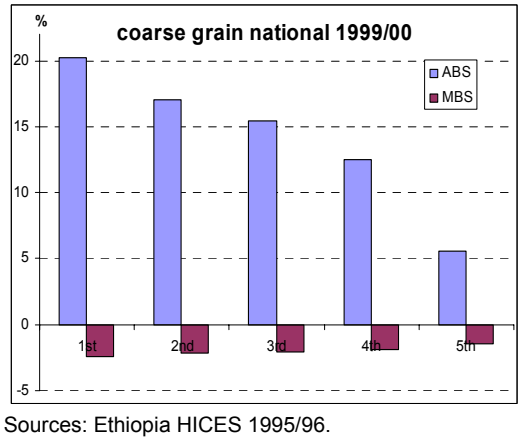








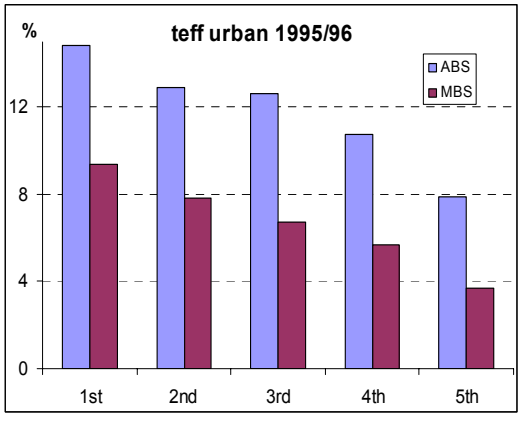


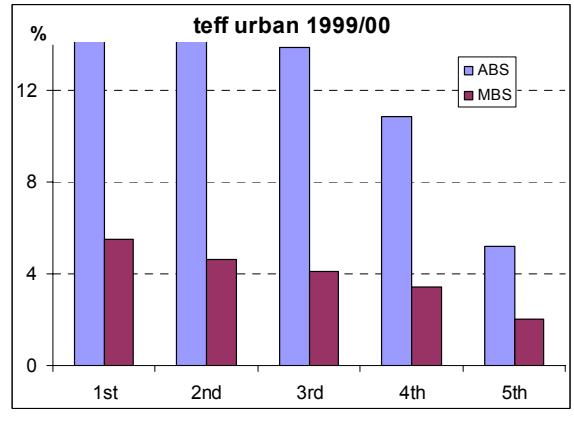


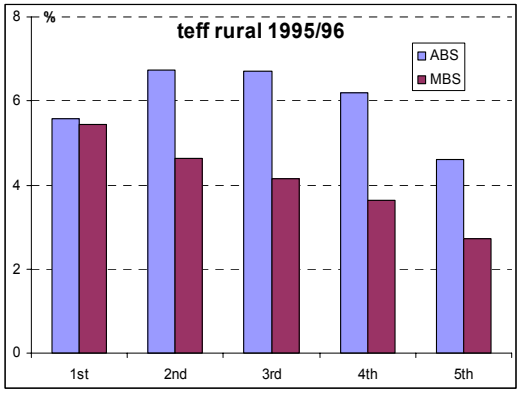
Sources: Ethiopia HICES 1995/96.

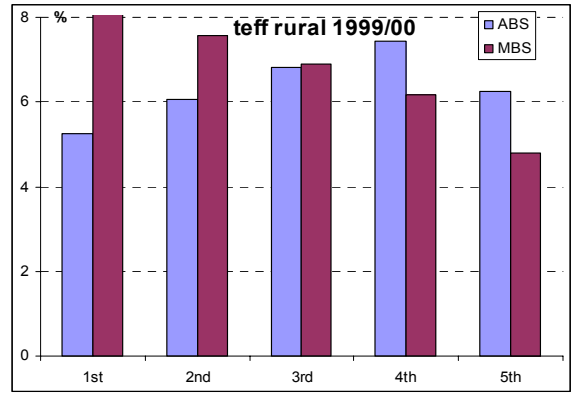
Sources: Ethiopia HICES 1995/96.

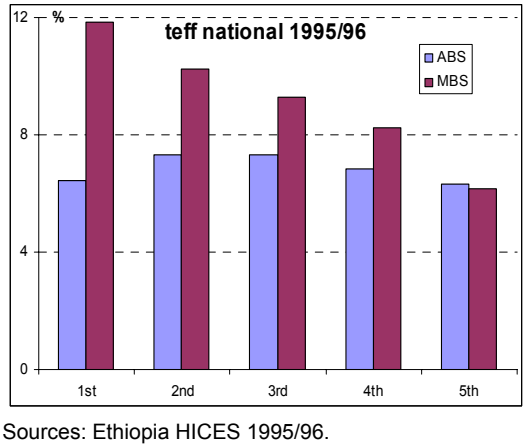
Figure 1(b). Average and marginal budget share for teff, 1995/96 and 1999/00

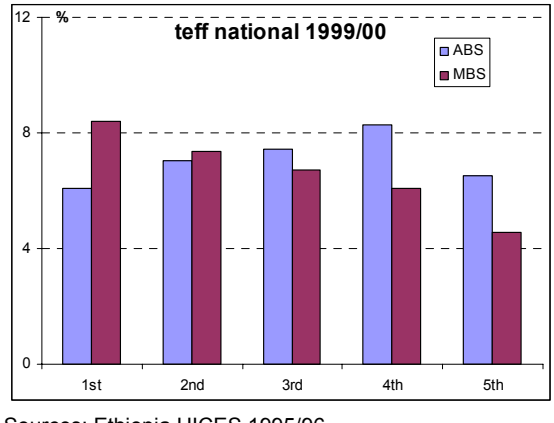










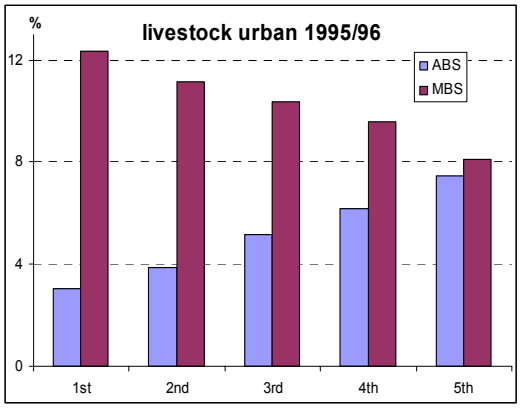


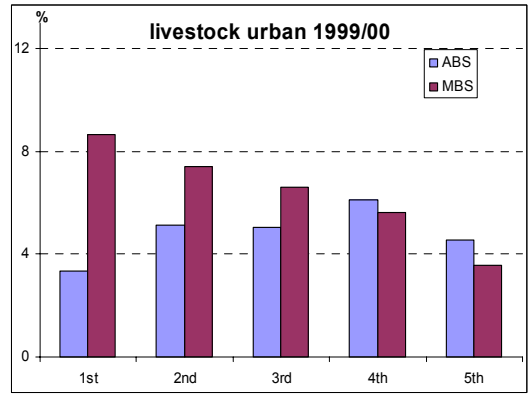
Sources: Ethiopia HICES 1995/96.

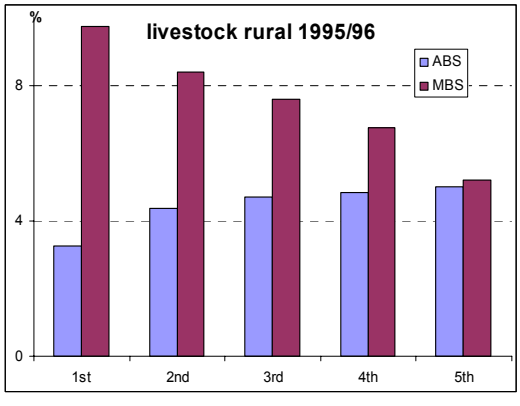
Sources: Ethiopia HICES 1995/96

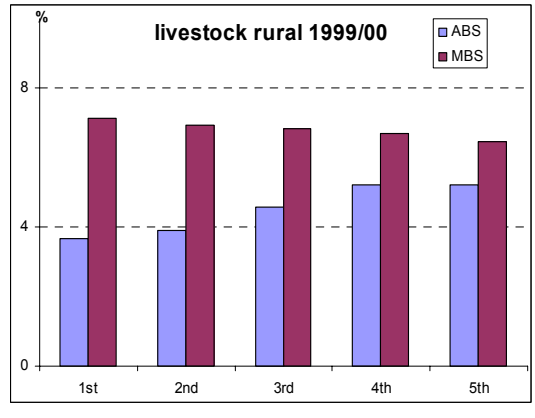
Figure 1(c). Average and marginal budget shares for livestock, 1995/96 and 1999/00

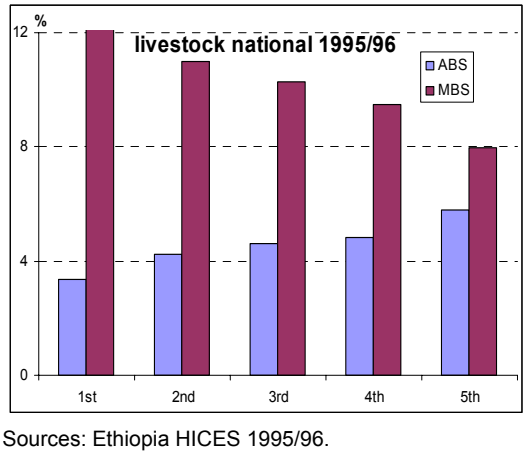
Sources: Ethiopia HICES 1995/96.

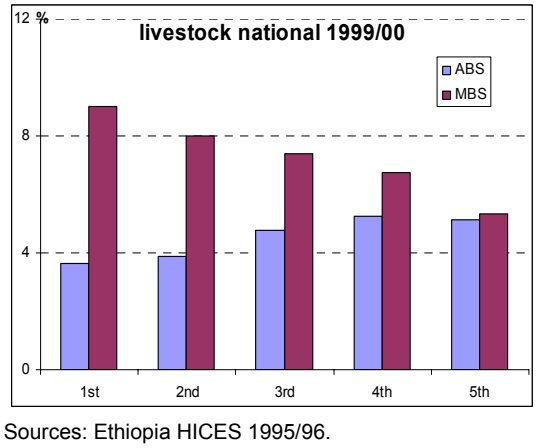








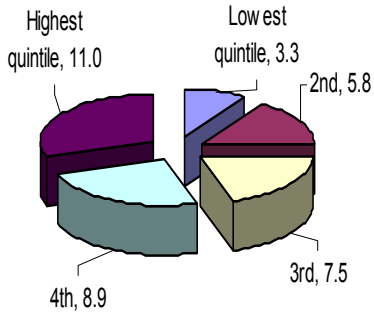




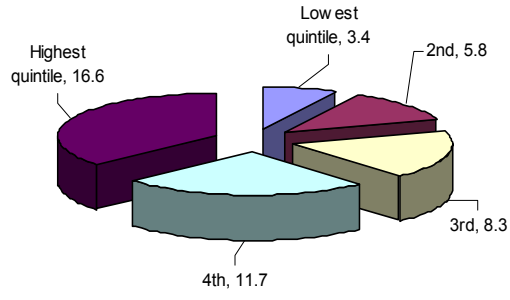
Sources: Ethiopia HICES 1995/96.

Sources: Ethiopia HICES 1995/96.

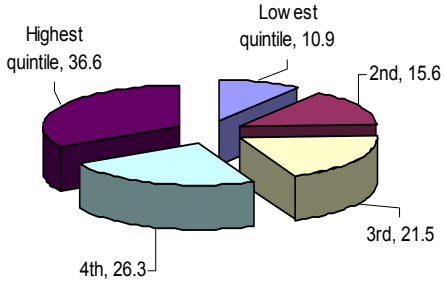
Figure 2. Mean per capita teff expenditure by quintile, 1995/96 and 1999/00



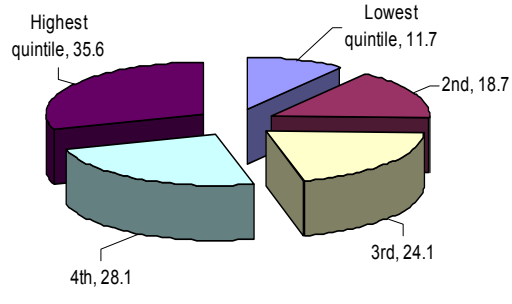
Mean urban household expenditure for teff, 1995/96 in USD



Mean urban household expenditure for teff, 1999/00 in USD



Mean rural household expenditure for 1995/96 in USD



Mean rural household expenditure for teff, 1999/00 in USD

Annex 2

1995 HICES

The 1995 Welfare Monitoring and Income Expenditure Survey (WMS I, or 1995 HICES) was carried by the Central Statistical Agency of Ethiopia. The data collection process was spread over six months, from July 1995 to January 1996. The project was funded by the World Bank which provided technical assistance in the data collection and analysis.

Objectives

(a) Provide data on the levels, distribution and pattern of household income, consumption and expenditure. This will provide analysis of changes in the levels of living standards of households over time in various socio-economic groups and geographical areas.
(b) Obtain information for the formulation of socio-economic plans and policies.
(c) Furnish bench mark data for assessing the impact of existing or proposed socio-economic programs on household living conditions.
(d) Provide data for compiling household accounts in the system of national accounts, especially in the estimation of private consumption expenditure.
(e) Obtain weights and other useful information for the construction of consumer price indices at various levels and for different population groups.

The HICES was a nationwide household survey which covers all administrative regions, including urban and rural. Sample is representative at regional level. However, non sedentary population was not covered. The overall sample has 11687 at the national level, of which 6569 rural households and 4379 urban households. Data was collected on multiple visits to the households. In particular, households were visited twice for nonfood items. To take into account the slack season and the peak/dry (harvest) season, surveyed households were visited 16 times for food items.

Sample design

The data was collected using a multi-stage stratified random sampling. The 69 zones were grouped into 32 domains, of which 21 were rural and 11 urban. A total number of 943 enumeration areas (EAs) were identified in the administrative regions and 929 of them were surveyed. Using systematic random sampling, 15 households were sampled from urban EAs, and 12 households were sampled from each rural EA.

Expenditure data

The HICES was an income expenditure type survey which collects information on most households expenditure items, including food and nonfood consumption. Food expenditure include 200 items, both purchased and home produced. The total expenditure variable was calculated by aggregating all estimates of expenditure items extrapolated to the annual value. Prices deflators were not used to account for regional and spatial differences.

1999 HICES

The 1999 Ethiopia Welfare monitoring / Income Consumption and Expenditure Survey (1999 HICES) was carried by the Central Statistical Agency of Ethiopia. The data collection process was spread over eight months, from June 1999 to February 2000. The project was funded by the World Bank which provided technical assistance in the data collection and analysis.

Objectives

(a) Provide data on the levels, distribution and pattern of household income, consumption and expenditure that could be used for analysis of the changes in the living standards over time by various disaggregates such as socio-economic groups and geographical areas.
(b) Obtain information for the formulation of socio-economic plans and policies.
(c) Furnish series of data for assessing the impact of existing or proposed socio-economic programs on living conditions in the household.
(d) Provide data for compiling household accounts in the system of national accounts, especially in the estimation of private consumption expenditure.
(e) Obtain weights and other useful information for the construction of consumer price indices at various levels and for different population groups.

Sample

The HICES was a nationwide household survey which covers all administrative regions, including urban and rural. Sample is representative at regional level. However, non sedentary population in 2 zones of Afar and 6 zones of Somali regions was not covered. The overall sample has 16,982 at the national level, of which 8,664 in rural areas and 8,672 in urban. Data was collected on multiple visits to the households. The survey was done in two phases: (a) June 11th to the first week of August 1999; and (b) Jan-Feb 2000.

It should be noted that the number of valid households and population changes and not all households have a corresponding individual file and vice versa. As a result, for any analysis, one must base results on 16,982 households. This only takes into account households with valid basic population information and with a valid expenditure (expenditure must be greater than zero).

Sample design

The data was collected using a multi-stage stratified random sampling. A total number of 1,264 enumeration areas (EAs) were selected in the administrative regions, with 722 in rural areas and 542 urban. Using systematic random sampling, 15 households were sampled from urban EAs, and 12 households were sampled from each rural EA.

Expenditure data

Household-based questionnaires include modules on housing amenities, accessibility of basic facilities such as food market, post office and telephone, possession of household asset and schedule on living standard indicators with respect to basic necessities (food, clothing and shelter). Proxy measure of household expenditure is also included in WMS questionnaires to hint at the economic situation of households

EXPLORING THE LINK BETWEEN EXCHANGE MARKET PRESSURE AND MONETARY POLICY IN ETHIOPIA[1]

Abebe Deressa[2]

Abstract

Entrusted with the responsibilities of maintaining exchange rate stability, the central bank Ethiopia, namely, the National Bank of Ethiopia (NBE) has paid more attention to the maintenance of exchange rate stability in the formulation and implementation of monetary policy during the past years. These considerations often prompted the NBE to intervene in the foreign exchange market so as to influence exchange rate developments.

A recent study that estimated an index of the Exchange Market Pressure(EMP) for Ethiopia over the period November, 2001 to December, 2005, on the other hand, reveals that in majority of the cases (in 42 months out of 49 months considered) the Ethiopian foreign exchange market was characterized by depreciation pressures (Abebe, 2006). According to a monetary model of exchange market pressure, a decrease in domestic credit (contractionary monetary policy) will reduce the EMP by increasing foreign reserves, or by causing an appreciation of the exchange rate, or some combination of the two (Kim, 1985).

The objective of this study is, therefore, to examine empirically the existence of such link between EMP and monetary policy in Ethiopia using the Girton-Roper monetary model of exchange market pressure and VAR technique. The result of the single equation model reveals that measure of the stance of monetary policy, i.e domestic credit growth, has a significant and positive impact on EMP. The VAR test provides further evidence supporting the claim that domestic credit has a positive impact on exchange market pressure. The estimated impulse response function (IRF) as well indicates a positive response of EMP due to a shock in domestic credit, implying that a contractionary monetary policy reduces EMP in line with traditional theory.

[1] This paper was originally prepared for the In-house presentation forum at the National Bank of Ethiopia.

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1. Introduction

The level and movements in the exchange rate have been a matter of policy concern for central banks of most countries, including that of Ethiopia, as erratic changes in the exchange rate not only undermine the goal of price stability but also reduce real output, trade, capital flows and investment (IMF, 1984). These considerations often prompt central banks to intervene in the foreign exchange market so as to influence exchange rate developments.

As specified in the Monetary and Banking Proclamation No 83 of 1994, the powers and duties of the National Bank of Ethiopia (NBE) include, among others, formulation and implementation of exchange rate policy. Entrusted with such responsibilities, the National Bank of Ethiopia has paid more attention to the maintenance of exchange rate stability in the formulation of monetary policy during the past years. In the Strategic Planning and Management Document of the Bank (NBE, 2003), maintenance of exchange rate stability has also been specified as one of the objectives of the Bank in the formulation of monetary policy.

A recent study that estimated an index of the EMP for Ethiopia over the period November, 2001 to December, 2005 reveals that in majority of the cases (in 42 months out of 49 months considered) the Ethiopian foreign exchange market was characterized by depreciation pressures (Abebe, 2006). A critical issue under such circumstances is the policy measures to be undertaken by Monetary Authority when the economy faces such external strains.

For a country adopting a managed floating exchange rate regime and faced with exchange rate pressures, policy options in the short run are only limited to monetary policy as certain fundamental domestic remedies, like fiscal adjustment and financial sector reform, may require time to implement (often under political stress).To assuage the pressures and reduce EMP, the authority should react by embracing contractionary monetary policy. Interest rate defense is recently emphasized by the literature as possible venue to defend the currency and contend the attack. A more traditional way is via controlling domestic credit (Kamaly and Erbil, 2000, Tanner, 2001). The policy response to an exchange market pressure to a large extent depends on the stance of monetary policy as well as the degree of monetary autonomy. When EMP builds up, the authority decides whether to use domestic credit or interest rate or a combination of both to contend such pressures.

A simple monetary model of exchange market pressure states that for a given rate of growth of world prices, real income and the money multiplier, an increase in domestic

credit (expansionary monetary policy) will result in an equi-proportionate loss in foreign reserves, or an equi-proportionate depreciation of the exchange rate, or some combination of the two (Kim, 1985).

The objective of this study is, therefore, to examine empirically the impact of monetary policy on exchange market pressure (EMP) in Ethiopia. More specifically, this study examine whether contractionary monetary policy reduces EMP or not. The study also tests empirically how the monetary authority absorbs the pressures in the foreign exchange market. It also addresses whether the stance of monetary policy itself is a function of EMP. In this study, EMP is measured as the sum of the percentage change of international reserves scaled by the monetary base and the percentage change of nominal exchange rate depreciation. Domestic credit, the domestic component of monetary base, which is considered the variable directly controlled by policy makers, is used as measure of monetary policy.

As the exchange rate regime of Ethiopia is characterized as managed floating (the simultaneous adjustment of both exchange rates and reserves), EMP is the appropriate concept for analysis. To the best of my knowledge, there has been no study conducted so far analyzing the interaction between EMP and monetary policy in Ethiopia. As a result, this study differs from previous studies in that it investigates the relationship between EMP and monetary policy instead of the relationship between exchange rate and monetary policy or the relationship between reserves and monetary policy alone.

The remainder of this paper is organized as follows. The next chapter provides a brief overview of the conduct of exchange and monetary policy in Ethiopia. Chapter 3 briefly describes a theoretical model of EMP and reviews an empirical work on exchange market pressure and monetary policy focusing in particular on the Griton-Roper's model of exchange market pressure. Chapter 4 specifies an empirical EMP model for Ethiopia and presents main results. Chapter 5 presents conclusions and policy implications.

2. An Overview of the Conduct of Exchange and Monetary Policy in Ethiopia

As the central bank of the country, the National Bank of Ethiopia (NBE) is obviously entrusted with the responsibility of maintaining the stability of the exchange rate of the Birr, the country's legal tender currency against other currencies.

Accordingly, during 1970s and 1980s, when the Ethiopian Birr was pegged to the US dollar at a fixed rate, the NBE used to maintain exchange rate stability of the Birr by making available foreign currency to the market at the fixed rate.

Following the introduction of the auction system on May 1, 1993 and the subsequent replacement of the auction system by the daily inter-bank foreign exchange market in October, 2001, demand and supply factors were given more latitude in the determination of the exchange rate. As a result, the NBE acts as a buffer between forces of demand and supply through intervention. Indeed, the NBE has attempted to stabilize the exchange rate through official interventions mainly by varying the amount of foreign exchange it supplied to the market. In effect, pressures in the foreign exchange market are reflected by changes in both exchange rate and reserve holdings of the NBE.

The objectives of monetary policy in Ethiopia are, among others, maintenance of price and exchange rate stability and ensuring the safety and soundness of the financial system, within the broader macroeconomic policy of attaining high level of economic growth. The responsibility of formulation and implementation of Monetary Policy in Ethiopia is vested in the National Bank of Ethiopia (NBE).

A monetary control mechanism in Ethiopia mainly follows the financial programming approach applied by IMF. This involves establishing a ceiling for the growth rate of money supply on the basis of projected growth rate of GDP and targeted inflation, establishing a floor for international reserves and ceilings for net domestic assets of the National Bank of Ethiopia and net domestic government financing.

With regard to instruments of monetary policy, prior to the commencement of economic reform program in 1992, the National Bank of Ethiopia uses direct monetary policy instruments. The direct control mechanisms include aggregate and individual bank credit ceilings, direct controls on interest rates, including preferential rates for socialized sectors.

Since 1992, the NBE starts to shift its policy orientation towards use of indirect monetary policy instruments. The NBE started to rationalize the structure and interest rates in October 1992, by eliminating discriminatory deposit and lending interest rates. By January 1, 1998, the NBE has totally liberalized the lending interest rates while continued to determine the minimum deposit rate.

In January 1995, the NBE also started to issue treasury bills of 91-days maturity. In addition, since December 18, 1996, the Bank issued treasury bills of 28 and 182 days

maturity. In general, the NBE issues treasury-bills as a means of controlling domestic liquidity. In case of excess liquidity, the Bank will mop-up excess liquidity by issuing treasury bills, while in case of shortage of liquidity, the Bank will avail liquidity to the economy by purchase of T-bills from security holders. It is also a non-inflationary means of financing government deficit vis-à-vis borrowings from the NBE through direct advances or ways and means.

3. Literature Review

3.1 The Relationship between Exchange Rate and Monetary Policy

An exchange rate policy implies a systematic effort on the part of the monetary authorities to influence the level or rate of change of the exchange rate. A variety of policy instruments are potentially available to influence the exchange rate, including foreign exchange market intervention, domestic monetary policy, various forms of controls on international trade and capital flows, and official announcements of future policies (Glick and Hutchison, 1989).

Most attention has focused on either foreign exchange market intervention or domestic monetary policy as the primary instruments available to the central bank in its pursuit of systematic exchange rate policy. In many respects, it is possible to accomplish the same objectives with either domestic monetary policy or foreign exchange intervention policy (Glick and Hutchison, 1989). Domestic monetary policy typically involves a change in domestic monetary base (that is, reserves held by the banking sector plus currency held by the public) brought about by the central bank through the open market purchase or sale of domestic government securities. Un-sterilized foreign exchange market intervention - purchase or sale of foreign currency in the foreign exchange market have also a direct effect on the domestic monetary base. In case of un-sterilized intervention, the central bank changes its net foreign asset holdings through purchases and sales of foreign exchange and allows a corresponding change in its monetary liabilities, that is, the monetary base. Un-sterilized intervention, thus, amounts to using the foreign exchange market to conduct monetary policy in lieu of the domestic financial market.

The exchange rate is often a signal of the stance of monetary policy. For example, in the absence of any other changes in economic circumstances, a weakening of the exchange rate (or upward pressure) may suggest that monetary policy is too loose, relative to policy in the country of the reference foreign currency. On the other hand, a strengthening of the exchange rate, or downward pressure, may suggest that monetary policy is tight.

3.2 Monetary Model of EMP

The exchange market pressure model draws on the combination of the monetary approach to the balance of payments and the monetary approach to the exchange rate determination (Younus, 2005).

Following the work of Girton-Roper (1977), different authors (for instance, Kim (1985), Thornton(1995), and Younus (2005)) have developed a simple monetary model of exchange market pressure as follows:-

$$M^d = kPY \quad \textbf{(1)}$$

$$M^s = A(R+D) \quad \textbf{(2)}$$

$$P = EP^* \quad \textbf{(3)}$$

$$M^d = M^s \quad \textbf{(4)}$$

Equation (1) represents the demand for money where P stands for the domestic price level and Y is real income, k is a fraction of nominal income that people want to hold as cash. Equation (2) is a nominal money supply equation. The money supply is the sum of the net foreign assets (R), the foreign component of the monetary base and the domestic assets (D), the domestic component of the monetary base multiplied by the money multiplier, A, whereas A=M2/Monetary Base. Equation (3) represents a purchasing power parity condition where E is the nominal exchange rate, which is defined as the domestic currency per unit of foreign currency and P* is the foreign price level. Equation (4) represents a money market equilibrium identity where money demand equals money supply.

Substituting (1) and (2) into (4) we get

$$kPY = A(R+D) \quad \textbf{(5)}$$

Replacing P by EP*, we get

$$k(EP^*)Y = A(R+D) \quad \textbf{(6)}$$

In terms of percentage change and rearranging terms, equation (6) can be rewritten as:

$$r - e = -d + p^* + y - a \quad \textbf{(7)}$$

Where, r=the percentage change in international reserves;
e= the percentage change in the nominal exchange rate depreciation;
d=the percentage change in domestic credit;
p*=the percentage change in the foreign price level;
y=the percentage change in domestic real income; and
a=the percentage change in the money multiplier; money multiplier is calculated as the ratio of broad money to the monetary base

Kim (1985) and Thornton (1995) citing the works of Connolly and Silveira (1979), and Shiva and Bahmani-Oskooee (1998) included a variable Q= (e-1/r-1) on the right hand side of the equation to see whether the monetary authority respond to absorb exchange market pressure either by the exchange rate depreciation or reserve depletion. The variable Q is a measure of the way a central bank absorbs exchange market pressure. A significant and positive coefficient of Q implies that the monetary authority absorb more pressure by the exchange rate depreciation, while a significant and negative Q implies that more pressure is absorbed by reserve losses (Younus, 2005). An insignificant coefficient implies that the monetary authority is not sensitive to components of EMP.

3.3 Review of Empirical Literature

Empirical studies on the interrelations between exchange market pressure and monetary policy can be broadly divided into two categories: single-equation econometric methods and vector autoregressive (VAR) models. Earlier studies mostly used single-equation econometric methods, while a number of recent studies have applied VAR models.

Most of the empirical studies that applied Girton-Roper model of exchange market pressure (Kim 1985, Hallwood and Marsh, 2003, Thornton, 1995) found that there is a strong evidence of a negative relationship between the rate of domestic credit creation and the rates of changes in the exchange market pressure.

Kim (1985) applied a Girton-Roper model of exchange market pressure to the Korean data from March 1980 to July 1983. The regression analysis using the OLS estimation technique shows that there is a strong evidence of a negative relationship between the rate of domestic credit creation and the rates of changes in the exchange market pressure. The coefficient of domestic credit was -0.699 indicating the fact that as the domestic credit increases by 10 percent, foreign reserve decreases by 6.7 percent or exchange rate depreciates by the same amount. The result also shows that coefficients of foreign prices and domestic real income are

positive (0.952 and 0.057 respectively) implying that an increase in foreign prices or real income increases the foreign reserves or appreciates the domestic currency. On the other hand, an increase in money multiplier is found to reduce reserves or depreciate the domestic currency in line with theoretical expectations. The study also indicated that the measure of exchange market pressure does not depend on its composition between foreign exchange and foreign reserves as the variable Q is statistically insignificant. Moreover, the Korean experience indicates that most exchange market pressure is absorbed by adjustments in foreign reserves (as use of r as the sole dependent variable results in overall good fit while use of e alone as the dependent variable results in exceedingly poor fit), reflecting the government's wariness of inflation and of the debt burden effects of exchange rate devaluation.

Thornton (1995) applied the Girton-Roper monetary model of exchange market pressure to the experience of Costa Rica in the period 1986-92. The OLS estimation of the exchange market pressure provide a strong evidence of a negative relationship between domestic credit creation and exchange market pressure (measuring EMP as the sum of r and e, where e is the percentage appreciation (if positive) of the exchange rate). The coefficient for domestic credit, d, is close to its hypothesized value of minus one. The study also indicated that over the sample period, the Central Bank of Costa Rica absorbed most of the exchange market pressure by adjustments in foreign reserves.

Many current works prefer to apply a VAR technique in order to account for the many possible interactions between the variables in monetary models. Tanner (2001) uses a VAR technique to unravel the interrelations between EMP and monetary policy (observable in changes in domestic credit and the interest rate differential) for the cases of Brazil, Chile, Mexico, Indonesia, Korea, and Thailand in 1990-98. He found that monetary policy affects EMP as generally expected: contractionary monetary policy helps to reduce EMP.

Kamaly and Erbil (2000) applied a VAR technique to Turkey, Egypt and Tunisia. These results are somewhat more mixed. They found a strong link between domestic credit and EMP for Turkey. Egypt and Tunisia have used domestic credit and interest rate changes, respectively, as a policy tool in response to EMP shock, but the direction of the response is not clear from the results.

Younus (2005) examined empirically the impact of monetary policy on exchange market pressure (EMP) in Bangladesh using quarterly data from 1976:2 to 2003:1. He applied Engle and Granger's (1987) two-step single-equation error correction model (ECM) and Impulse response functions (IRFs) and variance decompositions (VDCs)

derived from a vector error correction model (VECM), to examine the Girton and Roper's (1977) monetary model of the EMP. The estimated coefficient of domestic credit derived from the ECM shows that domestic credit has a significant and negative impact on EMP. The IRFs and VDCs derived from the VECM also indicate that monetary policy, measured by domestic credit, has a significant and negative impact on EMP. Younus (2005) found insignificant coefficient of Qi , indicating the fact that the monetary authority in Bangladesh responds to EMP by depreciating currency and losing international reserves.

Empirical literatures on Ethiopia mainly focused on the determinants of the real exchange rate (Andualem, 1996, Teferi, 2005, Melesse, 2001). The real exchange rate is hypothesized to be determined by terms of trade, fiscal and monetary policy variables and trade variables. The rate of growth of domestic credit less the lagged rate of growth of real GDP, a proxy for excess supply of credits, was among the monetary variables frequently used in empirical analysis.

An excess supply of credits is found to have a depreciating impact on the real exchange rate (Andualem, 1996, Teferi, 2005) contrary to the expectations of appreciating the real exchange rate. On the contrary, Melesse (2001) found that high level of excess credit would result in the appreciation of the real exchange rate.

4. An Application of the EMP Model to Ethiopia

4.1 Sources and Description of the Data

The main sources of the data for this study are NBE's Quarterly Bulletin (various issues) and International Financial Statistics (IFS) data base. The data used in empirical analysis are monthly data spanning from August 1993/94 to December 2005/06.

4.2 Econometric Methodology

In order to gauge the impact of monetary policy on the exchange rate, this study estimates two sets of econometric models-single equation regressions and Vector auto regressions (VARs)

4.2.1 Single Equation Model.

Following the works of Kim (1985), Thornton (1995), and Younus (2005), the empirical formulation of the model is given by the following form:-

$$\ln EMP_t = \beta 0 + \beta 1 \ln DC_t + \beta 2 \ln FP_t + \beta 3 \ln mm_t + \beta 4 \ln SP_t + \beta 5 \ln Q_t$$

Where EMP is exchange market pressure, DC is the percentage change in domestic credit, FP is US inflation (a proxy for foreign inflation), mm is the change in money multiplier, SP is the spread and Q is Q= (e-1/r-1). The variable Q is added to the model to see whether the monetary authority in Ethiopia, namely, NBE respond to absorb exchange market pressure either by the exchange rate depreciation or reserve draw down or both. In other words, it shows the sensitivity of the NBE to the components of the EMP. A significant and positive coefficient of Q implies that the NBE absorbs more pressure by the exchange rate depreciation, while a significant and negative Q implies that more pressure is absorbed by reserves losses. An insignificant coefficient implies that the monetary authority is not sensitive to components of EMP.

The expected sign of β1 is positive as an increase in domestic credit creation is assumed to increase the exchange market pressure through depreciating the domestic currency or reserve losses. For similar reason, the expected signs of β3 and β4 are also positive. On the other hand, the expected sign of β2 is negative, implying that an increase in foreign prices increases the foreign reserves or appreciates the domestic currency, thereby reducing EMP.

4.2.2 Vector Auto Regression (VAR)

Despite its simple appearance, single equation estimation embodies a number of interdependent relations between variables. For instance, when faced with a surge in EMP, the authority may choose to fend such pressures by reducing domestic credit. According to this policy option, the line of causality runs from EMP to domestic credit. Similarly, in case of a bulge in capital flows monetary authority may decide to sterilize these flows by lessening the amount of domestic credit. Here, a fall in EMP following the accumulation of international reserves induces a reduction in domestic credit**.** Single estimation equation, on the other hand, depicts the opposite direction of causality from domestic credit to EMP. This relation simply states that a lax monetary policy would likely result in a loss in reserves or a depreciation in domestic currency or both spurring a rise in EMP. The interdependence between the variables renders the process of empirically delineating the factors affecting EMP a bit challenging. In order to sift out the reactions of the monetary authority to a rise in EMP, we need to portend the response of domestic credit to a shock in EMP. This, however, cannot be accomplished under OLS framework (Kamaly and Erbil, 2000). There are mainly two reasons that justify the use of VAR. First, VAR would enable a researcher to circumvent the endogeinty problems that exist in a single equation. Second, VAR is a

very effective tool in portending how this system reacts to a shock in one of its components through impulse response functions (Tanner, 2001).

Following Tanner (2001), this study uses a VAR methodology and focuses on EMP. A key feature of this framework is how monetary policy is modeled. In most recent research works, a monetary aggregate and the interest differential are considered as the policy variable. However, in this study, the domestic credit is considered as the stance of monetary policy.

The VAR system applied in this study takes the following form:-

$$Xt = a0 + a1Xt\text{-}1 + a2Xt\text{-}2 + ... + vt \quad \textbf{(1)}$$

where X = (δ , EMP,) is a matrix of variables, ai is a vector of coefficients, and

vt = (vδ , vE,) is a vector of error terms. A system like (1) permits testing for effects of past values of X on current values. Assumptions regarding the exogeneity of certain variables (like a policy variable) are easily incorporated into a system like (1). To do so, first assume that each element of the error vector vt is, in turn, composed of "own" error terms wt = (wδ , wE,) and contemporaneous correlations with "other" errors. That is:

$$vt = Bwt \quad \textbf{(2)}$$

where B is a 2 x 2 matrix whose diagonal elements (own correlations) equal one and whose nonzero off-diagonal elements reflect contemporaneous correlations among the error terms.

The ordering of the variables imposes certain restrictions on the VAR model so that the domestic credit growth variable $\delta_{\cdot}$ is assumed to be the exogenous policy variable. That is, in any period, innovations to $\delta_{\cdot}$ (i.e., v$\delta_{\cdot\cdot}$)reflect only the tastes and preferences of the policymaker:

$$v\delta t = w\delta t \quad \textbf{(3)}$$

Next, shocks to exchange market pressure (vE) contain two elements: the "own" shock (wE) plus one related to innovations in domestic credit:

$$vEt = wEt + b21w\delta t \quad \textbf{(4)}$$

Thus, wE may be thought of as a shock to the demand for a country's currency, attributable perhaps to changes in investor confidence and sentiment. Thus, b21wδt represents the portion of shocks to EMP that is contemporaneously correlated with domestic credit growth.

In addition to the contemporaneous relationships shown in equations (3) and (4), impulse response functions (IRFs) summarize the effect of past innovations (i.e., lagged elements of w) to current values of X. Thus, IRFs provide additional ways to evaluate the effect of monetary policy on EMP. IRFs show effects on EMP of both current and past innovations to domestic credit (wδ). The IRFs also provide a policy reaction function: they show effects on current δ. of past (but not current) innovations to EMP (wE) .For example, when faced by positive innovations to EMP (for example, a decrease in investor confidence) policymakers may respond "prudently" with contractionary policy (reducing δ).

In brief, the IRFs show the dynamic response of each variable in the system to shocks from each variable in the system. Ordinarily we expect the response of the exchange market pressure to be significant and positive due to shocks to domestic credit. An IRF is significant if its t-statistic exceeds/2/

4.3 Unit Root Tests of the Variables

As this study employs time series data, an analysis of the statistical properties of each variables are essential before proceeding to the estimation of the model. This procedure helps as to identify the problem of spurious regression. A series of Dickey-Fuller unit root tests are conducted to test for the presence of unit root using log level data.

The augmented Dickey-Fuller (ADF) unit root tests suggest that the logs of all the variables are stationary. Consequently, tests for co integration among the variables were not conducted.

4.4 Interpretation of Results

4.4.1 Single Equation Results

The coefficients of the growth rate of the domestic credit and foreign prices appear to be statistically significant with the expected positive and negative signs, respectively. A significant and negative coefficient of foreign inflation implies that an increase in

foreign prices decreases foreign exchange market pressure in Ethiopia, either through increase in reserves or appreciating the currency, or both.

The coefficient of money multiplier is with the expected positive sign but not statistically significant, presumably reflecting the offsetting impacts of increases in net foreign assets and domestic credit on exchange market pressure. In other words, increases in net foreign assets would decrease the pressure on EMP while an increase in domestic credit increases EMP. The coefficient of the spread between the parallel and official exchange rate is with a negative sign, contrary to the expectation and is also statistically insignificant. The negative coefficient may indicate the fact that unsatisfied demand in the official foreign exchange market will shift to the parallel market and cause the spread between the parallel and the official market to rise, while an increase in the spread will not immediately result in depreciation of the official exchange rate or in official reserve drawdown. The inclusion of an additional variable, Q, which captures the sensitivity of the NBE to exchange rate depreciation or reserve drawdown, improves the overall fits of the model. The coefficient of Q is negative and statistically significant implying that the NBE absorbs a lion's share of the exchange market pressure by drawdown of reserves rather than exchange rate depreciations.

Table 1: OLS Estimation Results: Final Output

Independent Variables	Dependent Variables		Q	R^2	Ad.R^2	D-W
	LNDC	LNFP				
	0.93	-0.84		0.13	0.13	1.99
LNEMP	(5.83)	(-2.66)				
	2.564		-1.658	0.31	0.30	2.1
	(8.49)		(-6.81)			

Note: T-statistics in parentheses

4.4.2 VAR Estimation Results

Table 2 presents the summary results of the VAR test. The Table depicts that 24 percent of the variations in EMP are explained by the VAR system, together with its exogenous variables. The estimated coefficients of DC and MM are with the expected positive sign indicating that increases in both domestic credit and money multiplier raises the exchange market pressure. The coefficient of FP is with the correct sign reflecting the fact that increase in foreign prices would decrease the exchange market pressure largely by increasing foreign reserves. On the other hand, the coefficient of SP was with the wrong sign presumably reflecting the ex-post result of the shift in foreign exchange demand from the official market to the parallel market.

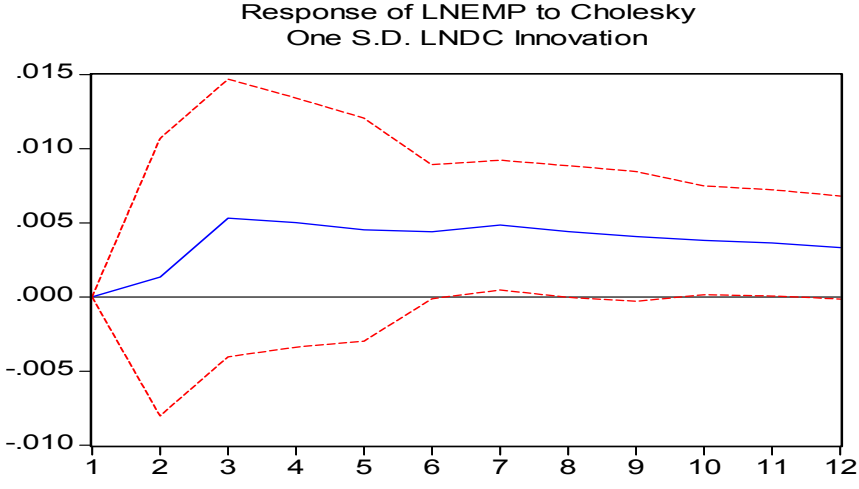
Table 2: VAR Estimation Results

Dependent Variable	EMP	DC
R-squared	0.24	0.01
Adj.R-squared	0.18	-0.06
F-Statistics	4.15	0.16
FP Coefficient	-0.03	0.09
t-statistics	-0.15	1.19
MM Coefficient	0.01	0.02
t-statistics	0.76	2.01
SP Coefficient	-0.06	0.09
t-statistics	-0.43	1.63

Source: Appendix 1.

Domestic credit shocks affect EMP positively as depicted in Fig 1. The positive response of EMP to domestic credit shocks is supportive of the conventional wisdom, where an expansionary shock to domestic credit builds up pressure on EMP, either by reducing reserves, depreciating the currency or some combination thereof.

Figure 1: Response of Exchange Market Pressure to Domestic Credit

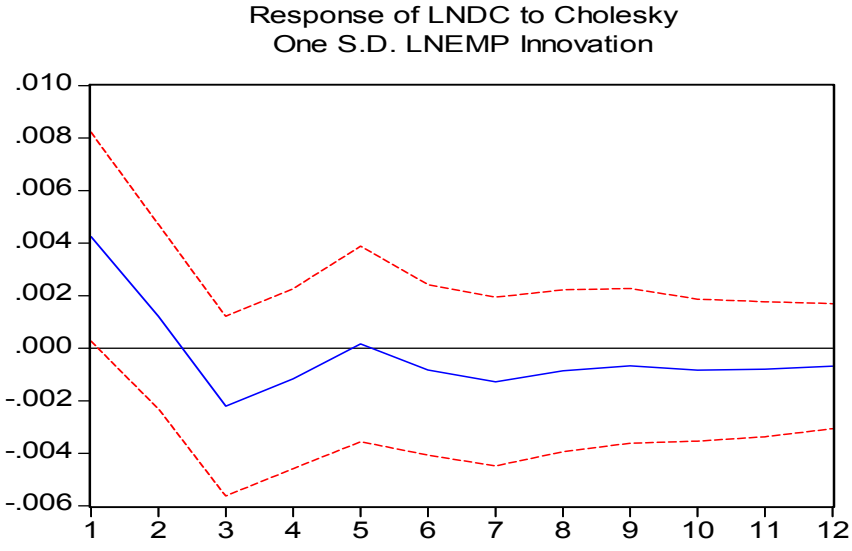


On the other hand, the domestic credit equation suffers from a low level of overall significance, with F-statistics of 0.15, R-squared of 0.01 and Adj. R-squared of -0.06. This presumably was due to the exclusion of major explanatory variables, such as economic growth and budget deficit.

As a policy reaction function, except in the initial cases, EMP shocks affect domestic credit negatively (though the coefficients are insignificant) (see Appendix 2 and Fig

2). This result suggests that the NBE responds to increased EMP by withdrawing liquidity from the banking system (i.e by contracting money supply). This finding seems plausible given the un-sterilized nature of NBE's intervention in the foreign exchange market.

Figure 2: Responses of Domestic Credit to Exchange Market Pressure



5. Conclusion and Policy Implications

5.1 Conclusion

With the introduction of the auction system on May 1, 1993 and the subsequent replacement of the auction system by the daily inter-bank foreign exchange market in October, 2001, the exchange rate regime of Ethiopia is officially classified as managed floating. Under this regime, the NBE allows some exchange rate flexibility but often intervenes in the foreign exchange market(mainly through purchase and sale of foreign exchange) to influence the path of the exchange rate. In such circumstances, neither the reserve changes nor the exchange rate movements capture the extent or nature of the exchange market pressure. Indeed, monetary authorities should focus on the exchange market pressure, rather than on changes in exchange rates or foreign exchange reserves alone (Tanner, 2001).

A recent study that estimated an index of the EMP for Ethiopia over the period November, 2001 to December, 2005 found that in majority of the cases (in 42 months

out of 49 months considered) the Ethiopian foreign exchange market was characterized by depreciation pressures (Abebe, 2006). A critical issue under such circumstances is the policy measures to be undertaken by Monetary Authority when the economy faces such external strains.

Theoretical literature suggests that for a country adopting a managed floating exchange rate regime and faced with exchange rate pressures, policy options in the short run are only limited to monetary policy. To assuage the pressures and reduce EMP, the authority should react by embracing contractionary monetary policy, via controlling domestic credit (Kamaly and Erbil, 2000).

The objective of this study is, therefore, to examine empirically the impact of monetary policy on exchange market pressure (EMP) in Ethiopia using monthly data from August 1993 to December 2005 by applying the Griton-Roper(1977) model of exchange market pressure.

The results of the single equation model reveal that measure of the stance of monetary policy, i.e domestic credit growth, has powerful impact on *EMP.* Domestic credit has a significant and positive impact on EMP. The coefficient of domestic credit was 0.93 implying that as the domestic credit increases by 10 percent, foreign reserve decreases by 9.3 percent or exchange rate depreciates by the same amount, or a combination thereof. The result also shows that the coefficient of foreign prices is negative (0.83) and significant indicating that an increase in foreign prices increases the foreign reserves or appreciates the domestic currency. On the other hand, the coefficient of money multiplier was positive in line with theoretical expectations (though insignificant). The study also indicated that the monetary authority tend to absorb more of the exchange market pressure by drawing down of reserves as the variable Q is statistically significant with a negative sign.

The VAR test provides further evidence supporting the claim that domestic credit has a positive impact on exchange market pressure. The estimated IRF as well indicate a positive response of EMP due to a shock in domestic credit, implying that a contractionary monetary policy reduces EMP in line with traditional theory.

The paper also provides evidences of the fact that the NBE responds to increases of EMP by contracting domestic credit. This finding largely reflects the un-sterilized nature of NBE's intervention in the foreign exchange market.

Finally, the low level of R-square and adjusted R-square indicates that the amount of EMP that could be explained by macroeconomic variables is minimal. One possible

explanation is the existence of omitted set of variable(s) such as real income and devaluation expectations.

5.2 Policy Implications

The main policy implications of the findings of this study are the following:-

1. The NBE can reduce EMP by contracting the pace of domestic credit expansion. This proposal is consistent with standard IMF's policy prescription that is, using contractionary monetary policy to counter depreciation pressures.
2. The main implication of the findings of small values of R-square and adjusted R-square is that disciplined management of fundamentals may not be enough to maintain exchange rate stability or contain exchange market pressures.

References

Abebe, Deressa. 2006. "Measuring Exchange Market Pressure and the Degree of NBE's Intervention in the Foreign Exchange Market," A Paper presented to the 9th In-House Presentation Forum of the Economic Research and Monetary Policy Directorate, National Bank of Ethiopia, January 2006.

Andualem, Berhanu. 1996." The Behavior and Dynamics of the real exchange rates of the Birr (1960-1991)". Unpublished Masters Thesis, Addis Ababa

Girton, Lance, and Don Roper, (1977). "A Monetary Model of Exchange Market Pressure Applied to the Postwar Canadian Experience, "American Economic Review, 67(4): 537-48

Glick, Reuven and Michael Hutchison, 1989. "Exchange rates and Monetary Policy" Federal Reserve Bank of San Francisco Economic Review, no. 2

Haile Kibret. 2001. Monetary Policy and the Monetary Approach to the Balance of Payments: The Case of Ethiopia (1968/69-1999/00). Unpublished Masters Thesis, Addis Ababa.

Hallwood, C. Paul and Ian W. Marsh. 2003. Exchange Market Pressure on the Pound-Dollar Exchange Rate: 1925-1931.

IMF 1984. Exchange Rate Volatility and World Trade, Occasional Paper No. 28, Washington, D.C.

Kamaly, Ahmed and Nese Erbil (2000). "A VAR Analysis of Exchange Market Pressure: A Case Study for the MENA Region", Working Paper 2025. Economic Research Forum.

Kim, Inchul. 1985. "Exchange Market Pressure in Korea: An application of the Girton-Roper Monetary Model" Journal of Money, Credit, and Banking, Vol. 17, no. 2 (May 1985)

Mcnown, Robert and Myles S. Wallace. 1994. "Cointegration Tests of the Monetary Exchange rate Model for three High Inflation Economies" Journal of Money, Credit and Banking, Vol. 26. no. 3, PP 396-410.

Melesse, Minale. 2001. "Determinants of Equilibrium Real Exchange Rate in Ethiopia", **NBE Staff Working Paper**, ERD/SWP/002/2001.

Neely, Christopher J. and Lucio Sarno, 2002. "How well do Monetary Fundamentals Forecast Exchange Rates? The Federal Reserve Bank of St. Louis Review, September/October, 2002.

Tanner, Evan, 2001. "Exchange Market Pressure and Monetary Policy: Asia and Latin America in the 1990s" IMF Staff Papers, Vol. 47, No. 3, International Monetary Fund.

Teferi, Mequaninte, 2005. Estimating the Equilibrium Exchange Rate of Ethiopia: Dynamic OLS Approach, A Paper presented to the 9th In-House Presentation Forum of the Economic Research and Monetary Policy Directorate, National Bank of Ethiopia , January 2006.

Thornton, John, 1995. "Exchange Market Pressure in Costa Rica, 1986-92: An Application of the Girton-Roper Model." International Economic Journal, Volume 9, Number 1, Spring 1995.

Younus, Sayera. 2005. **"**Exchange Market Pressure and Monetary Policy" Working Paper Series: WP 0603, Policy Analysis Unit (PAU), Research Department, Bangladesh Bank

Appendix 1. VAR Estimation Results

Sample (adjusted): 1993M12 2005M12
Included observations: 145 after adjustments
Standard errors & t-statistics in parentheses

	LNEMP	LNDC
LNEMP (-1)	0.287629	0.006741
	(0.07282)	(0.03078)
	(3.94961)	(0.21900)
LNEMP(-2)	-0.105854	-0.066769
	(0.05643)	(0.02385)
	(-1.87573)	(-2.79925)
LNEMP(-3)	0.159937	-0.010263
	(0.05249)	(0.02218)
	(3.04712)	(-0.46262)
LNEMP(-4)	0.023393	-0.000429
	(0.05338)	(0.02256)
	(0.43827)	(-0.01904)
LNDC(-1)	0.056533	0.194770
	(0.19695)	(0.08324)
	(0.28704)	(2.33976)
LNDC(-2)	0.196590	0.296919
	(0.19755)	(0.08350)
	(0.99514)	(3.55604)
LNDC(-3)	0.095469	0.143978
	(0.19594)	(0.08282)
	(0.48724)	(1.73853)
LNDC(-4)	0.045422	0.232570
	(0.19740)	(0.08343)
	(0.23010)	(2.78749)
LNFP	-0.026453	0.087178
	(0.17340)	(0.07329)
	(-0.15255)	(1.18950)
LNMM	0.014633	0.016491
	(0.01938)	(0.00819)
	(0.75518)	(2.01367)
LNSP	-0.060342	0.096017
	(0.13910)	(0.05879)
	(-0.43379)	(1.63313)
R-squared	0.236572	0.011933
Adj. R-squared	0.179599	-0.061804
F-statistic	4.152400	0.161827

Appendix 2. IRF of Domestic Credit Shock (DC) on EMP

Period	EMP
1	0.000000
	(0.00000)
2	0.001342
	(0.00468)
3	0.005316
	(0.00468)
4	0.005013
	(0.00420)
5	0.004535
	(0.00376)
6	0.004396
	(0.00226)
7	0.004844
	(0.00219)
8	0.004410
	(0.00222)
9	0.004072
	(0.00219)
10	0.003815
	(0.00183)
11	0.003643
	(0.00179)
12	0.003331
	(0.00174)

Appendix 3. IRF of Exchange Market Pressure (EMP) on Domestic Credit (DC)

Period	DC
1	0.004245
	(0.00199)
2	0.001212
	(0.00175)
3	-0.002202
	(0.00171)
4	-0.001158
	(0.00171)
5	0.000163
	(0.00186)
6	-0.000830
	(0.00162)
7	-0.001272
	(0.00161)
8	-0.000861
	(0.00154)
9	-0.000674
	(0.00147)
10	-0.000834
	(0.00135)
11	-0.000803
	(0.00128)
12	-0.000684
	(0.00119)

EVALUATING THE EFFECTS OF MICROFINANCE SERVICE ON URBAN POVERTY REDUCTION: THE CASE OF ARADA SUB-CITY

Esubalew Alehegn[1]

Abstract

Whether microfinance impacted poverty reduction positively or negatively is a contentious issue. The premises of this paper hinges on its positive spillover effects: microfinance provides ways to assist and empower the poor, improves access and efficient provision of savings, enables the poor to smooth their consumption, manages the poor risk better, builds their assets, develops their micro-enterprises, contributes to the improvement of resource allocation, promotes market link, leads to adoption of better technology, and improves their way of life.

Based on the above premises the study evaluated the effects of microfinance service on urban poverty reduction at Arada Sub-City of Addis Credit and Saving Institution. Data to undertake the study came from a cross-sectional survey of January 2006. Close and open-ended questionnaires were distributed to the systematic randomly selected respondents (clients and non-clients). Close-ended questionnaires were analyzed through descriptive statistics and econometric models while the open-ended questionnaires were narrated through focus group discussions.

Contrary to the premises the findings of the study revealed mixed results-neither microfinance service helped the poor reduce their poverty status nor worsened it at best. The result suggests that in order for the service work properly interest rate, repayment period, client selection ,training of clients, experts capacity building in such areas need to be revisited

Keywords: Evaluation, Microfinance, Addis Credit and Saving Institution, Ethiopia

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1 Introduction

Microfinance service is one of the emerging issues which have provoked interest among policy makers, academicians, researchers, non-governmental and governmental organizations as a tool of poverty reduction and employment generation (Getahun, 2002).Microfinance is an instrument that, under the right conditions, fits the needs of a broad spectrum of the population, including the poorest—those in the bottom half of people living below the poverty line. It provides ways to assist and empower poor women who make up a significant proportion of the poor and suffer disproportionately from poverty .It improves access and efficient provision of savings & credit. It enables the poor to smooth their consumption, manage their risks better, build their assets gradually, develop their micro-enterprises, & enhances their income earning capacity (Jonathan et al, 2000)

On the contrary, when the service is inappropriately designed and the loans are given without proper planning and follow up, it is hard for clients to make profits and repay the principal with its interest. In such a situation, it might worsen the poverty situation, (Wolday, 2006) .Thus, microfinance will remain as a tool for poverty reduction only if it is able to strike the right balance between poverty and finance (Senanayake & Premaratne, 2006)

1.1 Problem

There are conflicting views among academicians, policy makers, and practitioners on whether microfinance service helps the poor improve their life standard. In the works of Woller and Parsons (2002) the impact of microfinance services on poverty remained debatable. Zeller (1998) found positive effects on income and food security whereas Beger (1998) and Diagne (1998) got nearly fifty-fifty effects. An Ethiopian scholar, Wolday (2006) outlined the main operational risks of microfinance intervention as ownership, governance, political interference, and donor interference. These are impediments to poverty reduction.

Microfinance as a tool of poverty reduction in Ethiopia faces various constraints and challenges. Those constraints and challenges can be identified at three different levels-macro, meso and micro level. At macro level, unstable policies and "poor" macro-economic conditions (economic growth and stability) are crucial to microfinance development. Inadequacy of institutional capacities such as managerial and financial worthiness is the main constraint at meso level. Problems related to the credit worthiness and credit discipline of the clients are the micro level challenges.

In Ethiopia a major part of microfinance clients do not have entrepreneurial skills (Wolday, 2006). The poor and low-income clients have low levels of education and vocational training skills. Their accounting and management skills are poor. While the enterprises run by MF[2] clients are very small, the loans taken by clients are also very small. Consequently, the clients fail to start and to expand a sizable industry other than a cottage industry. Hence, the impact of MF on poverty reduction may not be very significant as expected. In spite of such constraints analytical works that scrutinize the effects of microfinance service on urban poverty reduction are at best scanty.

1.2 Objectives

Objectives of this study include:

- assess the services of Addis Credit and Saving Institution(ACSI) and
- evaluate the effects of its services on urban poverty reduction at Arada[3] sub-city

The remaining paper is organized as follows. The next section brings data & methodology. Section two provides literature review. Section three presents results and discussions. Finally, section four, forwards conclusions and policy implications.

1.3 Data and Methodology

This study used primary and secondary data. Primary data came in three ways: individual interview, focus group discussions and key informants. A pre-tested structured was questionnaire administered to clients and non-clients in January 2006. Two focus groups, each with six participants were interviewed. Besides, the study used checklists to collect information from key informants.

1.4 Sampling Technique

The study utilized multiple cluster sampling. First, it used the whole administrative sub-cities of Addis Ababa City. Second, of the ten sub-cities we took Arada as the target area. We selected this purposely, among others; this sub-city is rated as the most vibrant in its service delivery. Third, from Arada Sub city we took kebele[4] 11/12. This is again based on the existence of more clients. Finally, we took 10 percent of

[2] Microfinance
[3] One of the ten sub-cities of Addis Ababa City Administration
[4] The lowest Administrative Unit of the Federal System

the clients from the sub-city- 80 respondents [50 clients (62.5%) and 30 non-clients (37.5%)]. The study included the non-clients as control groups. This is done intentionally to see whether the improvements in the life of the clients could easily be achieved without joining programs. Analysis is made at a household level.

1.5 Method of Data Analysis

We analyzed the output with statistical techniques. The data collected from individual respondents were coded and feed into a computer and analyzed through SPSS program. Descriptive statistics (ratio, mean, standard deviation, percentages, minimum, maximum, etc) were used for analysis.

1.6 Econometric Issue

The Logit Model

In testing the likelihood decision of individuals' (clients and non-clients) willingness to the service of microfinance we employed a Logit model. This model is appropriate when we assume the random components of response variables follow binomial distribution. It is suited when the dependent variable is dichotomous and of the type that have a yes or no response. The form of the Logit model following (Maddala, 1994 & 2004; Gujarati, 2006) is shown below:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + ... + \beta_k X_k + \varepsilon \quad \textbf{(1)}$$

Where,

Ý = client's willingness to continue as a member

α = constant term

β_k =coefficients of predictors

X_i= predictors/independent variables

ε = error term

Aggregating the value yields

$$\acute{Y} = \alpha + \sum_{k=1}^{k} \beta_k X_k + \varepsilon \quad \textbf{(2)}$$

The above model represents the linear probability model (LPM), Y=1 willingness to ACSI service, 0 otherwise. Consider the following expression,

$$P_i = \frac{1}{1+e^{-z_i}} \quad \textbf{(3)}$$

Where $$Z = \beta_1 + \beta_2 X_i \quad \textbf{(4)}$$

Equation 4 represents Logistic distribution function
If Pi is the probability of willingness to have the service of ACSI, it is given by (4), then (1-Pi), the probability of not willing to have the service is

$$1 - P_i = \frac{1}{1+e^{z^i}}$$

$$\frac{p_i}{1-p_i} = \frac{1+e^{zi}}{1+e^{-z^i}} = e^{zi} \quad \textbf{(5)}$$

Where pi/ (1-pi) is the odds ratio-the ratio of the probability that a household is willing to have the service to the probability that it is not willing to have.

2. Literature Review

2.1 Conceptual Framework

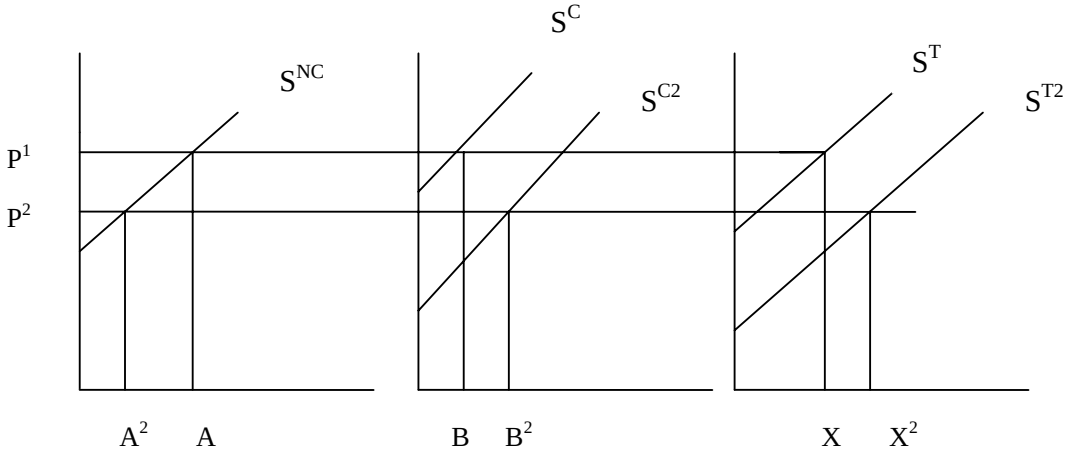
Microfinance is referred to as a small-scale financial service rendered to the rural and urban poor, the provision of credit for self-employment and small businesses, including savings and technical assistance (Shete, 1996). It is the supply of loans, savings, and other financial services to the poor and low-income people (Senanaayake & Premaratne 2006). Tsehay and Mengistu (2002) in AEMI [5](2001) studies brought two major schools of thought in microfinance effect assessment. The first school focuses mainly on changes in the organization and its operations. In this approach, two key variables of institutional outreach and sustainability are focused on .The second school, which has got prominence, focused on clients instead of organizational delivery of the service. Microfinance provides cheaper loans than those available in the formal credit market. As a result, microfinance institutions' clients supply function shifts downward.

Figure 1 shows the supply functions of the two groups, clients (S^C) and non-clients (S^{NC}). The supply function of the two groups aggregate in the overall market to form total supply function (S^T) .As noted above, with the service, clients supply function

[5] Association of Ethiopian Microfinance Institutions

shifts downward. Thus, they can expand their output from B to B^2 and operate at their full limit. Accordingly, in the market, market supply function shifts downward (S^{T2}). Consequently, the quantity increases to X^2, while the price decreases to $P^{2.}$

Figure 1: Effects of Microfinance Service on Clients and Non-clients



Source: Tschach, 2003
in Senanayake 2006

The increase in consumer and producer surplus that is induced by the introduction of micro credit can predict income effect and distribution of income. On the producers' side, producers' surplus of non-clients decreases, while the producers' surplus of clients increases (Senanayake, 2006). Depending on the price elasticity of supply and demand, the non-clients might even suffer income losses larger than the income gains accruing to clients of the service. Hence, the incomes of the producers increase although at the same time there is also a redistribution of income with the producers from non-clients to the clients of the service.

2.2 Microfinance and Poverty Reduction

The major objective of microfinance service is to help the poor reduce their poverty. The level of microfinance services on poverty reduction can be seen in different areas as the concept, definition, and measurement of poverty varies significantly among various writers and countries across times. In any case, the service on poverty reduction can be seen at individual, household, community or enterprise level. At individual level, it could be seen in income, savings, decision-makings, and asset

ownership. The most commonly mentioned element is, however, household income level. At household level, it can be observed in income, asset, or welfare and at enterprise level changes in enterprise business management, net worth, fund availability, and estimation capacity of clients (AEMFI, 2002). Zeller and Sharma (1998), for instance, pointed out that microfinance service helped the poor to adopt better technology and expand family enterprises, thereby increasing the level of income for the family. It helps them get access to finance their business.

2.3 Microfinance in Ethiopia

2.3.1 Pre-1996 Financial Service

The formal establishment of microfinance institution in Ethiopia is a recent phenomenon which can be traced back to ten years (Proclamation No 40/1996). There were, however, other financial services rendered in the country before. In the 1970s, 1980s and 1990s many international donors, nongovernmental organizations (NGOs) and the government of Ethiopia have supported the expansion of credit services in the country, mainly, in the rural areas. Besides, credit access was delivered through the formal banks such as the Agricultural and Industrial Development Bank (AID Bank), Development Bank of Ethiopia (DBE), and the Commercial Bank of Ethiopia (CBE); yet they focused mainly on input loans through the Service Cooperatives (Wolday, 2006).

There was also credit services in rural and urban areas of Ethiopia initiated and delivered by local and international NGOs. A study by Pischke et al (1998) cited in Wolday (2006) found that there were around thirty NGOs in Ethiopia delivering micro credit services most of which were, however, concentrated in rural areas. This tells as that though the formal establishment of MFIs goes back to more than a decade the provision of financial services existed much earlier.

In many cases these financial services provided by government banks as well as NGOs were not effective enough to have impact on the poor's life. They were not financial intermediaries; instead, they were the tools of distributing funds in order to increase production and productivity. For instance, if we look at the repayment performance of the Agricultural and Industrial Development Bank of Ethiopia, it varies between 68% and 11% in 1998 and 1993 respectively (Wolday, 2006). Due to these and other similar problems on the financial service of the country a legal foundation for the establishment of microfinance institution was laid in 1996.

2.3.2 Legal Frameworks

Although there were many laws, proclamations, and directives to the proper functioning of the financial services of Ethiopia, key legal foundation for microfinance institutions was laid in 1996. This is "The Licensing and Supervision of the Microfinance Institution" Proclamation No 40/1996. This proclamation has laid the well-defined legal basis for microfinance institutions in Ethiopia. In the proclamation the purposes and duties of a microfinance institution are clearly stipulated. Generally, they include, among others, granting credit, accepting deposits and savings, and providing counseling services to clients.

Pursuant to this proclamation the National Bank of Ethiopia (NBE) primarily vests on licensing and supervision of the business of microfinance business. Following the proclamation the Bank has made a series of directives regarding the activities of the microfinance institutions. The bank determined the minimum startup capital to begin a microfinance service at 200,000 Birr (Directive No. MFI 01/96). The envisaged microfinance institution is also required to act as a share company. The legal framework clearly stated that microfinance institutions should be owned by Ethiopian nationals or organizations owned by Ethiopians. This, however, will restrict the cash inflow from abroad.

The Bank has changed the interest rates frequently. The 2002 directive fixed the minimum interest rate on deposits to be three percent (3%) and each microfinance institution is left free to set its own interest rate on deposits above the minimum amount (3%). Regarding interest rate on loans the bank left it to be under the jurisdiction of each microfinance institution (Directive No. MFI/13/2002). Therefore, each MFI is free to determine its own interest rates on loans. The Bank also issued Directive No 18/2006 to ease obstacles to the regulatory framework of the microfinance industry. The major components of the new directives of the National Bank of Ethiopia include: a) the total loans extended by a microfinance institution to any single borrower shall at no time exceed 1% of the total capital of the microfinance institution, b) total loans extended by a microfinance institution to a group of borrowers on the basis of group guarantee shall at no time exceed 4% of the total capital of the microfinance institution, c)the maximum repayment period of the loans extended in line with (a) and (b) above shall not exceed 5 years, d) maintain minimum provisioning requirements of 25%, 50% and 100% for standard, doubtful, and loss categories of loans respectively on the bases of numbers of days past due, e) a loan shall be categorized as a non-performing loan principal and/or interest due in line with the contractual agreement is unpaid for more than ninety days. The entire outstanding loan shall be classified as a non-performing, f) classifying the non-

performing loans and advances of microfinance institution into substandard, doubtful and loss for 91-180,181-365 and over 365 days respectively on the bases of days past due.

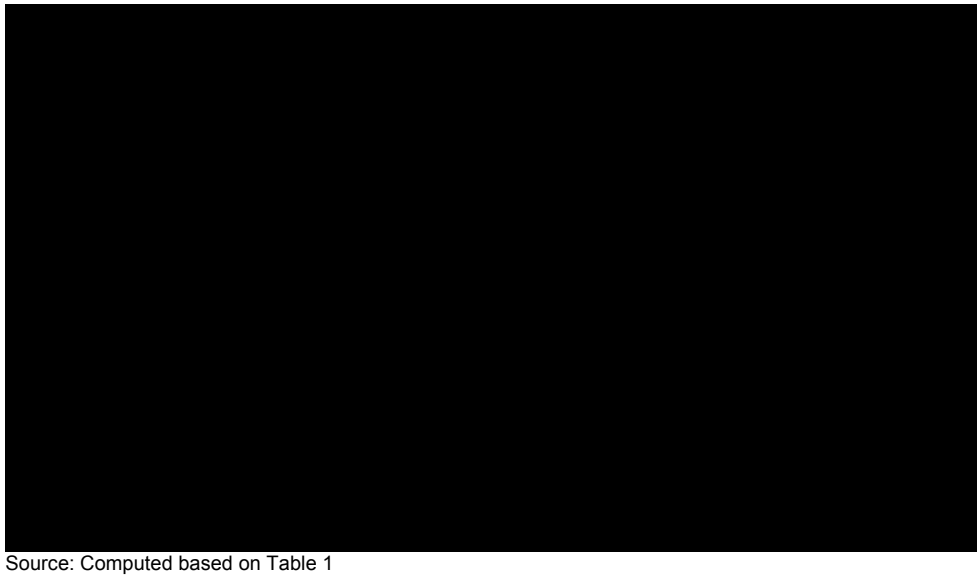
2.3.3 Growth of Microfinance Institutions in Ethiopia

In ten years around 27 microfinance institutions have been established. Not only the numbers but also the growth of microfinance industry is progressive in terms of assets, loans, savings, and outreach issues. Table 1 below indicates the growth of microfinance industry in Ethiopia, the amount of assets, loans, savings and/or deposits.

Table 1: Asset, loans and savings of microfinance institution (in millions of Birr[6])

Description	1997	1998	1999	2000	2001	2002	2003	2004	2005
Assets	223.976	264.475	448.959	509.542	645.9	716	882	1405.7	2199
Loans	162.059	198.448	284.249	291.619	352.7	399	593.9	996.6	1628.3
Saving	35.067	64.252	119.365	163.772	251	277	323.9	423	574.5

Source: National Bank of Ethiopia (2006)



Source: Computed based on Table 1

[6] Ethiopia official currency. A Birr roughly equals 0.11 US Dollar

The above table shows that the total asset of MFIs between 1997 and 2005 is increasing. It has shown nearly a ten-fold growth within the specified years. Likewise, microfinance institutions have also disbursed a loan of more than 4,906.875 million Birr within nine years time. The growth of saving mobilization is good-it increased by more than sixteen times at the end of the year 2005. In all the years the trend in the figure shows an encouraging effect.

2.3.4 Addis Credit and Saving Institution: General Profile

Addis Credit and Saving Institution (ACSI) is one of the major microfinance institutions of the country operating in Addis Ababa. Since its establishment in 2000 it has attracted a number of clients and is rendering services to the poor sections of the society. It has branches in all the ten sub-cities of Addis Ababa. The lion's share of ACSI financial source, 97%, came from the city government administration. Its vision and mission is to become exemplary in Ethiopia and Africa by creating sustainable financial base and make significant contribution to poverty reduction and employment creation. In doing so its main objectives include: provide sustainable and reliable loan service, make the low income section of the community beneficiary of the service, develop saving culture of the community, and encourage the community and the youth in developing self reliance.

The services rendered by ACSI include loan, saving, consultancy, and managing third party money. The loan service is given for different activities such as weaving, metal & wood works, hairdressing, production of construction materials, food processing, small trade activities, construction, leather works, and urban agriculture.

It is, however, important to note that not all loan seekers get enough many. It varies contingent on the period of repayment-short term, medium term, and long term which is expected to be returned within one, two and three years, respectively. The following figure shows the total loan given, saving mobilized, and repaid amount of ACSI.

Except for the year 1997, when the loan, saving, and repayment is the highest-110.600, 42.000 and 33.000 millions Birr respectively, all other years' record is insignificant. In the year 1996, however, the total disbursed loan was about 44.000 million Birr; yet the repayment and saving amount were very small. The gap between the loan disbursed and repaid is due to the high number of defaulters. The figure further reveals that albeit the institution started its function before six years its growth rate is by no means the least. Total loan disbursement of ACSI has increased from 1.799 Birr in the first year of service provision to more than 109.5 million Birr in the

year 1997. The total loan given has shown a rapid growth in the last two years- 1996 and 1997, whereby, ACSI provided more than 176 million Birr to the urban poor. Similarly, the total amount of saving also shows an increasing trend. It grew from less than a million in the year 1992 to more than 44 million in 1996. Overall, the institution has mobilized more than 50 million Birr. Repayment also grew in the years considered. Is this a good indicator of performance? Not necessarily.

Figure 3: Total loan, saving and repaid amount of the service (in Ethiopian Calendar[7])

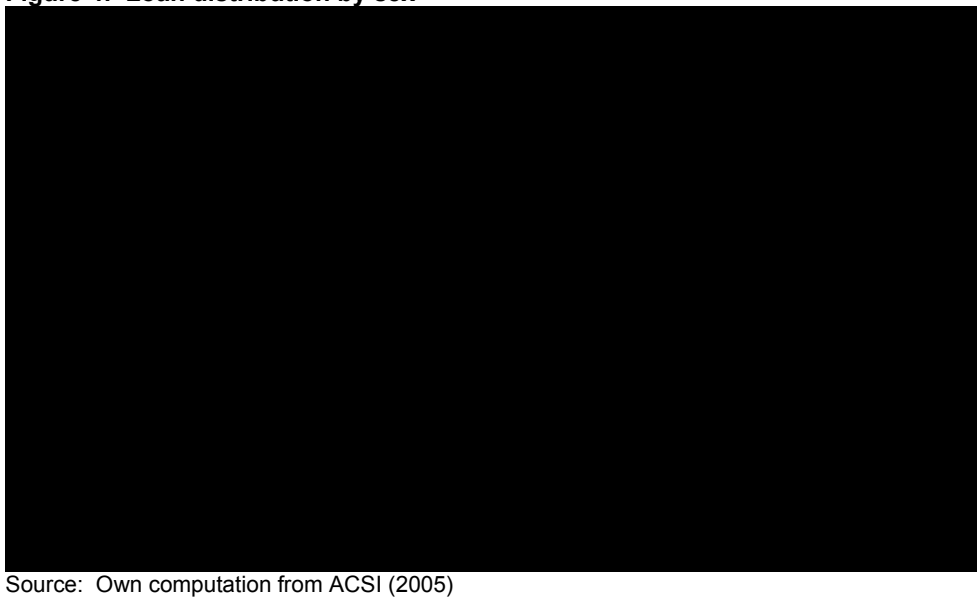
Source: Own calculation from Addis Credit and Saving Institution (2005)

The institution provides loans to individuals who take part in different small-scale production, mini-trade, construction, and for service areas. The major groups of clients, according to the document we got constitute women. Figure 4 indicates a number of male and female clients with the corresponding loan provided.

The table shows that the number of female clients is more than male counterparts except in the year 2004. This is because in this year the institution emphasized on metal and woodwork activities .And because practically such activities are for men under normal circumstances number skewed to men may not be surprising

[7] From September 11 to December 31 there is a difference of 7 years and from January 1 to September there is 8 years difference between Ethiopian and European Calendars. Ethiopian New Year begins on September 11.

Figure 4: Loan distribution by sex



Source: Own computation from ACSI (2005)

3. Results and Discussion

3.1 Descriptive Analysis

Clients and non-clients respectively share 62.5 and 37.5 percents of the sample. By religion, nearly half of the clients and non-clients were married and Orthodox Christian. The respondents' age ranges from 24 to 75 with a mean of 37.9 and 9.37 standard deviation.

As regards to the educational level 75 percent of them have completed at least grade nine. Grade 7-8 and 1-6 completes constitute 21 and 17 percent respectively. Only 2.53 percent of the clients were found to be illiterate. Overall, more than 75 percent of the respondents are either above grade six completes or are at least able to and write read. There is a positive correlation between (except above grade 12) educational level and participation in the service. Self-employment is the dominant occupation which it share nearly 75 percent of the clients and non-clients. Particularly, self-employed petty trading and service dominates (68%) respondents' jobs**.** Married, never married, divorced and widowed constitute 51, 27, 14, and 8 percent of the clients and non-clients respectively.

3.1 Cash Shortage and Credit Experience

All except one respondent faced cash shortage. Half of the non-clients never borrowed from any microfinance service in cash. The source of loan for the non-clients was found individual money lenders. Although they were in cash problem they were not able to get credit service from ACSI. This is because 39% of them justified that their request was rejected during screening and nearly 18% of, although they are in need, yet did not request ACSI.

ACSI started rendering service at *kebele* 11/12 in 2000. About 52%, 38% and 10% of the clients took a short term (less or equal to 2000 Birr), a medium term (2000-3000 Birr) and a long term loan (3000-20,000 Birr) expected for return in one, two and three years[8], respectively. Credit taken ranges from minimum of 400 Birr in 2003 to 10,000 in 2005, but the most frequent of the loan is short-term loan of Birr 1,000. Most clients took loan on individual basis (66 %), 16 % were on individual and group and 12 % in-group. Eighteen clients defaulted in the study periods. The two major reasons for the default were business loss and shift of the profit to other purpose.

Table 2: Amounts of loan, repaid, and unpaid (in Birr)

Year*	Loan					repaid*		defaulted	
	N	Min	Max	Sum	Mean	Sum	Mean	Sum	Mean
2001	3	1000	1500	4000	1333.33	4000	1333.33	0	0.00
2002	3	1000	1500	3700	1233.33	4000	1000.00	700	350.00
2003	18	400	3000	25300	1405.56	20950	1102.63	5350	297.22
2004	29	1000	3000	44200	1524.14	26490	1018.85	14710	565.77
2005	17	1000	10000	48500	2852.94	17090	1068.13	31180	1834.12
2006	6	1500	5000	18500	3083.33	4200	600.00	19300	2757.14

Source: Survey result 2006

Remark: * Did not show repayment performance of that year but collected money from disbursed loan

3.1 Evaluating the Service on Poverty Reduction

Direct investigation of microfinance effect on poverty would be difficult since it may lead us wrong to interpretations for several reasons. Rogaly in Graham (2001) rightly put three justifications. First, respondents may be interested in providing false information if the loans have been used for a purpose other than the stipulated one.

Addis Credit and Saving Institution classifies short, medium and long-term loans respectively as less or equal to 2000 Birr,2000-3000 Birr and 3000-20,000 Birr. The repayment is due in one, two and three and three years in order.

Second, establishing a casual relationship to the actual loan in question involves knowledge of all the beneficiary's sources and uses of funds. Third, it is difficult to establish what could have happened if the loan had not been made.

Kobb (1997) also examines problems, theoretical and practical, arising from trying to measure impact through changes in income. He noted that incomes are heavily skewed-several high income earners distorted averages that respondents are influenced by the way and by whom questions are asked, and that disentangling impact from "exogenous factors" is impossible. Despite these objections, the popular aim of microfinance programs generally includes a reference to "increasing the income of the target group" or some income dominated objective. Implicit in this is that increased income results in a reduction in poverty. This assumption, therefore, requires careful examination. For instance, on a simple money-determined level, if increased income is simply spent in the cinema or at the tea-stall or on alcohol, there is no increase in wealth and no reduction in poverty. We should also bear in mind that poverty is not only about having adequate income or income below the poverty line but also about the inability to sustain a specified level of well being.

The greatest potential of micro credit to improve the lives of the poor on a sustainable basis has been offset by lack of concomitant promotion of technology. Much of such credit has been used for traditional activities and not enough has been done to include technology along with it (Chowdhury and Alam, 1997). Dawson (1997) and Gibson (1997) argue that microfinance' primary goal is to create sustainable microenterprises and thus employment and those services can be offered on a reasonably cost-effective basis. But it should be noted that it is difficult to find examples of business development services where the benefits exceed the costs.

Wood (1997) in his "Breaking Out of the Ghetto: Employment Generation and Credit for the Poor" asserts that many of the poor are not natural entrepreneurs, and would like to be employed in preference to self-exploitative self-employment generating marginal returns. This would, indeed, be true if what we call the job is respectable, regular and reasonably paid .Most informal sector returns and self-employment opportunities in developing countries are insecure, irregular and verging on exploitative at best. In the words of Yenus (1989) unless designed properly, self/wage employment may mean being condemned to a life in squalid city slums or working for two meals a day for one's life. Wage employment is not a happy road to the reduction of poverty. Removal or reduction of poverty must be a continuous process of creation of assets, so that the asset –base of the poor person becomes stronger at each economic cycle, enabling the client to earn more and more. It is also important to mention that microfinance service would play a vital role in social capital formation

due to grouping, open the opportunity for political participations, provide access for health and education, and develop confidence and sense of worthiness.

This paper has examined whether or not the service really helped the lower income groups reduce their poverty level. We made the analysis at a household level. Exogenous variables like remittances are controlled for the simple justification that if they were included they would make it difficult to see the real effects of microfinance service on poverty reduction and hence would make the analysis less valid. Variables to evaluate the effect include income, employment, saving, asset and social capital[9] empowerment which together are treated as dependent parameters.

In this paper Table 4 shows the results of the survey.

Table 3: Clients benefits from (2001-2005)

Description		Income		Employment		Saving		Asset		Social Capital	
Status		In	De	Yes	No	Yes	No	In	De	Yes	No
Clients	No	37	13	32	18	19	31	35	15	23	27
	%	74	26	52	48	38	62	70	30	46	54
Total	No	50		50		50		50		50	

Source: Survey result 2006, Note: In=increased and De=decreased

In referring to the above table, 74 percent of the clients' income increased as a result of the service while 26 percent explained the reduction of their income. In the former groups (74%) improvement in income enabled households to send their children to school, better their diet, and improve their economic empowerment. The gap between the increased with the decreased income level (48 %) signifies the presence of significant improvements on the households' income level. This shows that the likelihood of clients to move out of poverty in income matters has increased. Respondents were further solicited to know exactly their monthly additional income as a result of the service. Nevertheless, a significant number of them were either unable or not willing to tell the value.

The table further depicts that 52 percent of the clients got job opportunity because of the service. They, among others, are engaged in petty trade, metal and wood works, construction, hairdressing, and photocopy services. On the contrary, 48 percent, which is a comparable figure with the former, did not get job opportunity. When one

[9]Social Capital refers to those features of social organization such as networks, norms, trust that facilitate coordination and cooperation for mutual benefit.

simplifies the difference we get almost the same result which the effect of the service on employment generation is not significant. Therefore, the notion that microfinance service helps the poor create employment opportunity in this study is found to be impractical. Unlike the effects of the service on income 62 percent of the clients did not save at all after the intervention. Put differently, 62 percent of them had no any change in their saving status in spite of the service and those who acquired saving constitute only 38 percent.

It is reported that 70 percent of the clients gained assets as a result of the service. Inquired whether the assets were acquired after joining the programs most clients responded positively supporting proponents that service provision positively correlates to ownership of additional household assets. Asset ownership is important for empowering clients economically. This is because as clients get services they utilize it in line with their plans and generate income, they tend to use part of the income for priority household assets instead of using it on themselves. Table 3 also shows that the services helped them improve their ownership status in having household goods. On the contrary, 30 percent of the clients asked about whether the intervention has brought any effect on their asset replied "no". Generally, one could conclude from the study area that the effect of the service on asset increment is impressive. For social capital the service did not bring considerable impact in terms of networks, connectedness and norms, among the clients, with the no response outweighing (54 percent) .This is probably due to the fact that Ethiopians' social capital by culture is strong on historical perspectives. The above variables have also been utilized in a similar fashion for non-clients to see whether the change in the life of the clients could easily be achieved without joining the programs.

Table 4: Non-clients missed benefits

Description		Income		Employment		Saving		Asset		Social Capital	
		yes	no	yes	no	yes	no	yes	no	yes	no
Missed	no	9	21	11	19	7	23	3	27	0	30
	%	30	70	36.7	63.3	23.3	76.7	10	90	0	100

Source: Survey result 2006

Examination of the above table reveals that 30%, 36.7%, 23.3%,10%, and 0% respectively of the non-clients missed income, employment opportunity, saving, asset, and social capital. On the contrary, it is reported that 70%, 63.3%, 76.7, 90%, and 100% replied no respectively implying that the non-clients did not lose, the benefits despite they remained being non-client. In each of the selected variables no

significant number of non-clients regret of not being a member of the service, nor did they think they missed the opportunity. To further analyze the effect of the service on poverty reduction we introduced a question, *did microfinance service bring positive result on poverty reduction?* The responses are summarized below.

Table 5: Effects of microfinance service on poverty reduction

Did Addis Credit and Saving Institution service generally bring positive result on poverty reduction?	Yes	I do not know	No
Number	12	3	35
Percentage	24	6	70

Source: Survey result 2006

The table demonstrates that 70 percent of the clients explained that the service did not generally bring effects on their poverty status while 24 and 6 percent respectively did say yes and do not know. Overall, respondents' opinions were of the sort that if implementations were applied imprudently, incommensurate with poor approach, the impact would ultimately be negative or all too often blurred.

3.1.3 Evaluation of the Service by Respondents

In the study we employed frequently used microfinance service performance or evaluation criteria. We, specifically, applied twelve criteria[10],viz, registration procedure, beneficiary selection, collateral issue, period of loan maturity, repayment schedule, purpose of loan , training and advice, risk allowance/default management, clients' participation, interest rate, sustainability, and outreach. Besides, working place was provided for additional criterion.

These criteria evaluated the service based on five Likert scale form ranging from strongly agree to strongly disagree. The corresponding numbers are: one for strongly disagree, two for disagree, three for neutral, four for agree and five for strongly agree. The overall evaluation of each individual (E_i) is calculated taking the total aggregate value of the individual's evaluation (e_{ij}) divided by the total number of criteria (n) that the individual considers. The overall evaluation of all respondents for each criteria of evaluation (E_j) is computed aggregating individual's evaluation (e_{ij}) divided by total number of respondents (m) based on the evaluation criteria. This aggregate value

[10]Practically there could be a number of criteria used to evaluate the performance of microfinance service. The ones used here are few and readers are free to include many indicators so as to evaluate the effect of microfinance service on urban poverty reduction.

gives a numerical variable which assumes a figure with decimal points. Any value *less than three*[11] in this study is taken as negative evaluation while above it as positive evaluation. The formula for the computation of the aggregate evaluation of the service provision for individual clients, on-clients, and total respondents is depicted as follows:

$$E_i = \frac{e_{i1} + e_{i2} + \ldots + e_{ij}}{n} = \sum_{j=1}^{n} e_{ij} / n$$

$$E_j = \frac{e_{j1} + e_{j2} + \ldots + e_{ij}}{m} = \sum_{i=1}^{m} e_{ij} / m$$

$$E_{ij} = \sum_{j=1}^{n} e_{ij} / n = \sum_{i=1}^{m} e_{ij} / m$$

Where,

i = Number of respondents, i=1, 2, 3…80
j = Criterion of evaluation, j= 1, 2, 3…13
e_{ij} = Evaluation of respondent i on criterion j
E_i = Total evaluation of the service by respondent i
E_j = Total evaluation of the service by criterion j
E_{ij} = Total evaluation of the service by all respondents and all criteria

The evaluation was not only for the aggregate value of all the respondents but also in grouped respondents based on the three major categorical variables: respondents' relation to the service (clients and non-clients), sex (male and female) and willingness to the service in future. Moreover, the significant difference of the means of these categories is measured by t-test. Employing these results is presented in figures and tables in the following sections.

3.1.4 Evaluation of the Service by Clients and Non-clients

Beneficiary selection, registration procedure, training and advice, collateral, purpose of loan, and loan maturity period have been found positive evaluation. More precisely, they got 3.33, 3.28, 3.18, 3.12, 3.08, and 3.02 in order. The interest rate, sustainability issue, repayment schedule and risk allowance were rated as negative, with their corresponding values, 2.16, 2.70, 2.80 and 2.84 respectively. Non-clients evaluated

[11] The study took below, at, and above three as negative, neutral and positive evaluation of microfinance service respectively.

positively period of loan maturity (3.28) and repayment schedule (3.14) for poverty reduction. No non-client, however, strongly agrees to the service in any of the criteria.

A t-test was employed to measure the statistical significance of differences among the evaluation criteria between respondents (clients and non-clients). Based on this, there is a significant difference in all criteria of evaluation between clients and non-clients except beneficiary selection, interest rate and outreach. Of all the non-client respondents, no non-client strongly agreed in any of the criteria of evaluation. This clearly informs that the non-clients are predisposed with the negative effects of microfinance service and, in fact, could be better for them to be away than participating in the service. They gave the minimum evaluation for beneficiary selection (2.50) and the maximum to period of loan maturity (3.29) while clients gave the minimum to interest rate (2.16) and the maximum to beneficiary selection (3.54).

Figure 5: Evaluation of ACSI services by client and non-clients

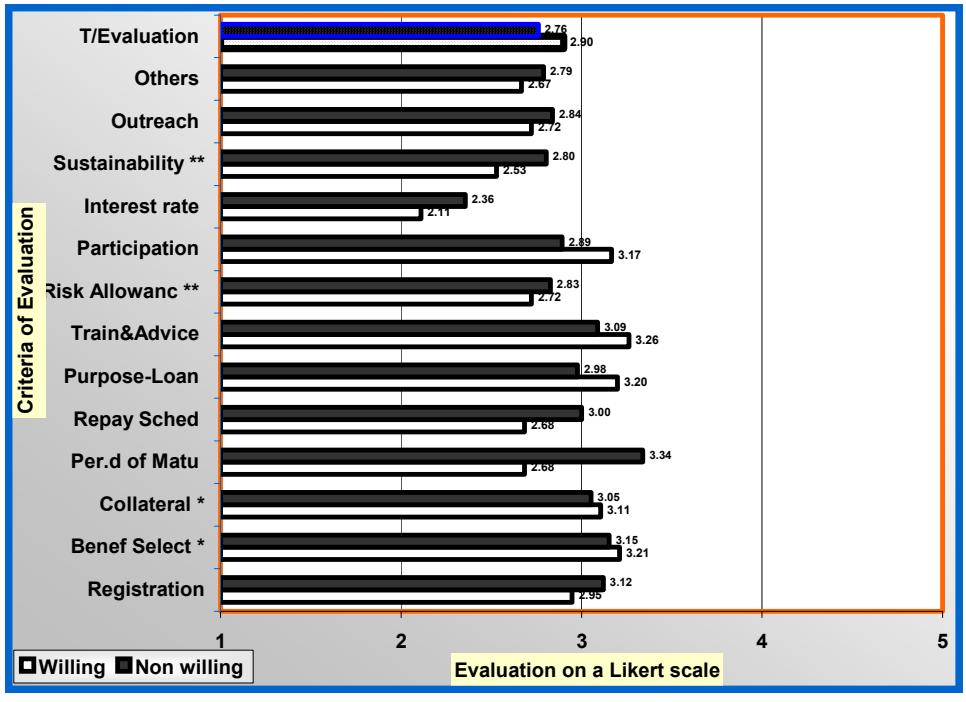
Source**:** Survey result 2006, * significant at 10% level, ** significant at 5 % level ***significant at 1 % level

The general evaluation of ACSI service according to non-clients is 2.86- slightly less than that of clients-2.89. Their (clients and non-clients) evaluation is significantly different at 10 % level. This overall evaluation, which is lower than the neutral (3), confirms that the effect of the service on poverty is insignificant.

3.1.5 Evaluation of the Service by willingness

Respondents were solicited about their future willingness whether they will continue or withdraw from the service .They were further inquired to tell the benefit they got, their life standard, and the effects on poverty. According to their response, although the benefits that accrued from being a member of the service is generally not in good pace it still is encouraging to find that 75 percent of the respondents (clients and non-clients) were willing to get the service. Clients' and non-clients' responses on willingness to have the service significantly differ only on variables of sustainability and risk allowance with 5% significant level and collateral and beneficiary selection with 90% significant level. The general evaluation of both is nearly neutral -2.90 and -2.76 for willing and not willing to join the service of ACSI.

Figure 6: Future willingness to the service



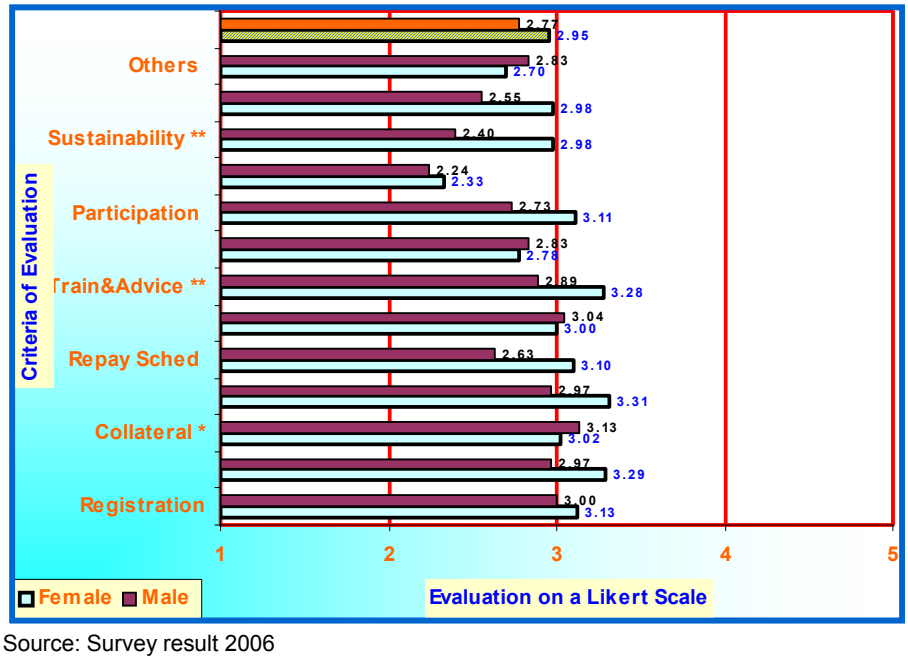
Source: Survey result 2006

There is seemingly a contradiction between general evaluation and willingness to the service for future. Though most clients were not benefited from the service they still insist on keeping a member for they basically did not have other opportunities.

3.1.6 Evaluation of the Service by Sex

If we exclude the focus group discussion females comprise 60 percent of respondents. Except on risk allowance, purpose of loan and collateral, men's evaluation is skewed to disagreement criteria than women's evaluation. This is, perhaps because men, unlike women, by culture, do not have the habit and sometimes are not willing to work in petty businesses. Men have the strong belief that in order the poor to work well and effectively fight poverty they need to get sufficient credit service. Contrary to their stand, they are provided small credits which in fact, according to their response, have yawing effects on being careless, default prone, and ultimately no effect or at worse negative impact. Be the case as it may, the

Figure 7: Evaluation of service by sex



Source: Survey result 2006

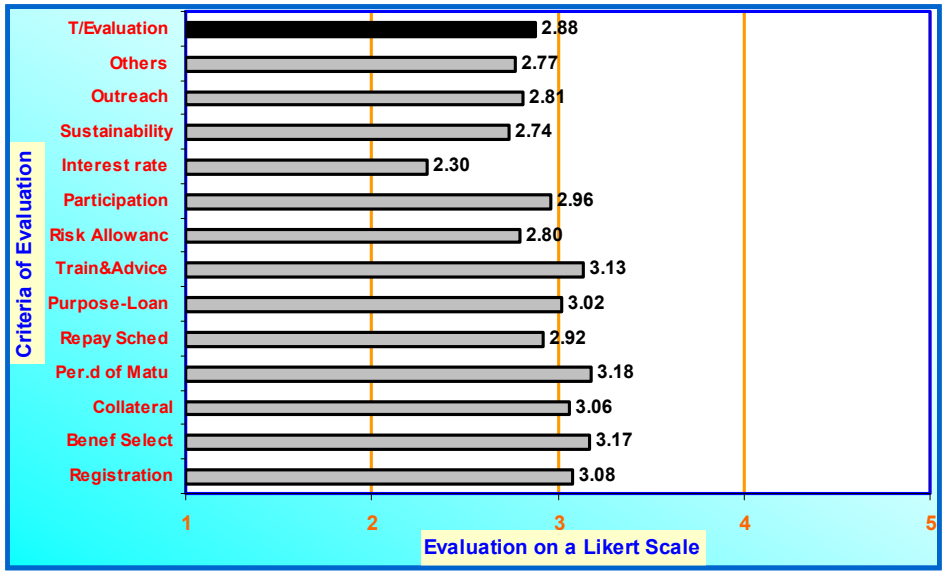
overall evaluation of males and females is 2.77 and 2.95, respectively. The response confirms that females have nearly positive evaluation with regard to participation, training and advice, repayment schedule, period of loan maturity, beneficiary selection and registration procedure. Nevertheless, males have negative evaluation in all the criteria except the collateral and purpose of loan. They significantly differ on sustainability, training and advice, and collateral at 10% level. Males in most cases were found to be more defaulters than females owing to credit diversion to drinking,

chat chewing, and smoking purposes. Besides, they are not as careful as females in running petty-trade activities, not as patient as females in undertaking small businesses. This has resulted, in their response, life impoverishment

3.1.7 General Evaluation of the Service

The aggregate evaluation of the service using some categorical variables – respondents' status to ACSI as client vs non-client, future willingness (willing or not-willing), sex: male vs female, and their evaluation statistical significance on a Likert scale has been separately discussed. Figure 8 below shows the cumulative evaluation of the service.

Figure 8: Aggregate evaluation of the service



Source: Survey Result 2006

Of the thirteen evaluation criteria: period of loan maturity, training and advice, beneficiary selection, registration procedure, purpose of loan, and collateral issue have each positive values slightly higher than neutral (3). The interest rate depicts the worst scenario (2.30) followed by the sustainability (2.74) and other criteria (2.77). The overall evaluation of the service is found to be negative (2.88) indicating the gap between respondents' expectations and the actual service delivery.

3.2 Econometric Analysis

Logit Model

One of the common models commonly employed in likelihood decision analysis is Logit model (Lindaer, 1987 cited in Michele Marra, et al, 2002; Degenet Abebaw, et al, 2001; Legesse Daddi, 2001; James Payne, et al, 2003).In this study to see the effect of independent variables on the dependent variable- respondents' willingness for future service we use a Logit model.

We took willingness for future service of ACSI as dependent variable. Hypothesized explanatory variables: age, sex, marital status, educational level, type of occupation, loan maturity, membership type, total evaluation of the service, current client status (client or non-client), general benefits gained, and benefits missed were considered in the model. The hypothesis for these variables is attached on annex 1. After checking the multicollinearity effect, we reduce the number of the explanatory variables into six. The results of the model give:

$$\log\left(y=1\right) = -1.06 + 0.34\,x_1 + 0.50\,x_2 + 0.11\,x_3 - 0.80\,x_4 - 0.28\,x_5 - 1.23\,x_6$$

(0.44) [12] (0.06) (0.14) (0.60) (0.26) (0.49) (0.04)

R^2=0.72

Where,

x_1= Sex ,x_2= Marital status ,x_3= Educational Level ,x_4= Current client status ,x_5= Total evaluation of the service,x_6= General benefit gained or missed.

The model shows that being female, married, and grade eight complete have positive influence in the decision to have the service. Total evaluation of the service negatively affects willingness to have the service for future. Gained benefits by clients or missed benefits by non-clients have negative influence on the decision to have the service. Sex and gained benefits by clients or missed opportunities by non-clients have respectively significant contribution to the service for future willingness at 10% and 5% levels.

[12] Numbers in parenthesis refer p-values

3.3 Focus Group Discussion

Apart from analyzing the effects of the service on urban poverty reduction through various variables and evaluation criteria we did focus group discussions with clients and non-clients. The discussion generated some important ideas which to some extent have complemented the previous discussions. Here are some excerpts taken from participants of the focus group discussion.

Participant – One: We are poor, we do not have any chance of getting credit services either from banks or other individuals. We are idle, we need to work, and this requires some money to start. We know Addis Credit and Saving Institution is providing the poor with credits to help engage in some business; we requested and got the credit from *kebele* 11/12; we started our business, and this in fact is better than being idle. Nevertheless, we now face insurmountable problems viz-loan repayment schedule and compulsory saving. This poses additional burden in the already limited capacity of our repayment capacity. The repayment most of the time is done before maturing our business. How can we reduce our poverty in such scenario?"

Participant - **Two:** The collateral issue is really not reasonable under any circumstance. Of course, collateral is important both for the institution and the client. Yet, it does not have to give unjustified privilege to the institution and overlook the clients. The rule requires applicants to provide collateral who must be a permanent government employee and whose monthly salary shall be greater than or equal to 1,500 Birr. I think the foundation and sole purpose of microfinance institution is to help the poor improve their life standard. If the collateral continues in this way, it complicates the life of clients and new applicants. This should be flexible if the institution is really to help the poor**.**

Participant - **Three":** You can't believe what a headache the interest rate is. For instance, if you take 3,000 Birr you must pay 3450 Birr. "450" Birr is, therefore, interest rate which is an additional burden to the loan taker. In this environment how can the poor be helped to reduce their poverty? How can we improve our living standard? Would it be wrong if I say it further worsens our living standard? Of course not**!**

4. Conclusion and Policy Implications

4.1 Conclusion

Recently, microfinance has been given due weight as a means of poverty reduction. Ethiopia, as part of the developing world, has adopted microfinance to mitigate the effects of poverty among the poor sections of the society. Although microfinance services as a tool of poverty reduction have been started since more than a decade little impact assessments were made in urban areas. Based on this premise this paper evaluated the effects of Addis Credit and Saving Institution services on urban poverty reduction at Kebele11/12 of the Arada Sub-city.

The paper used different evaluation criteria to see the effect of the service on poverty reduction. We used Logit model to analyze the quantitative relationship between the selected variables and microfinance service. The empirical findings of the study confirm that the cumulative evaluation of the effects of the service on urban poverty reduction either in the structured interview or focus group discussants is mixed. Complaints of the service provision include, among others, high interest rate, collateral, and sustainability of the service. The interest rate is found as high as 10-15%, which is incompatible with their low return. In addition, most of the poor in need of the service could not fulfill the collateral requirements. This leaves them without extra benefit, have yawing effect on the sustainability of the service, outreach and thereby reinforcing their poverty status.

4.2 Policy Implications

The prime goal of any microfinance service, at least to date, has been to help the poor engage in self-employments, increase entrepreneurial horizon and reduce their poverty status. Nonetheless, the study found that high interest rate is incapacitating the potentials of clients to perform better. Consequently, increase in income, job creation, asset ownership, saving which are assumed to better their life were found generally on gray matters. Thus, the institution as well as other responsible bodies should look for ways of compromising the interest rate.

Client selection criteria are not clearly stipulated and simplified. At this juncture the institution should redesign mechanisms to identify applicants' commitment and potential entrepreneurship capability to work but constrained by finance. This may include conducting short review of the background of potential applicants who are in need of the service. At the same time since most clients lack entrepreneurship

expertise and there is a high possibility of credit diversion, proper training, advice, and follow-ups before and after providing the service should be provided.

Immediate saving access to the poor is impossible as they are initially poor. However, the repayment schedules of the institution as stated by clients are too tight. Given their original low level of saving the institution ought to take into account the saving capacity of clients, give grace repayment period, and identify the types of activities that clients are engaged in so as to judge the return of business.

Experts in the service have limited knowledge and the institution as well doesn't have enabling prudential regulation. Officers hardly understand the role and objective of the service. The prudential regulation is too restrictive. Such things should, therefore, be revisited again. One way of easing such difficulties could be through the coordination of stakeholders-the trade and industry, urban municipality, *kebele* and sub-city administrators, and others. And one of the visible problems in Addis Ababa for business is lack of working places/market areas, promotion activities, and exhibitions. This problem has been truly faced by clients too. These parameters, therefore, should be addressed again.

References

Addis Credit and Saving Institution (2005). Report on Major Activities (*Amharic* Version, Unpublished).

Chowdhury and Alam (1997). "BRACs" Poverty Alleviation Efforts: A Quarter Century of Experience and Learning. Dhaka University Press.

Federal Democratic Republic of Ethiopia (1996). Federal *Negarit Gazeta*, Proclamation No 40/1996. Proclamation to provide for the Licensing and Supervision of Microfinance Institutions, Addis Ababa.

Federal Democratic Republic of Ethiopia (2000). Directive No MFI 13/2002. Addis Ababa

Federal Democratic Republic of Ethiopia (2006). Directive No MFI 18/2006. Addis Ababa

Getahun Nana (2002). Looking into Sustainable Sources of Funding for Microfinance Institutions in Ethiopia. Microfinance Development in Ethiopia: Prospects, Sustainability, and Challenges on Poverty Reduction. Proceedings of the Conference on Microfinance Development in Ethiopia.

Graham W. (2001). Microfinance Systems: Designing Quality Financial Services for the Poor, 2nd edition. Zed Book Ltd. London and New York

Gujarati D. (2006). Basic Econometrics. Fourth Edition. New York

Hulme and Mosley (1996). Finance against Poverty, Routledge, London

Jonathan M, et al (2000). Analysis of the Effects of Microfinance on Poverty Reduction, NYU Wagner Working Paper No. 1014

Khandker S. (2003). Microfinance and Poverty: Evidence using panel Data from Bangladesh. World Bank Research Working Paper 2945.

Kobb and Daniel (1997)."Measuring Informal Sector Incomes in Tanzania-Some Constraints to cost-benefit analysis" Vol. 8 no. 4 Intermediate Technology Publications, London

Maddala, G. S. (1994). Limited-Dependent and Qualitative Variables in Econometrics. Press Syndicate of the University of Cambridge, New York.

Michelle et al (2003). The Economics of Risk, Uncertainty and Learning in the Adaptation of New Agricultural Technologies: Where are we on the Learning Curve? Agricultural Systems, 75:215-234.

National Bank of Ethiopia (2006). Licensing and Supervision of the Businesses of Micro-financing Institutions, Directive No. MFIi/18/06. December 2006.

Senanayake S., Premaratne S. (2006). Microfinance for Accelerated Development (PP143-168).

Shete, N. (1996) Alternative Models of Microfinance: Experiences of Indian Commercial Banks Saving and Development vol. XXIII No. 4.

Tsehai T. and Mengistu B. (2002). The Impact of Microfinance Services among Poor Women in Ethiopia. Occasional Paper No. 6. AEMFI Addis Ababa. Website: www.elsevier.com/locate/agsy, accessed on January 26, 2006.

Wolday Amha (2006). Prudential Regulation of the Microfinance Institutions: Lessons from Ethiopia. African Journal of Microfinance. Addis Ababa.

Woller G. and Robert Parsons (2002). Assessing the Community Impact of Microfinance Institutions. Journal of Development Entrepreneurship, Vol. 7, No.2. August 2002.

Yenus M. (1989). ”Credit for Self-employment, A Fundamental Human Right” in the Grameen Reader, Grameen Bank, Dhaka.

Zeller, M and M. Sharma (1998). Rural Finance and Poverty Alleviation. Food Policy Report, Washington DC.

Zeller, M et al (1998). Rural Development in Madagascar :Towards a Better Understanding of the Critical Triangle Between Economic Growth, Poverty Alleviation and Environmental Sustainability. Washington DC.

Annex 1: Hypothesis of variables used in the estimated equations

Variables	Assumption
Dependent Variable :Willingness to ACSI Service for Future	1 if willing, 0 otherwise
Explanatory Variables	
Sex	Dummy: 1if female and 0=male
Marital Status	Dummy :1if single, 0 otherwise
Educational Level	1 if above grade 8,0 otherwise
Client current status	Dummy: 1if client ,0 otherwise
Total evaluation of ACSI by different criteria	(Numeric, $E_i = \sum e_{ij} / n$, 1 if >3,0 otherwise)
General benefit gained (by clients) or missed (by non-clients)	Dummy: 1 if yes(gained by clients and loss by non-clients), 0 otherwise

MACROECONOMIC IMPLICATIONS OF FINANCIAL MARKET LIBERALIZATION IN ETHIOPIA

Menelik Solomon[1]

Abstract

This study has tried to assess the practical implications of financial market development and liberalization on macroeconomic variables like saving, investment, inflation and Economic growth in Ethiopia, using a time series data covering the period 1974/75 –2003/04. The Johansen Maximum likelihood estimation procedure has been employed to see the short and long-run dynamics of selected financial variables and major macroeconomic variables.

To test the Mckinnon-Shaw hypothesis that removal of repressive policies and development of financial markets can enhance saving, investment and ultimately growth; the life-cycle saving model, the flexible accelerator model, Fry's inflation and Growth model were used as theoretical foundations.

The result indicated that saving is positively and significantly affected by the real deposit rate of interest and income growth. Domestic investment has a positive long-run equilibrium relationship with output growth whereas the real depreciation of the exchange rate and an increasing level of government debt on domestic financial system were found to affect investment negatively. Inflation was found to be non-responsive to the growth in per capita stock of money supply and income, reflecting the structural rigidity of the economy.

Finally, liquid liabilities of the financial system showed a significant and positive relationship with growth in per capita income whereas variables which proxy private sector credit growth were found to be insignificant in both the saving and growth functions.

Nevertheless, this study has certain limitations, i.e. it doesn't consider the informal and semi-formal financial markets in the analysis due to inavailability of organized data.

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1. Introduction

1.1 Background of the problem

Historically the first modern bank – Bank of Abyssinia was set up in Ethiopia in 1905. The first insurance company (Instituto Nazionale per L'Assocurozione Contro gli infortuni sul larvaro) was established in 1922. However, it was after the 1960's that a rapid and stable financial development took place. In the period between 1960 – 1974, privately – owned banks were operating alongside the commercial bank of Ethiopia which was state owned. Foreign owned banks (Banco di Roma, Banco di Napoli) and the Addis Ababa Bank (with foreign equity participation) were also in operation.

Apart from commercial banks, there were specialized financial institutions such as the Ethiopian Investment Corporation, Imperial Savings and Home Ownership Public Association and Savings and Mortgage Corporation of Ethiopia established to provide development and mortgage finance.

During the period between 1974-1991, the Ethiopian economy was oriented by the socialist doctrine. Private capital accumulation and investment was officially banned, market rule was over-ridden and a centrally planned economy was set up. Accordingly, a state – owned mono bank system, where all banks acted, in effect, as branches of the central bank, was established; "financing the plan" was set as the over-riding mission of banks. Consequently, the financial sector was characterized by a high degree of financial repression that resulted in credit rationing other than the interest rate, while an informal market develops at uncontrolled rates. Regulations on the foreign exchange market and the highly overvalued exchange rate have led to the development of the parallel market widening the premium.

The fragmentation of the credit market has resulted in favored borrowers obtaining funds at subsidized often highly negative, real interest rates, while others must seek credit in inefficient and expensive informal markets. Due to the misguided **"**financing the plan**"** doctrine of the government in the banks, mostly inefficient and politically prioritized sectors and enterprises were major borrowers of the formal financial sector which led to accumulation of non-performing loans in the banks balance sheets.

In the period post 1991, Ethiopia has adopted economic reform programs contained in the Structural Adjustment Programme (SAPs) framework of the International Monetary Fund (IMF). The policy prescriptions in SAPs include removal of price controls, devaluations of the Birr and subsequent determination of the exchange rate through the auction system, gradual liberalization of interest rates, opening up of the

financial sector for private participation, privatization of state – owned enterprises and provision of foreign currency through the auction system.

Despite the above measures, recent monetary aggregates for Ethiopia indicate that currently the financial sector in the country is characterized by a high degree of monopoly and state intervention (the share of Commercial Bank of Ethiopia from total outstanding credit is 51.5% and the share of public banks including Development bank of Ethiopia and construction and business bank from total outstanding credit is 67.3% by 2006/07) The number of private banks established since 1991 is 7 with a total capital of 1.9 billion Ethiopian birr by 2005/06 which accounts only for 35.2% of the total banking sector capital in the country. On the other hand the total capital of public banks in the same year was 3.5 billion Ethiopian Birr which accounted for 64.8% of the total banking sector capital. When we look at the spatial distribution of private banks in the country, by the year 2005/06, from the total number of 185 private bank branches, 91 of them are found in Addis Ababa and 86 are in the regions. There are eight private insurance companies currently operating in the country with a branching network of 35 in Addis Ababa and 40 in the regions. There are no foreign banks or insurance companies in the Ethiopian financial sector. No secondary markets exist. The poor intermediation capacity of the financial sector can be exemplified by the stagnating and declining growth of gross domestic saving/GDP ratio which had declined from 5-7.8 percent from the period 1993/94-1997/98 to 2.5 percent by 2002/03[2].

Hence it would be worth to ask; *Are the liberalization steps so far taken adequate enough to mobilize saving, enhance investment and achieve the desired growth rate in the economy? Is the sequencing of policy reform on the right track? And what are the impacts of these reform measures on the macroeconomic variables of this country?*

The basic research hypothesis for this study is based on the pioneering works of Mckinnon (1973) and Shaw (1973) which assert; removal of repressive policies and minimization of government intervention in the financial sector would lead to financial deepening, better capability of the formal financial sector in mobilizing saving, higher domestic investment and higher growth of the economy; for given improved institutional capacity, prudential regulation system, an independent central bank and stable macroeconomic and political environment in Ethiopia.

[2] All percentage figures are the author's calculations based on statistical figures from the Annual Report of The National Bank of Ethiopia (2005/06)

2. Theoretical Controversies around the Implications of Financial Market Liberalization on the Real Economy: The McKinnon-Shaw School Vs Neostructuralists

2.1 Proponents of Financial Market Liberalization

Theories linking financial development to the growth of the real economy are so diverse and date back to the age of Karl Marx, who recognized the importance of the financial system in the process of capitalist economic development over a century ago. Lenin impressed by the powerful political and economic influence of the European banks in the eighteenth and nineteenth centuries, also understood the crucial role of the financial system. He nationalized all Russian banks immediately after the 1917 revolution as the fastest and most effective way of ending capitalism and assuming control over the entire Russian economy. John Maynard Keynes was also wary of the potential damage wrought by financial systems in capitalist economies. He believed that without careful management money could disrupt economic activity quite seriously.

For 60 years from the onset of World War I, advocates of financial liberalization were a rare breed. During this period the bulk of theoretical work relating financial conditions to economic development detected possibilities of negative or, at best, neutral effects of financial development on income levels or growth rates.

In 1973 the dominant theoretical position was forcefully challenged. Mckinnon (1973) and Shaw (1973) both develop models of economic development in which financial liberalization and development accelerate the rate of economic growth. They also highlight some of the deleterious effects of financial repression- interest rate ceilings, high reserve requirements, directed credit policies and discriminatory taxation of financial intermediaries- on economic growth.

Mckinnon's formal analysis of how the real deposit rate of interest affects saving, investment and growth is based implicitly on an outside money model[3]. It rests on two assumptions: a) All economic units are confined to self-finance. b) Indivisibilities in investment are of considerable importance – investment expenditures are lumpier than consumption expenditures.

[3] Outside money model relies on the assumption that all economic units are confined to self-finance where firms cannot borrow to finance investment.

Mckinnon formalizes his complementarity hypothesis, “the basic complementarity between money and physical capital” Mckinnon (1973) which he applies to “semi-industrial LDCs”; complementarity is reflected in the demand for money function.

$$M/P = f\ (Y, I/Y, d-\pi^e) \qquad \textbf{(2.1)}$$

Where M is the money stock (broadly defined to include saving/time deposits as well as demand/ sight deposits and currency in circulation-M2), P is the price level, Y is real GNP, I/Y is the ratio of gross investment to GNP, and $d-\pi^e$ is the real deposit rate of interest (d is the nominal deposit rate of interest and π^e is expected inflation, both continuously compounded.)

Complementarity works both ways: “The conditions of money supply have a first-order impact on decisions to save and invest.”(Mckinnon, 1973) Hence Mckinnon’s complementarity can also be expressed in an investment function of the form

$$I/Y = f(r^*, d-\pi^e) \qquad \textbf{(2.2)}$$

Where r* is the average return to physical capital. Complementarity appears in the partial derivatives:

$$\frac{\partial\,(M/P)}{\partial\,(I/Y)} > 0\ , \qquad \frac{\partial\,(I/Y)}{\partial\,(d-\pi^e)} > 0 \qquad \textbf{(2.3)}$$

Shaw (1973) constructs a monetary model in which money is backed by productive investment loans to the private sector. The larger is this monetary stock in relation to the level of economic activity, the greater is the extent of financial intermediation between savers and investors through the banking system. Shaw maintains that expanded financial intermediation between savers and investors resulting from financial liberalization (higher real institutional interest rates) and financial development increases the incentives to save and invest; it also raises the average efficiency of investment. Financial intermediaries raise real returns to savers and at the same time lower real costs to investors by accommodating liquidity preference, reducing risk through diversification, reaping economies of scale in lending, increasing operational efficiency and lowering information costs to both savers and investors through specialization and division of labor.

Financial intermediation is repressed and suboptimal when interest rates are administratively fixed below their equilibrium levels. When interest rates are employed as rationing devices (allowed finding their equilibrium levels), financial intermediaries

can use their expertise to allocate efficiently the larger volume of investible funds which is then forthcoming.

Shaw's debt-intermediation view is based firmly on an inside money model[4]. It produces a demand for money function that can be characterized as follows (Shaw, 1973)

$$M/P = f(Y, V, d\text{-}\pi^e) \qquad \textbf{(2.4)}$$

Where V is a vector of opportunity costs in real terms of holding money. Shaw expects real yields on all forms of wealth, including money, to have a positive effect on the saving ratio.

Molho (1986a) argues that the models of Mckinnon and Shaw need not be viewed as incompatible with one another, even though Mckinnon's formal analysis uses outside money. He asserts, "Mckinnon's complementarity hypothesis, on the one hand, emphasizes the role of deposits in encouraging self-financed investment. A rise in the deposit rate stimulates demand for capital by making savings accumulation more rewarding and by increasing the amount of internally financed investment. Shaw's debt-intermediation view, on the other hand, focuses on the role of deposit accumulation in expanding the lending potential of financial intermediaries.

Higher deposit rates encourage the inflow deposits to banks, which in turn can increase lending, thereby stimulating externally financed investment. Although the Shaw and Mckinnon theses emphasize different aspects of the process of accumulation of financial assets and liabilities, it is clear from the discussion so far that these theses should be viewed as complementary rather than competing theories……The two approaches complement each other because most projects are financed in part with own funds and in part with borrowings." (Molho, 1986a)

2.1 Critics of Financial Market Liberalization

Neostructuralists represented by Buffie (1984), Khosaka (1984), Taylor (1983) and van Wijnbergen (1982, 1983a, 1983b), mounted an assault on the Mckinnon-Shaw school in the early 1980s using a markup pricing framework, a cost-push inflation model and Keynesian adjustment mechanisms, the neostructuralist models predict the opposite effects of financial development and liberalization to those derived from the Mckinnon-Shaw models. In the neostructuralist models, the nominal interest rate,

[4] Inside money model assumes investors are not constrained to self-finance.

which is determined in the curb or non-institutional credit market, adjusts to equate demand for and supply of money and credit. Income adjusts to equilibrate demand and supply in the goods market. Neostructuralist models are based on five assumptions that differ fundamentally from the basic assumptions of the Mckinnon-Shaw school: (a) Wages are determined institutionally or exogenously through class conflict; (b) Inflation is determined by the relative power of capitalists and workers (who may themselves be influenced by the state of the economy); (c) Saving takes place only out of profits, not wages; (d) The price level is determined by fixed markups over cost of labor, imports, and working capital finance (the interest rate) ; and (e) developing countries have a critical need for imports of raw materials, capital equipment, and intermediate goods (Taylor, 1983). Assumption (d) and (e) imply that a restrictive monetary policy that raises the price of imports can produce stagflation – an acceleration in the inflation rate and a reduction in the rate of economic growth at the same time.

Neostructuralists treat curb markets, in which money lenders and indigenous banks intermediate between savers and investors, as a crucial feature of their models of developing economies. Neostructuralists view these markets as “often competitive and agile” (Taylor, 1983). Since reserve requirements constitute a leakage in the process of financial intermediation through commercial banks, Neostructuralists claim that banks cannot intermediate as efficiently as curb markets between savers and investors.

All Neostructuralist models base household asset allocation on Tobin’s portfolio framework. Households face three categories of assets: gold or currency, bank deposits, and curb market loans. The Mckinnon-Shaw models specify only two assets (gold or other inflation hedges and money) in household portfolios. Hence substitution into money must come from substitution out of inflation hedges. Taylor (1983) and van Winbergen (1982) point out that whether higher deposit rates do increase the total real supply of credit depends on the required reserve ratio and on whether the increased holdings of real money balances come mainly at the expense of inflation hedges or mainly from direct lending in the curb market. Buffie (1984), Kohsaka (1984), Taylor and van Winbergen conclude that, in practice, financial liberalization is likely to reduce the rate economic growth by reducing the total real supply of credit available to business firms.

The Neostructuralists assume that funds flow freely between the banking system and the curb market; savers and investors can use either market, at least to some extent. Hence the relevant interest rate in the Structuralist models is the curb market rate: it represents the marginal cost of borrowing on the one hand, and enters the money

demand function on the other hand, since curb market loans constitute an alternative to holding money balances. Any increase in the curb market rate raises the price level because a rise in the curb market rate increases the cost of working capital; prices are determined by fixed markups over costs in all the Neostructuralist models. A rise in the curb market rate also reduces output by deterring investment. An increase in the deposit rate of interest may raise the curb market rate and so depress growth if it reduces the total supply of working capital – working capital supplied by both the banking system and the curb market. Buffie (1984) also concludes that "once we allow for repercussions in the curb market, financial liberalization becomes a perilous undertaking."

3. Methodology

3.1 Model Specification

3.1.1 The Saving Function

In this study the specific saving function to be used for empirical testing is based on the "life-cycle saving" model. The standard life-cycle saving model assumes that young, income earning households save to finance consumption when they become old, non-earning households.

The simplest life-cycle model assumes that each household consumes all its resources over its life time; the level of household consumption L over its lifetime is equal to 1.

$$L = \int c(a)da \qquad \textbf{(3.1)}$$

Where L is consumption over life time
C(a) is consumption of household aged a.

Even if no household saves over its life time, this life-cycle model shows that aggregate saving can still be positive, provided that there is positive growth in aggregate real income. With positive growth, the life time resources of young savers exceed those of old dissavers and there will be positive aggregate saving. Because incomes of younger earning households are higher than incomes of older, non-earning households, saving exceeds dissaving in the society as a hole.

The aggregate saving ratio is determined by the age profile of the average household's saving S(a) = E(a) – C(a), where E(a) is income, and by the lifetime

resources that each age group can mobilize. If V(a) is the ratio of lifetime resources of all households aged a to aggregate real income, then V(a) S(a) is the total saving of age group a as a fraction of aggregate real income. The aggregate saving ratio S is derived by summing across all age groups:

$$S = \int v(a)s(a)da \qquad \textbf{(3.2)}$$

With steady-state growth, V(a) is independent of time and given by

$$V(a) = V(0)\, e^{-ga} \qquad \textbf{(3.3)}$$

Where V(0) is the ratio of life time resources of newly formed households to aggregate real income, and g is the rate of growth in aggregate real income.
If g is zero, then

$$S = V(0)(1-L) = 0 \qquad \textbf{(3.4)}$$

All aggregate real income is consumed because V (a) is a constant, L equals 1 and $\int$ S(a)da is 1-L.

With positive growth in aggregate real income, the lifetime resources V (a) of young savers exceed those of old dissavers and there can be positive aggregate saving. This is the rate-of-growth effect. The rate-of-growth effect is itself determined by the relationship between income and consumption over the household's lifetime. Mason (1987) shows that the timing of household saving can be defined in terms of the mean ages of consumption μ_c and income μ_y. These are the average ages weighted by the values of consumption expenditure and income at each age at which half-life time consumption and income are reached. The higher is the rate of economic growth, the richer is the current generation compared with the previous generation. The rate-of-growth effect can be positive only to the extent that households on average accumulate wealth when they are younger in order to dispose off these assets when they are older. In countries where households can borrow against future income, households may have spent more than they have earned, in cumulative terms, for a large part of their lifetime. In this case, the rate-of-growth effect can be negative.

The aggregate saving ratio can be represented approximately as function of g, L, μ_c and μ_y. All factors that influence the aggregate saving ratio must enter through one of the four variables (Fry and Mason, 1982)

$$S = -\log(L) + (\mu_c - \mu_y)g \qquad \textbf{(3.5)}$$

Equation (3.5) allows factors that influence the timing of consumption or income over the lifecycle to enter the saving function interactively with the rate of growth of income.

The level of household consumption can be approximated by a log-linear function in a vector of independent variables Z.

$$L = e^{-\delta z} \quad \textbf{(3.6)}$$

The difference between the mean ages of consumption and income is represented by a linear function in the same vector of independent variables Z.

$$\mu_c - \mu_y = \beta Z \quad \textbf{(3.7)}$$

Substituting equations (3.6) and (3.7) into equation (3.5) gives

$$S = \delta z + \beta Z g \quad \textbf{(3.8)}$$

The specific saving function to be used for empirical testing can be specified as follows:

$$SNY_t = a_{10} + a_{11}DEPR_t + a_{12}CRDAV_t + a_{13}RDI_t + a_{14}\ lnRPB_t + a_{15}\ YG_t + a_{16}D + e_t \quad \textbf{(3.9)}$$

Description of Variables

SNY_t – National Saving Ratio = National Saving/Nominal GNP

National Saving (which is the dependent variable) is calculated by subtracting foreign saving (SF) from domestic gross investment (Ig). Foreign saving is obtained by subtracting exports of goods and services (EX) and net factor income from abroad (NFI) from imports of goods and services (IM) as SF= IM-EX-NFI

$DEPR_t$-Dependency Ratio= [(Age <14) + (Age >64)]/(Age 15 – 64)

Mason (1981) shows that a rise in the population dependency ratio is likely to reduce the mean age of consumption but to have a relatively small effect on the mean age of earning. Hence an increase in the population dependency ratio reduces the rate-of-growth effect in the aggregate saving function. (Mason 1981, 1987; Fry and Mason 1982)

YG_t- Growth Rate in Real GDP-which reflects the rate-of-growth effect in the life-cycle saving model. Theoretically a higher income growth in an economy will have a positive impact on the national saving ratio.

$CRDAV_t$-Credit Availability-Calculated as the ratio of Domestic Credit to the Private Sector to Nominal GNP. This ratio is used as a proxy for the available credit in the domestic economy. As stated in Fry (1995) credit rationing is endemic in the developing world. Even where interest rates are relatively free for investment lending, there may be restrictions on consumer lending. If some households are liquidity-constrained consumer, an increase in credit availability will raise consumption and lower saving.

RDI_t- Real Deposit Rate of Interest = (r – inf)/(1 + inf), where r is the nominal average twelve month deposit rate and inf is the change in the Addis Ababa price index. An increase in the real return on financial assets raises the relative price of current to future consumption. If the substitution effect outweighs the income effect as posited by Olson and Bailey (1981), then the saving ratio rises with an increase in the domestic real interest rate.

$lnRPB_t$- Rural Population Per Bank Branch- this is the ratio of the rural population of Ethiopia divided by the number of rural bank branches existing in the country for each year of the study period (here all bank branches except those in Addis Ababa are included). This variable is used as a proxy for proximity or accessibility of depository institutions' branches in rural areas. Given other things increased bank proximity could raise the saving ratio.

D- Dummy Variable which is 0 for the pre liberalization period (1974-1992) and 1 for the post liberalization period (1992-2003)

e_t – Disturbance Term

3.1.2 The Investment Function

3.1.2.1 Effect of Financial Conditions on the Volume of Investment

The particular investment function selected for empirical testing in this study is based on the "accelerator model". As stated by Blejer and Khan (1984) and Fry (1989a, 1995) even though estimation of neoclassical investment functions for developing countries are difficult due to lack of data on measures of the capital stock or its rate of return, there is little choice but to use some version of the accelerator model.

The accelerator model sets the desired capital stock K* proportional to real output y as:

$$K^* = \delta y \qquad \textbf{(3.10)}$$

This can be expressed in terms of a desired ratio of investment to output (I/Y)* as:

$$(I/Y)^* = \delta\gamma \qquad \textbf{(3.11)}$$

Where γ is the rate of growth in output.

The adjustment mechanism allows the actual investment ratio to adjust partially in any one period to the difference between the desired investment ratio and the investment ratio in the previous period:

$$\Delta(I/Y) = \lambda[\,(I/Y)^* - (I/Y)_{t-1}]$$

$$\text{Or} \qquad I/Y = \lambda(I/Y)^* + (1-\lambda)(I/Y)_{t-1} \qquad \textbf{(3.12)}$$

Where λ is the coefficient of adjustment. The flexible accelerator model allows economic conditions to influence the adjustment coefficient λ. specifically,

$$\lambda = \beta_0 + \left[\frac{\beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \ldots}{(I/Y)^* - (I/Y)_{t-1}}\right] \qquad \textbf{(3.13)}$$

Where Z_i are the variables (including an intercept term for the depreciation rate) that affect λ.

The partial adjustment mechanism specified for the investment ratio is somewhat more complicated than the equivalent mechanism for the level of investment. Specifically, there could be a lag in achieving the same investment ratio this year as last year if output rose rapidly last year; this year's desired investment level will be higher than last year's, despite a constant desired ratio of investment to output. To incorporate this adjustment lag, last year's growth rate γ_{t-1} can be included as an additional explanatory variable. (Fry, 1995)

Based on the theoretical foundations of the flexible accelerator model the specific saving function to be estimated in this study can be specified as follows:

$$DIY_t = b_0 + b_1 CRDAV_t + b_2 Yg_t + b_3 CRGOV_t + b_4 lnREXRt + b_5 FL_t + b_6 D + e_t \qquad \textbf{(3.14)}$$

Description of Variables

DIY_t – Investment Ratio- This is the dependent variable, which is calculated as the ratio of Total Domestic Investment (capital formation) to Nominal GNP.

$CRDAV_t$- Credit Availability- This variable is calculated as the ratio between Domestic Private Sector Credit and Nominal GNP. Blinder and Stiglitz (1983), Fry (1980b) and Keller (1980) emphasize that the availability of institutional credit can be an important determinant of the investment ratio in developing countries. They argue that, banks specialize in acquiring information on default risk. Such information is highly specific to each client and difficult to sell. Hence the market for bank loans is a customer market, in which borrowers and lenders are imperfect substitutes. A credit squeeze rations out some bank borrowers who may be unable to find loans elsewhere and so be unable to finance their investment projects. Therefore the availability of credit to the private sector is expected to have a positive relationship with the investment ratio.

Yg_t – Growth in Real GDP – Theoretically growth in real output is expected to affect the investment ratio positively.

$CRGOV_t$ – Credit to Government- This variable is calculated as the ratio of Net Domestic Credit to Government to Total Domestic Credit. This variable is used here as a proxy for the general state of macroeconomic management and the crowding out effect on domestic private investment. As emphasized by Hamilton and Flavin (1986) the weaker is fiscal performance, as proxied by the ratio, Net Domestic Credit to Government, the greater is the probability of increased asset taxation in the future. For this reason, a higher value of CRGOV would deter domestic investment.

$lnREXR_t$ – Real Exchange Rate = [D GNP D/US WPI]*1/OFF RATE, where D GNP D is Domestic GNP Deflator, US WPI is US Whole Sale Price Index and OFF RATE is Domestic Currency per US dollar. This variable is used as a proxy for the price of non-tradable goods in relation to import prices. Fry (1995) states that the price of intermediate imports may affect the profitability of investment projects in developing countries. Therefore, a higher value REXR implies a lower relative price of imports. By appreciating the real exchange rate, capital inflows may stimulate investment.

FL_t– Foreign Liabilities – This is the cumulated end of year net foreign liabilities scaled by nominal GNP. It serves as a proxy for the country-specific risk premium (Dooley 1986, Edwards 1986). This ratio may affect the investment ratio negatively either because it reduces the expected net return to domestic investment or because it reflects a higher cost of investible funds.

D- Dummy Variable, which is 0 for the pre liberalization period (1974-1992) and 1 for the post liberalization period (1992-2003)

e_t – Disturbance Term.

3.1.2.2 Efficiency of Investment

If financial intermediaries allocate investible funds more efficiently than other allocative mechanisms, then raising real deposit rates of interest up to the point where interest rates reach their competitive free-market levels will improve the quality of investment (Fry, 1995) Real interest rates could influence the average efficiency of investment in the ways suggested by Galbis (1977), Mckinnon (1973), and Shaw (1973)

Mckinnon(1991) shows the derivation of the average efficiency of investment which is monotonically related to the incremental output/capital ratio σ, using the traditional Harrod-Domar one sector growth model as follows:

$$Y = \sigma K \qquad \textbf{(3.15)}$$

Equation (3.15) is a valid representation of the productivity of capital in the presence of unlimited supplies of labor if the real wage is fixed (Kapur, 1986). Then any increase in K is implicitly associated with proportional increases in the supply of labor. We can now represent the change in output growth dY as:

$$dY = \sigma dK + K d\sigma, \text{ where } dK=I=S \qquad \textbf{(3.16)}$$

Where d is the differential operator.

Equation (3.16) partitions the sources of growth into that associated with new investment for a given σ and increases in σ for a given capital stock. The impact of new investment per se on output growth is captured by the first term on the right-hand side.

The familiar Harrod-Domar growth model assumes that the second term on the right-hand side of equation (3.16) is zero; then dividing through by Y, we get

$$dY/Y = \sigma(I/Y) = \sigma s, \text{ Where } s = S/Y \qquad \textbf{(3.17)}$$

The rate of growth for a single country is simply the propensity to save times the average (marginal) productivity of capital; incremental output/capital ratio (IOCR).
By construction then,

$$IOCR = \frac{dy/y}{(I/y)} = \sigma \text{.....(3.18)}$$

Gelb (1989) partitioned the sources of output growth from increases in the real deposit rate of interest as follows. Differentiate (3.18) with respect to the real deposit rate of interest RR to get:

$$\frac{\partial dy/y}{\partial(RR)} = \frac{\partial(IOCR)}{\partial RR}[I/Y] + \frac{\partial(I/Y)}{\partial(RR)} IOCR \text{.....(3.19)}$$

For explaining output growth rates across countries, Gelb then assessed the relative importance of the two terms on the right hand side of (2.19): the efficiency effect, measured by weighted changes in IOCR, versus the investment effect, measured by weighted cross-country differences in investment as a share of GDP. He then found that the efficiency effect was almost four times as important as the investment effect in explaining differences in real GDP growth across his sample of thirty-four countries. Higher real deposit rates of interest had their major impact through increased investment efficiency (as measured by IOCRs) rather than through investment or aggregate saving as a share of GDP.

The specific model to be used for empirical testing in this study can then be formulated as:

$$IOCR_t = c_o + c_1 RDI_t + c_2 D + e_t \quad \textbf{(3.20)}$$

Description of Variables

$IOCR_t$ – Incremental Output Capital Ratio = Yg/(Inv/GDP), where Yg is the growth rate in real GDP, Inv/GDP is domestic Investment (capital formation) to GDP ratio. It is the dependent variable.

RDI_t – Real Deposit Rate of Interest, which is calculated as the ratio between the nominal deposit rate of interest and the annual percentage change in the Addis Ababa CPI, using the formula presented above. The real deposit rate of interest is expected to affect the efficiency of investment IOCR positively.

D- Dummy Variable, which is 0 for the pre liberalization period (1974-1992) and 1 for the post liberalization period (1992-2003)

e_t – Disturbance Term

3.1.3 Inflation

To test the impact of financial reform on one of the major macroeconomic variables, inflation, I have used Fry's (1995) model, in which inflation is determined explicitly as the difference between growth rates in per capita nominal money supply and per capita real money demand. It states that, provided that the money market clears within the time period under consideration, inflation can be explained proximately by the rate of change in nominal money supply and the determinants of the rate of change in real money demand. The equilibrium condition in the money market can be expressed:

$$M^s = M^d \quad \textbf{(3.21)}$$

$$\text{Or} \quad M^s = P.\ N.\ m^d \ldots \quad \textbf{(3.22)}$$

Where M^s is the nominal money supply (broadly defined to include saving/time deposits as well as currency in circulation and demand deposits – M^2), M^d is nominal money demand, P is the price level, N is population and m^d is per capita demand for real money balances $(M^d/P)/N$. It seems reasonable to expect the market clearing or equilibrium condition – Short-run demand equal to supply – to hold for annual models applied to most developing economies because of the prevalence of auction markets. (Fry, 1995)

Equation (3.22) can be expressed in first difference logarithmic form:

$$\Delta\log(M^s) = \Delta\log(P) + \Delta\log(N) + \Delta\log(m^d) \quad \textbf{(3.23)}$$

Which can be rearranged:

$$\Pi = \Delta\log\,(M^s/N) - \Delta\log\,(m^d).. \quad \textbf{(3.24)}$$

Where Π is the continuously compounded rate of change in the price level Δlog (P)

The inflationary process can be understood fully only through an analysis of the determinants of both nominal money supply and real money demand. However provided that any feedback from inflation to money supply growth occurs with a lag, the model is recursive (Aghveli and Khan, 1977). In such case, changes in the nominal money supply can be treated as if they were exogenous for the purpose of estimating inflation.

Real money demand is invariably specified as a function of one or more price (interest rate) variables and a budget constraint. Here the price variable is the real deposit rate of interest $d-\Pi^e$ and the budget constraint is per capita permanent or expected real income y_p. The long-run or desired money demand function takes the standard form:

$$m^* = cy_p^{\,b}\, e^{a(d-\Pi e)} \qquad \textbf{(3.25)}$$

Where m* is the long-run or desired level of real money balances and a, b and c are constants.

The actual level of real money balances may be adjusted with a lag to changes in the determinants of money demand. To allow for this, short-run or actual money demand is specified:

$$\log(m^d) = \log(m_{t-1}) + \theta[\log(m^*) - \log(m_{t-1})] \qquad \textbf{(3.26)}$$

some fraction θ of the gap between desired money balances and money balances held in the previous time period is eliminated in the current period. Equations (3.25) and (3.26) can be combined and expressed in first difference logarithmic form:

$$\Delta\log(m^d) = \theta b\Delta\log(y_p) + \theta a\Delta(d-\Pi^e) + (1-\theta)\Delta\log(m_{t-1}) \qquad \textbf{(3.27)}$$

Now defining γ^e as the rate of change in per capita permanent income $\Delta\log(y_p)$ and substituting equation (3.27) into equation (3.24) we get:

$$\Pi = \Delta\log(Ms/N) - \theta b\gamma^e - \theta a\Delta(d-\Pi^e) - (1-\theta)\,\Delta\log(m_{t-1}) \qquad \textbf{(3.28)}$$

Based on the above theoretical foundation the empirical model to test the response of inflation for changes in the financial variables can be formulated as follows:

$$INF_t = d_0 + d_1MS_t + d_2PCY_t + d_3RDI_t + d_4D + e_t \qquad \textbf{(3.29)}$$

Description of Variables

INF_t – Inflation Rate – This is the dependent variable, which is calculated as the percentage change in the annual Addis Ababa CPI.

MS_t – Growth in Per Capita Stock of Money = Δ ($M2_t/POPn_t$), where $M2_t$ is broad money supply at year t (= demand deposit + currency in circulation + quasi money/saving & time deposit/) and $POPn_t$ is the total number population of Ethiopia at year t. Theoretically growth in the money supply is expected to affect the inflation rate positively.

PCY_t – Per Capita Income Growth = Δ ($Y_t/POPn_t$), where Y_t is Real GDP at year t and $POPn_t$ is the total number population of Ethiopia at year t. Fry (1995) states that if actual price level or inflation exceeds expected price or inflation, entrepreneurs interpret the difference to reflect a real increase in the demand for their products. Their response is to the raise the rate of capacity utilization of existing capital to increase output in the short run, and to invest more to increase capacity in the long run. Which reflects the positive relationship between output or per capita income growth and inflation.

RDI_t – Real Deposit Rate of Interest- Calculated as in the above functions. Kapur (1976a), Mathieson (1980) and Fry (1980b) all conclude that an increase in the nominal deposit rate of interest that raises the real deposit rate towards its competitive free-market equilibrium level may reduce the inflation rate.

D- Dummy Variable, which is 0 for the pre liberalization period (1974-1992) and 1 for the post liberalization period (1992-2003)

et – Disturbance Term

3.1.4 Economic Growth and Financial Variables

“A simple way of discriminating between the Mckinnon-Shaw school and others would be to examine episodes of financial liberalization and see whether or not these were accompanied by higher or lower rates of economic growth. In practice, however, most clear-cut cases of financial liberalization were accompanied by other economic reforms (such as fiscal, international trade and foreign exchange reforms). In such cases it is virtually impossible to isolate the effects of financial components of the reform package. This is unfortunate; since causality can be inferred when financial conditions have been deliberately and substantially changed, as in the case of discrete financial liberalization. Examining the association between financial conditions and economic growth over time provides in itself no evidence of causality.” (Fry, 1995) With this caveat however many empirical works, relating financial episodes and economic growth, have been done by different researchers with varying results.

The effect of financial conditions on economic growth can also be calculated in the medium run indirectly from the effects of disequilibrium real deposit rates on saving and investment ratios: section 3.1.1, 3.1.2 and 3.1.3. Khan and Reinhart (1990) show that, since credit availability is an important determinant of private investment, the effect of financial conditions on growth may occur through this channel.

Given these facts, I have tried to assess the impact of financial conditions on economic growth in Ethiopia by incorporating financial variables other than the real deposit rate of interest based on the arguments of King and Levine (1993a, 1993b, 1993c)

The empirical model can be stated as follows:

$$PCY_t = f_0 + f_1 LLY_t + f_2 DCR_t + f_3 DCRY_t + f_4 D + e_t \qquad \textbf{(3.30)}$$

Description of Variables

PCY_t – Per Capita Income Growth –Dependent variable, calculated based on the formula given in the above section.

LLY_t – Growth in Liquid Liabilities = $\Delta (M2_t/GDP_t)$, where $M2_t$ is broad money supply at year t (= demand deposit + currency in circulation + quasi money/saving & time deposit/) This variable is selected to see the impact of financial deepening or the degree of monetization on economic growth. Theoretically it is expected to have a positive relationship with per capita income growth.

DCR_t – the ratio of private sector credit to total domestic credit at year t.

$DCRY_t$ – the ratio of private sector credit to GDP at year t.
Both the above variables are expected to affect PCY positively.

D- Dummy Variable which is 0 for the pre liberalization period (1974-1992) and 1 for the post liberalization period (1992-2003)

e_t – Disturbance Term

4. Data Description, Estimation Results and Discussion

4.1 Type and Source of Data

The data used for estimation purpose in this study is a secondary annual time series data collected from different sources i.e National Bank of Ethiopia, Ethiopian Economic Association, Ministry of Economic Development and Cooperation and Central Statistical Authority. Data on rural bank branch network was colleted from the head offices of each bank both government (Commercial Bank of Ethiopia, Construction and Business Bank and Development Bank of Ethiopia) and private (Awash International Bank, Dashen Bank, Wegagen Bank, Abyssinia Bank, Nib International Bank and United Bank S.C) The latest edition of IMF CD-ROM database has also been used for comparison purposes.

The data period is from 1974 – 2003 G.C. Standard definitions and calculations have been applied, as shown in the description of each variable, to the crude data to arrive at the final data to be estimated.

4.2.1 The Saving Function

It is to be well remembered that the specific saving function selected as a theoretical foundation for the derivation of the empirical model in this study was the "life cycle model" Accordingly all the variables entering into the saving function were indicated in equation (3.9). The first step taken was to test for the order of integration of each variable. To this end the ADF test statistic was used and the result indicated that the null of unit root could not be rejected at levels for all variables at 5% significance level, whereas the null of unit root was rejected at differences for the same significance level which leads us to the conclusion that all the variables in the saving function are I(1)[5].

After checking the variables for their order of integration and based on the finding that all the variables are I(1), the next step is to test for cointegration among the variables. The two Johanson's test statistics namely the λ_{trace} (r) "trace" and λ_{max} (r, r+1) "maximum eigen value" tests were used to know the rank of matrix Π. It should be noted here that in the Johansen maximum likelihood estimation procedure there is no a priori categorization of the variables as exogenous and endogenous. Therefore we can represent all the variables in the saving function by the vector x_t and write the multivariate vector autoregressive process of order *p* as:

[5] See Annex II Table 1 for unit root test results

$$x_t = A_1x_{t-1} + A_2x_{t-2} + \ldots\ldots\ldots\ldots + A_px_{t-p} + e_t \qquad \textbf{(4.1)}$$

which can be solved to form:

$$\Delta x_t = \Sigma\pi_i \Delta x_{t-i} + \pi x_{t-p} + e_t \quad (i=1 \text{ to } p-1)$$

$$\text{Or} \quad \Delta x_t = \Sigma \pi_i \Delta x_{t-i} + \alpha \beta' x_{t-p} + e_t \qquad \textbf{(4.2)} \quad (i=1 \text{ to } p-1)$$

Which is the Vector Error Correction Model (VECM) counterpart of equation (4.1). Once we have the representation of our model as (4.2), our task will be to determine the number of cointegrating vectors and estimate β and □, which are a vector of long-run parameters and speed of adjustment to disequilibrium respectively[6].

It is clear from the results of cointegration test that both the trace and maximum eigen value statistic identify only one cointegrating vector; the null of r = 0 against the general alternative r ≤ n-1 is rejected at the 5% level of significance, which assures us the existence of at least one cointegrating vector; and, the maximum eigen value statistic test rejects the null of r = 0 against r = 1 which again assures us the existence of one cointegrating vector.

Once we identify the existence of one cointegrating vector, the next step is to determine the β and □ coefficients. By normalizing the cointegrating coefficient of SNY_t, which is the dependent variable in our saving function, we obtain the following results.

The β vector is given by:

[β_{11}	β_{12}	β_{13}	β_{14}	β_{15}	β_{16}]
SNY_t	$CRDAV_t$		$DEPR_t$	$lnRPB_t$	RDI_t	YG_t
[1.000000	0.033281		-0.053818	-0.020411	0.034793	0.007267]

[6] The results of co integration are summarized in Annex II Table 2

and the α vector is given by :

$$\begin{pmatrix} D(SNY_t) \\ D(CRDAV_t) \\ D(DEPR_t) \\ D(lnRPB_t) \\ D(RDI_t) \\ D(YG_t) \end{pmatrix} = \begin{pmatrix} -0.542982 \\ 0.418249 \\ -0.000248 \\ -0.139699 \\ -39.13858 \\ -101.3947 \end{pmatrix} = \begin{pmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \\ \alpha_{41} \\ \alpha_{51} \\ \alpha_{61} \end{pmatrix}$$

Having estimated the β and α coefficients, we have to be assured of the endogeniety of our dependent variable SNY_t and the exogeniety of the other remaining variables in our hypothesized function. To this end, we restrict the values of the i^{th} row of the α matrix to be zero and if we cannot reject the restriction, then the i^{th} variable in the α matrix is said to be "weakly exogenous" with respect to the β parameters (See Johansen, 1992b). The LR test statistic which has a χ^2 distribution with (n-r) number of degrees of freedom is used in this procedure and the result of this test is shown in the following table.

Table 4.1: Test for zero restriction on □- coefficients

	SNY_t	$CRDAV_t$	$DEPR_t$	$LRPB_t$	RDI_t	YG_t
α coefficient	-0.542982	0.418249	-0.000248	-0.139699	-39.13858	-101.3947
LR-statistic:χ2 (~1)	9.019937	9.929653	0.760261	2.574490	0.676824	4.824043
P-value	0.00267*	0.00162	0.38324	0.10859	0.41068	0.028065

***** Rejection at 5% level

According to the results of zero restriction on α coefficients, the coefficient of the dependent variable α_{11}= -0.542982 was found to be significantly different from zero and its sign is as expected. It indicates adjustment towards the long-run steady state path. If it were positive, it would indicate that SNY_t would be deviating from the long-run steady-state path after a certain shock. Its magnitude (54%) indicates partial adjustment which is reasonable since full adjustment cannot be expected.

The remaining part is to test the long-run coefficients β for their significance in the long run equilibrium model which is given by:

$$SNY_t = 0.033281\ CRDAV_t + 0.053818DEPR_t + 0.020411\ LRPB_t + 0.034793RDI_t + 0.007267\ YG_t$$

To test for the significance of each variable in the long-run model we again use the zero-restriction and the LR-statistic. The results are summarized below.

Table 4.2: Test for zero restriction on β- coefficients

	SNY_t	$CRDAV_t$	$DEPR_t$	$LRPB_t$	RDI_t	YG_t
β -coefficient	1.0000	0.033281	0.053818	0.020411	0.034793	0.007267
LR-statistic:χ2 (~1)	32.61512	0.760325	7.706107	34.93035	41.67912	26.97936
P-value	0.00000*	0.38322	0.005503*	0.000000*	0.00000*	0.00000*

*Rejection at 5% significance level.

The zero restriction result on the long-run equilibrium coefficients shows that except $CRDAV_t$ variable, all variables were significantly different from zero. The hypothesized linkage between credit availability and the national saving ratio was based on Fry's (1995) hypothesis that; because credit rationing is endemic throughout the developing world, there may be restrictions on consumer lending even where interest rates are relatively free for investment lending. If some households are liquidity constrained, credit availability could affect consumption and saving behavior. For a liquidity-constrained consumer, an increase in credit availability will raise consumption and lower saving. But according to our result in this study the proxy for credit availability $CRDAV_t$ was insignificant in relation to the national saving ratio, which could be due to (a) The fragmentation of the credit market into formal, semi-formal and informal and (b) the relative inaccessibility of formal financial sector credit as compared to the informal financial sector which is not incorporated in this model. Therefore, the marginal impact of formal financial sector liberalization in relaxing household borrowing constraint could depend on the degree of fragmentation of the market.

The significant effect of the dependency ratio is compatible with the theory that, an increase in the population dependency ratio reduces the rate-of-growth effect in the aggregate saving function.

The logarithm of rural population per bank which was used to proxy the proximity or accessibility of depository institutions' branches in rural areas, also affects the aggregate saving ratio significantly, even though with a smaller coefficient (0.02) which could be attributed again to the severe fragmentation of the market especially in rural areas.

The significant result of the real deposit rate of interest explains the fact that an increase in the real rate of return on financial assets raises the relative price of current to future consumption. It also partially explains Mckinnon's complementarity hypothesis. On average a 1 percentage point increase in the real deposit rate of interest raises the national saving ratio by 3.4 percentage points in the long-run.

The rate of growth in real GDP also affects the national saving ratio significantly in the long run by 0.7 percentage points for a 1 percentage point rise.

4.2.2 The Investment Function

4.2.2.1 Effects of Financial Conditions on the volume of Investment

The econometric procedures followed in the investment function are all the same with the saving function and hence, hereafter I will only focus on the results and interpretation of estimated results.

The variables shown in the investment function in section (3.14) were tested for their order of integration and the results showed that all the variables are I(1)[7].

After checking the variables for their order of integration and finding that all the variables are I(1), the cointegration test for the number of cointegrating vectors using the λ_{trace} (r) "trace" and λ_{max} (r, r+1) "maximum eigen value" test statistics, showed that there is one cointegrating vector in the unrestricted vector auto regression[8].

Being assured that there is one cointegrating vector in the investment function we can proceed with the estimation of α and β coefficients that make up this cointegrating equation. Accordingly the vector error-correction estimation normalized with $\beta_{11} = 1$ shows the following result:

The β vector is given by

$[\ \beta_{11}$	β_{12}	β_{13}	β_{14}	β_{15}	$\beta_{16}]$
DIY_t	$CRDAV_t$	$CRGOV_t$	FL_t	$lnREXR_t$	YG_t
[1.000000	-0.229065	-0.311961	0.091610	-0.017188	0.098206]

and the α vector is given by :

$$\begin{pmatrix} D(DIY_t) \\ D(CRDAV_t) \\ D(CRGOV_t) \\ D(FL_t) \\ D(lnREXR_t) \\ D(YG_t) \end{pmatrix} = \begin{pmatrix} -0.497679 \\ 0.594435 \\ 1.080271 \\ -0.154045 \\ 4.980267 \\ 0.538759 \end{pmatrix} = \begin{pmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \\ \alpha_{41} \\ \alpha_{51} \\ \alpha_{61} \end{pmatrix}$$

[7] See Annex II Table 3
[8] See Annex II Table 4

Testing the weak exogeniety of the variables by using a zero restriction on the α coefficients, we get the following result:

Table 4.3: Test for zero restriction on α- coefficients

	DIY_t	$CRDAV_t$	$CRGOV_t$	FL_t	$lnREXR_t$	YG_t
α-coefficient	-0.497679	0.594435	1.080271	-0.154045	4.980267	0.538759
LR-statistic:χ2 (~1)	4.343646	0.629547	6.125739	2.680724	1.534939	0.354973
P-value	0.037147*	0.42752	0.013323	0.101570	0.215373	0.551311

* Rejection at 5% level

The result that all the short-run adjustment coefficients except α_{11} are insignificant confirms that we have one endogenous (weakly exogenous) variable (DIY_t) in our vector autoregression. The value of the coefficient α_{11} = -0.497679 goes in line with the theoretical expectation that the volume of investment adjusts towards the long-run steady-state path with a 50% approximated value. We can therefore write the full equation of the investment function with the relevant long-run parameters as follows:

$$DIY_t = 0.229065CRDAV_t + 0.311961CRGOV_t + 0.091610FL_t + 0.017188lnREXR_t + 0.098206YG_t$$

To test the significance of each variable we again run a zero restriction test on the long-run parameters β.

Table 4.4: Test for zero restriction on β- coefficients

	DIY_t	$CRDAV_t$	$CRGOV_t$	FL_t	$lnREXR_t$	YG_t
β-coefficient	1.000000	-0.229065	-0.311961	0.091610	-0.017188	0.098206
LR-statistic:χ2 (~1)	80.27087	34.04093	73.37447	14.41570	25.08078	57.33894
P-value	0.00000*	0.00000*	0.00000*	0.00014*	0.00000*	0.00000*

* Rejection at 5% level

According to the result, all the variables in the investment function were found to be statistically significant at the 5% percent level.

The availability of institutional private sector credit scaled by nominal GNP is found significant but affects investment negatively. Even though we found this variable in the national saving ratio insignificant, it could have affected investment through an increase in consumption expenditure which resulted due to relaxes in liquidity constraints at the household level and thereby a decrease in the domestic saving ratio.

The impact of poor fiscal performance as proxied by the ratio of public or government credit to total domestic credit $CRGOV_t$ had also a significant impact on the level of domestic investment. This variable may also be used as a proxy for the general state of macroeconomic management. A government that extracts high seigniorage from the banking system may well be following a variety of other macroeconomic policies that impair the investment climate. (Fry, 1995)

Foreign liabilities FL_t which proxies country-specific risk premium is significant but with the opposite sign which could be due to the dominance of domestically financed investment (especially government financed) as compared to foreign direct investment from the total share of gross capital formation.

The real appreciation of the exchange rate is found to affect domestic investment significantly. In other words the devaluation/depreciation of the real exchange rate affects domestic investment negatively by making the price of intermediate imports more expensive to local producers.

Growth in real GDP also affects the level of domestic investment positively with a long run equilibrium coefficient of 9.8%.

4.2.2.2 Efficiency of Investment

The variables in the specific function (equation 3.20) intended to estimate the impact of changes in the real deposit rate of interest on incremental output capital ratio (IOCR) were tested for their order of integration and accordingly, both variables ($IOCR_t$, RDI_t) were found to be I(1) without a constant and a linear trend[9]. We can test these two variables for their cointegration. What we have to note here is, since we have only two variables the maximum number of cointegrating vectors we can have is one (r=1) r<n, where n is the number of variables entering into the cointegrating space. Otherwise if we have r=n, we have full rank and hence every variable is I(0). Having this in mind, the test for cointegration i.e the trace and the maximum eigen value statistics showed that there is one cointegrating vector[10], hence we can estimate for the short-run adjustment coefficients and the long-run parameters β that make up the cointegrating vector. Accordingly the β parameters are given by:

[9] See Annex II Table 5
[10] See Annex II Table 6

$[\ \beta_{11} \quad \beta_{12}\ ] = [\ IOCR_t \quad RDI_t\ ] = [\ 1.000000 \quad -0.445224\ ]$

and the α coefficients are given by:

$$\begin{pmatrix} IOCR_t \\ RDI_t \end{pmatrix} = \begin{pmatrix} -0.321431 \\ 1.766579 \end{pmatrix} = \begin{pmatrix} \alpha_{11} \\ \alpha_{21} \end{pmatrix}$$

After ascertaining statistically the presence of one cointegrating vector and estimating the respective short-run and long-run coefficients, we check for the weak exogeniety between the two variables by imposing a zero restriction on the α coefficients.

Table 4.5: Test for zero restriction on α- coefficients

	$IOCR_t$	RDI_t
α-coefficient	-0.321431	1.766579
LR-statistic:χ2 (~1)	3.511722	9.802174
P-value	0.060936*	0.001743*

***** Rejection at 5% level

The zero restriction test on both short-run adjustment coefficients ($\square_{11}$ and $\square_{21}$) shows, we reject the case of weak exogeniety for both variables. This result clearly contradicts with our original hypothesis that in the short and medium runs the efficiency of investment is determined by the real deposit rate of interest. Nevertheless, $\square_{11}$ shows that IOCR adjusts towards the long-run steady state path without deviation with a value of 32 percentage points. Whereas the adjustment coefficient for the real deposit rate of interest indicates deviation from the long-run steady state path with a value greater than 100% which is unrealistic. Given the fact that in our country deposit rates of interest were fixed before 1992 and they were under policies of floors since 1995, and the high degree of monopoly in the financial market, we cannot expect this much adjustment value. Hence based on these facts we can estimate the long-run equilibrium relationship between IOCR and RDI to test whether the normalized value of the former and the long-run coefficient of the latter are statistically different from zero. The long-run equilibrium equation is given by:

$$IOCR_t = -0.445224\ RDI_t$$

and the zero restriction test result shows:

Table 4.6: Test for zero restriction on β- coefficients

	$IOCR_t$	RDI_t
β-coefficient	1.00000	-0.445224
LR-statistic:χ2 (~1)	11.37002	11.81982
P-value	0.000746*	0.000586*

***** Rejection at 5% level

The zero restriction on the β-coefficients is rejected at the 5% significance for both variables, which assures the existence of long-run equilibrium relationship between the two variables.

4.2.3 The Inflation Function

In order to determine the dynamics between financial variables and inflation, equation (3.29) has been used. As in the other functions, the variables entering into this function were tested for their order of integration using the ADF test statistic which showed all the variables are I(1)[11]. A test for cointegration was also run using the trace and the maximum eigen value statistic which indicated the existence of one cointegrating vector in the vector auto regression[12].

Having statistically proved the existence of one cointegrating vector, the related short-run and long-run parameters are given by:
The β vector is given by:

[	β_{11}	β_{12}	β_{13}	β_{14}]
[	INF_t	PCMSt	PCYt	RDIt]
[1.000000		-1.952301	0.726420	0.084739]

and the α vector is given by:

$$\begin{pmatrix} INF_t \\ PCMSt \\ PCYt \\ RDIt \end{pmatrix} = \begin{pmatrix} -0.229726 \\ 0.329958 \\ -0.181145 \\ -14.16475 \end{pmatrix} = \begin{pmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \\ \alpha_{41} \end{pmatrix}$$

[11] See Annex II Table 7
[12] See Annex II Table 8

We run then a test for weak exogeniety among the variables in the vector autoregression using a zero restriction on the α coefficients. (see Table 4.7)

Table 4.7: Test for zero restriction on α- coefficients

	INFt	PCMSt	PCYt	RDIt
α-coefficient	-0.229726	0.329958	-0.181145	-14.16475
LR-statistic:χ2 (~1)	1.098671	10.14533	1.275294	5.863065
P-value	0.294558	0.001447*	0.258776	0.015462

***** Rejection at 5% level

The result here indicates that we reject the zero restriction on per capita money supply $PCMS_t$, but not for the others at the 5% level of significance which implies that inflation in our model does not adjust at least in the short-run with the other intended explanatory financial variables. Possibly this result could be due to the strong link between inflation (Addis Ababa or country level CPI) and agricultural output prices rather than inflation being a monetary phenomenon in our country. It can be observed from the time series data on inflation in Ethiopia that most of the time both in the Derg and current government; it was swinging between single digits except in those years where there were droughts and sharp increases in agricultural prices.

4.2.4 Economic Growth

The last function to be estimated in this study is the one indicated by equation (3.30), which is intended to measure the impact of selected financial variables on economic growth in Ethiopia.

Similar with the other functions, a test for the order of integration of the variables was undertaken and the result shows that all the variables entering the growth function are I (1)[13].The Johansen cointegration test using the trace and the maximum eigen value statistic shows that there is one cointegrating vector in the unrestricted vector autoregression[14].and the values of the short-run and long-run coefficients that make up the cointegrating vector normalized with respect to PCY_t is given by:

The β vector is given by:

[β_{11}	β_{12}	β_{13}	β_{14}]
[PCY_t	$DCRY_t$	DCR_t	LLY_t]
[1.000000	2.628861	-2.707611	-6.800727]

[13] See Annex II Table 9
[14] See Annex II Table 10

and the α coefficients are given by:

$$\begin{pmatrix} PCY_t \\ DCRYt \\ DCRt \\ LLYt \end{pmatrix} = \begin{pmatrix} -0.058112 \\ -0.404122 \\ -0.391823 \\ 0.123202 \end{pmatrix} = \begin{pmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \\ \alpha_{41} \end{pmatrix}$$

We run the test for weak exogeniety and the results are given in Table 4.8

Table 4.8: Test for zero restriction on α- coefficients

	PCYt	**DCRYt**	**DCRt**	**LLYt**
α-coefficient	-0.058112	-0.404122	-0.391823	0.123202
LR-statistic:χ2 (~1)	11.59192	0.005059	0.713273	3.996394
P-value	0.000662*	0.943295	0.398359	3.996394

***** Rejection at 5% level

The Result here indicates that the zero restriction on the adjustment coefficient of per capita income growth PCY_t is rejected at the 5% level of significance, but not for the others. The sign and value of α_{11} = -0.058112 shows that per capita income growth adjusts to the long-run steady state equilibrium without deviation with a very small value of 5.8%, signifying the poor intermediation capacity of the financial sector and the very low monetization of the economy.

Having ascertained statistically the existence of one endogenous (weakly exogenous) variable in our growth function we can build the long-run equilibrium relationship as follows:

$$PCY_t = 2.628861DCRY_t + 2.707611DCR_t + 6.800727LLY_t$$

To test for the significance of each variable in the long-run equation we run a zero restriction test on each variable and the result is presented in Table (6.19) below.

Table 4.9: Test for zero restriction on β- coefficients

	PCY_t	**$DCRY_t$**	**DCR_t**	**LLY_t**
β-coefficient	1.000000	2.628861	2.707611	6.800727
LR-statistic:χ2 (~1)	8.276186	0.068904	2.21E-06	11.40599
P-value	0.004017*	0.792940	0.998814	0.000732*

***** Rejection at 5% level

The significance test on the long-run parameters shows that growth in per capita income PCY_t and growth in liquid liabilities LLY_t (which is the ratio of M2 to GDP) are significantly different from zero but both credit availability ratios to the private sector- $DCRY_t$ and DCR_t, where the former is scaled by GDP and the latter by aggregate domestic credit, were found to be insignificantly different from zero.

In all the functions, the various diagnostic tests i.e the Breush-Pagan test of higher order serial correlation up two lags, the autoregressive conditional heteroscedastic test, the test for normality based on skewness and kurtosis, the White test of heteroscedasticity, and the Ramsey's RESET test of functional form were conducted and detect no statistical problems.

5. Conclusion, Policy Implications & Recommendations

5.1 Concluding Remarks

Ethiopia with a population of 73 million is the second most populous country in Sub-Saharan Africa next to Nigeria. In the past four decades despite the fact there were three different kinds of governments in power, the people of Ethiopia is not lucky enough to gain any discernible changes in its standard of living. The structure of the economy hasn't changed much in these decades (agriculture still contributes 50% of the GDP, 90% of exports and 85% of employment), the average per capita income growth has never been able to cope with the ever increasing population growth and as a result more than 40% of the population lives under the poverty line marked by the World Bank.

As an economist, I was obliged to ask myself "what policies and strategies, at the macro-level, could at least in the short and medium-runs be effective in this country?" The approach followed by both the Derg and the current government, which focused on the agricultural sector as the driving force of the economy, has taken us nowhere as to my understanding. However my personal experience from Ghana and Kenya who have relatively stronger and more liberalized financial sectors and have better per capita income growth rates and living standards as compared to Ethiopia, has urged me to look into the relationship between financial variables and key macroeconomic variables like saving, investment, inflation and ultimately the growth of the economy in Ethiopia.

To this end, I have used an annual time series data, which ranges from 1974/75-2003/04 from different sources. The Johansen Maximum likelihood estimation technique has been used to assess the short and long-run dynamics of the variables.

Before looking into the cointegrating relationships of each function, the variables were tested for their order of integration using the ADF test statistic and all the variables were found to be I(1). The λ_{trace} and λ_{max} test Statistics were employed to assess the number of cointegrating vectors present in each function and accordingly the null of no cointegration was rejected for all cases and the presence of one cointegrating vector was supported statistically at the 5% level of significance. The short-run adjustment coefficients for the saving, investment (volume) and growth functions were found to be statistically significant, applying the zero restriction test, and with the expected signs. Whereas the adjustment coefficients for the investment efficiency function showed rejection of the zero restriction for both the supposed to be endogenous (IOCR) and the explanatory (RDI) variables; the coefficient for the former one was with the expected sign and value but for the latter the value was unrealistic (more than 100%) and the sign was positive indicating deviation from the steady-state path. The adjustment coefficients for the inflation function showed that the zero restriction for the variable inflation was insignificant indicating that inflation is more explained by other factors (possibly agricultural prices and production) other than the classical proposition that inflation is determined explicitly by the difference between the growth in per capita stock of money supply and income in the case of Ethiopia.

The long-run parameters were also tested for their significance in all the functions except the inflation function (in this case, since the short run adjustment coefficient could not be rejected, it was not possible to continue to the next step) using the zero restriction test. The variables in the saving function were found to be statistically significant except the credit availability variable. The real deposit rate of interest and growth in real GDP were found to affect the national saving ratio significantly and positively, supporting the Mckinnon-Shaw hypothesis, whereas rural population per bank branch and dependency ratio affected it significantly and negatively. The unexpected negative result of rural population per bank branch could be attributed to the high degree of fragmentation of the financial market especially in rural areas and the very low per capita income growth, which transmits to an almost insignificant marginal propensity to save.

The long-term parameters in the investment function were found to be statistically significant. The credit availability and foreign liability variables were in the opposite direction from their expected signs but the other variables i.e net credit to government, the real exchange rate and output growth were, with their expected signs; reflecting the ill-effects of government crowding out and currency depreciation on domestic private investment and the positive impact of growth in output on capital formation supporting the classical Harrod-Domar growth model.

In the growth function the long-run parameters for the two domestic credit availability variables, $DCRY_t$ and DCR_t, were found to be insignificant in affecting per capita income growth, which is consistent with our finding that credit availability didn't affect the national saving ratio. Liquid liabilities of the financial sector had a positive impact on per capita income growth, showing the positive correlation between monetization and income growth.

5.2 Policy Implications and Recommendations

The immediate policy implications from the results of this study are the following:

1) The government needs to take special attention in minimizing structural rigidities, fragmentation, and the high degree of monopoly in the financial market so that financial asset prices could play their allocative mechanism of resources to their best alternative uses.

2) It is clear that, the development of the financial sector is directly related with the development of the real economy. Hence infrastructural development, commercialization of the agriculture sector, development of the industrial sector (especially agro-industries) and expansion of domestic and foreign direct investment are mandatory for the effectiveness of the financial sector in mobilizing saving and contribute to the growth of the economy.

3) In order to realize results of financial market liberalization, liberalization should first be effectively implemented in other sectors of the economy.

4) In Ethiopia, economic agents have limited opportunity to diversify their financial asset portfolios due to absence of secondary markets, specialized banks and capital markets. Hence the government should give due consideration in permitting entry of foreign banks which have the capacity to introduce new technology, diversification and competition in the banking sector while enhancing the autonomy and prudential regulation capacity of the National Bank of Ethiopia to avoid bank-runs and financial crises.

References

Aghveli, Bijan B., and Moshin S. Khan. (1977). “Inflationary Finance and the Dynamics of Inflation: Indonesia, 1951-72” American Economic Review.

Arestis, Philip, and Panicos O. Demetriades (1993). “Financial Liberalization and Economic Development: A Critical Exposition.” In Money and Banking: Issues for the Twentieth Century. Essays in Honor of Stephen F. Frowen. Edited by Philip Arestis. Basingstoke: Macmillan.

Barro, Robert J. (1991). “Economic Growth in A Cross-Section of Countries.” Quarterly Journal of Economics.

Bencivenga, Valerie R, and Bruce d. Smith. (1991). “Financial Intermediation and Endogenous Growth.” review of Economic Studies.

Bentham, Jeremy. (1787). Defence of Usury. London: T. Payne & Sons.

Blejer, Mario I., and Moshin S. Khan. (1984). “Government Policy and Private Investment in Developing Countries.” International Monetary Fund Staff Papers.

Blinder, Alan S., and Joseph E. Stiglitz (1983). “Money Credit Constraints, and Economic Activity.” American Economic Review.

Boskin, Michael J. (1978). “Taxation, Saving, and the Rate of Interest.” Journal of Political Economy

Buffie, Edward F. (1984). “Financial Repression, the New Structuralists, and Stabilization Policy in Semi-Industrialized economies.” Journal of Development Economics.

Celasun, Merih, and Aysit Tansel (1993). “Distributional Effects and Saving Investment Behavior in a Liberalizing Economy: The Case of Turkey.” METU Studies in Development.

Cole, David C., and Hugh T. Patrick. (1986). “Financial Development in the Pacific Basin Market Economies.” In Pacific Growth and Financial Interdependence. Edited by Augustine H. H. Tan and Basant Kapur. Sydney: Allen and Unwin.

De Gregorio, Jose, and Pablo E. Guidotti (1993). “Financial development and Economic Growth.” Washington D.C.: International Monetary Fund, July.

De Gregorio, Jose (1993). “Inflation, Taxation and Long-Run Growth.” Journal of Monetary Economics.

De Melo, Jamie and James R. Tybout (1986). “The Effects of Financial Liberalization on Savings and Investment in Uruguay.” Economic Development and Cultural Change.

Demetriades, Panicos O., and Michael P. Devereux (1992). “Investment and Financial Repression: Theory and Evidence from 63 Developing Countries.” Keele: University of Keele, Department of Economics, Working Paper 92-16, December.

Dornbusch, Rudiger, and Alejandro Reynosso (1989). “Financial Factors in Economic Development.” American Economic Review.

Dooley, Michael P. (1986). “Country-Specific Risk Premiums, Capital Flight and Net Investment Income Payments in Selected Developing Countries.” Washington, D.C. :International Monetary Fund, DM/86/17, March.

Drazen, Alan (1981b). “Inflation and Capital Accumulation under a Finite Horizon.” Journal of Monetary Economics: 247-260

Economic Commission for Africa (2003). Annual Report on African Economies, Vol. I, Addis Ababa, Ethiopia.

Edwards, Sebastain (1986). "The Pricing of Bonds and Bank Loans in International Markets: An empirical Analysis of Developing Countries' Foreign Borrowing." European Economic Review.

Enders, Walter (1995). "Applied Econometric Time Series." Wiley Series in Probability and Mathematical Statistics, Iowa State University

Engle, R.F. and C.W.J. Granger (1987). "Cointegration and Error-Correction: Representations, Estimation and Testing." Eonometrica, 55, 252-276

Ethiopian Economic Association (1999/00). "Annual Report on the Ethiopian Economy" Vol. I

_____ (2003/04). "Annual Report on the Ethiopian Economy: Industrialization in Ethiopia " Vol. I

Fischer, Stanley. (1979b). "Capital Accumulation on the Transition Path in a Monetary Optimizing Model." Econometrica.

Fry, Maxwell J. (1978a). "Alternative Stabilization Strategies from a Model of Short Run price and Output Fluctuations in Turkey." METU Studies in Development, no. 19

_____. (1979a.) "The Cost of Financial Repression in Turkey." Savings and Development, vol. 3 no. 2

_____. (1980a). "Saving, Investment, Growth and the Cost of Financial Repression." World Development, Vol. 8, No. 4

_____. (1988). "Money Supply Responses to Exogenous Shocks in Turkey." In liberalization and the Turkish Economy. Westport, Conn: Green Woods Press.

_____. (1991a). "Domestic Resource Mobilization in Developing Asia: Four Policy Issues." Asian Development Review. 15-39

_____. (1995). "Money, Interest, and Banking in Economic Development" 2nd ed, The Johns Hopkins University Press.

Fry, Maxwell J., and Andrew Mason (1982). "The Variable Rate-of-Growth Effect in the Life-Cycle Saving Model: Children, Capital Inflows, Interest and Growth in a New Specification of the Life-Cycle Model Applied to Seven Asian Developing Countries." Economic Enquiry.

G.S. Madalla and In-Moo Kim (1998). "Unit Roots, Cointegration, and Structural Change" Cambridge University Press.

Galbis, Vincente (1979). "Inflation and Interest Rate Policies in Latin America, 1967-79." International Monetary Fund Staff Papers: 334-366

_____ (1977). "Financial Intermediation and Economic Growth in Less-Developed Countries: A Theoretical Approach." Journal of Development Studies.

Gebrehiwot Ageba (1997). "An Analysis of Financial Sector and Credit Policies during the Derg Period and Post-Derg Reforms", Ethiopian Journal of Economics, Vol. VI, no. 1

Gelb, Alan H. (1989). "Financial Policies, Growth, and Efficiency." Washington D.C.: World Bank, Country Economics Department, PPR Working Paper WPS 202, June.

Ghani, Ejaz. (1992). "How Financial Markets Affect Lon-Run Growth: A Cross-Country Study." Washington D.C.: World Bank, Country Operations, PR Working Paper WPS 843, January.

Granger, Clive and P. New Bold. (1974). "Spurious Regressions in Econometrics." Journal of Econometrics.

Greene, Joshua, and Delano Villanueva (1991) “Private Investment in Developing Countries: An Empirical Analysis.” International Monetary Fund Staff Papers.

Hamilton, James D., and Marjorie A. Flavin (1986). “On the Limitations of Government Borrowing: A Framework for Empirical Testing.” American Economic Review.

Hermes, Neils, and Robert Lensink (1993). “The Financial Sector and Its Influence on Economic Growth; Evidence from 14 Latin American Countries, 1963-1989.” Groningen: University of Groningen, Institute of Economic Research, Research Memorandum 531, June.

Hoff, Karla, and Joseph E. Stiglitz (1990). “Introduction: Imperfect Information and Rural Credit Markets-Puzzles and Policy Perspectives.” World Economic Review. International Monetary Fund, Washington D.C

Johansen, S. (1991). “Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models” Econometrica.

_____. (1992b). “Determination of Cointegration Rank in the Presence of a Linear Trend” Oxford Bulletin of Economics and Statistics

_____. (1988). “Statistical Analysis of Cointegration Vectors.” Journal of Economic Dynamics and Control.

Kapur, Basant K (1974). “Monetary Growth Models of Less Developed Economies”, Stanford: Stanford University, PH. D. thesis.

_____ (1986). Studies in Inflationary Dynamics: Financial Repression and Financial Liberalization in Less Developed Countries. Singapore: Singapore University Press

Kapur, Basant K. (1976b). “Two Approaches to Ending inflation” in Ronald I. Mckinnon (ed), Money and Finance in Economic Growth and Development: essays in honor of Edward S. Shaw. New York: Marcel Dekker.

Keller, Peter M. (1980). “Implications of Credit Policies for Output and Balance of Payments.” International Monetary Fund Staff Papers.

Keynes, J. Maynard. (1936). “The General Theory of Employment Interest and Money. London: Macmillan.

Khan, Moshin S., and Carmen M. Reinhart (1990). Private Investment and Economic Growth in Developing Countries.” World Development.

Khan, Moshin S., and Delano Villanueva (1991). “Macroeconomic Policies and Long-Term Growth: A Conceptual and Empirical Review.” Washington D.C.: International Monetary Fund, WP/92/28.

King, Robert G., and Ross Levine (1993b). “Finance, Entrepreneurship, and Growth: Theory and evidence” Journal of Monetary Economics.

_____ (1993c). “Financial Intermediation and Economic Growth.” In capital Markets and Financial Intermediation. Edited by Colin Mayer and Xavier Vives. Cambridge University Press for the Centre for Economic Policy Research.

King, Robert G., and Ross Levine (1993a). “Finance and Growth: Schumpeter Might be Right.” Quarterly Journal of Economics

Kohsaka, Akira (1984). “The High Interest Rate Policy under Financial Repression” Developing Economies: 419-452

Leulseged Lemma (2004). “The Impact of Financial Sector Liberalization on The Environment: The Case of Plastic Waste Disposal.” MSc Thesis, Addis Ababa University.

Locke, John (1965). Further Considerations Concerning Raising the Value of Money, 2nd ed. London: A. & J. Churchill.

Long, Millard (1983). "Review of Financial Sector Work." Washington, D.C.: World Bank, Industry Department Financial Development Unit, October.

Mason, Andrew (1981). "An Extension of the Life-Cycle Model and Its Application to Population Growth and Aggregate Saving." Honolulu: East-West Center, January.

_____ (1987). "National Saving Rates and Population Growth: A New Model and New Evidence." In Population Growth and Economic Development: Issues and Evidence. Edited by D. Gale Johnson and Ronald D. Lee. Madison: University of Wisconsin Pres for National Academy of Sciences.

Mathieson, Donald J. (1980a). "Financial Reform and Stabilization Policy in a Developing Economy." Journal of Development Economics, Vol. 7 No. 3

_____. (1980b.). " Interest Rates and monetary Aggregates During financial Reform."

Mathieson, Donald J. (1983a). "Estimating Models of financial Market Behavior during Periods of extensive Structural Reform: the experience of Chile." International Monetary fund Staff Papers.

_____. (1981). "Inflation, interest rates and the Balance of Payments during a Financial Reform: the Case of Argentina." Washington D.C: International Monetary Fund, DM/81/47

Mckinnon, Ronald I. (1973). "Money and Capital in Economic Development." Washington, D.C Brookings Institution.

_____. (1991). "The Order of Economic Liberalization: Financial Control in the Transition To a Market Economy." The Johns Hopkins University Press.

Modigliani, Franco (1986). "Life Cycle, Individual Thrift, and the wealth of Nations." American Economic Review.

Molho, Lazaros E. (1986a). "Interest Rates, Saving, and Investment in Developing Countries: A Re-examination of the Mckinnon-Shaw Hypothesis." International Monetary Fund Staff Papers.

National Bank of Ethiopia (2001/02). Annual Report. Addis Ababa

Negarit Gazeta (1975d). Addis Bank Establishment Proclamation No. 69/1975. Addis Ababa.

_____ (1992a). A proclamation to Provide for the Encouragement, Expansion and Co-ordination of Investment No. 15/1992 (May 25). Addis Ababa.

_____ (1976b). Monetary and Banking Proclamation No. 99/1976 (21 September), Addis Ababa

Olson, Mancur, and Martin J. Bailey (1981). "Positive Time Preference." Journal of Political Economy: 1-25

Rama, Martin (1990). "Empirical Investment Equations in Developing Countries." Washington, D. C.: World Bank, PRE Working Paper WPS 563, December.

Rittenberg, Libby (1988). "Financial Liberalization and Savings in Turkey ." In Liberalization and the Turkish Economy. Edited by Tevfik F. Nas and Mehmet Odekon. Westport, Conn.: Green Wood Press.

Roubini, Nouriel, and Xavier Sala-i-Martin (1991). "Financial Development, the Trade Regime, and Economic Growth." Cambridge Mass.: National Bureau of Economic Research, NBER Working Paper No. 3876, October.

Schumpeter, Joseph A. (1912). “The Theory of Economic Development; An Enquiry into Profits, Capital, Credit, Interest, and the Business Cycle.” Translated by Redvers Opie. Cambridge, Mass.: Harvard University Press.

Shaw, Edward S. (1973). “Financial Deepening in Economic Development.” New York: Oxford University Press.

Sidrauski, Miguel (1966). “Inflation and Economic Growth.” Journal of Political Economy.

Smith, Adam (1776). An enquiry into the Nature and Causes of the Wealth of Nations. London: W. Strahan & T. Cadell .

Stiglitz, Joseph E. (1994). “The Role of the State in Financial Markets.” In Proceedings of the World Bank Annual Bank Conference on Development Economics 1993. Edited by Michael Bruno and Boris Pleskovich. Washington, D.C.: World Bank, 19-52.

Stock, J. H. and M. W. Watson (1988). “Testing for Common Trends” Journal of the American Statistical Association.

Taylor, Lance (1983). Structuralist Macroeconomics: Applicable Models for the Third World. New York: Basic Books.

Tobin, James (1965). “Money and Economic Growth.” Econometrica.

Van Wijnbergen, Sweder (1983a). “Interest Rate Management in LDCs.” Journal of Monetary Economics.

Van Wijnbergen, Sweder (1983b). “Credit Policy, Inflation and Growth in a Financially Repressed Economy.” Journal of Development Economics.

_____ (1982). “Stagflationary Effects of Monetary Stabilization Policies: A Quantitative Analysis of South Korea.” Journal of Development Economics.

INFLUENCE OF CREDIT CONSTRAINT ON PRODUCTION EFFICIENCY: THE CASE OF FARM HOUSEHOLDS IN SOUTHEASTERN ETHIOPIA

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Abstract

Credit constraint is one of the problems faced by farmers in general but more seriously by those in developing countries. The problem not only affects the purchasing power of farmers to procure farm inputs and cover operating costs in the short run, but also their capacity to make farm-related investments as well as risk behaviour in technology choice and adoption. These, in turn, have influence on technical efficiency of the farmers. Although credit constraint problem has been recognized in economics literature, especially in those dealing with developing countries, little emphasis has been given to its effect on productive efficiency of farmers. In light of this, explicitly considering credit constraint, this paper estimated technical efficiency of credit-constrained (CCFH) and unconstrained farm households (CUFH) by employing a stochastic frontier technique on farm household survey data from Southeastern Ethiopia. The CCFH had mean technical efficiency score of 12% less than that of the CUFH. Given the largest proportion of CCFH in Ethiopian farming population, this gap implies considerable potential loss in output due to inefficient production. Improving technical efficiency of all farm households in general but more of particularly the CCFH is desirable. Additional sources of inefficiency differential between the two groups were also identified, and education level of household heads, land fragmentation and loan size significantly affected technical efficiencies of both groups. Besides, wealth and experience affected the CCFH, and household size affected the CUFH. In general, the results have important implications for credit, education and land policies in developing countries in light of their effect on efficiency differential between CCFH and CUFH.

Keywords: Credit market, stochastic frontier, technical efficiency, smallholders.

JEL classification: C21, C24, Q12, Q14

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1. Introduction

Credit is one of the components of financial services considered fundamental in all production circuits and networks – material and service products (Dicken, 2007: 379). However, theories of production and finance developed along separate paths as if production and financial decisions could be precisely separated (Blancard et al., 2006), with little focus on their interactions. Recently, there has been a growing interest in understanding the impact of financial structure on production (e.g., Barry & Robinson, 2001). In some technical efficiency studies, production inputs and corresponding prices are assumed to be constant, which means that technical efficiency is independent of input use (Alvarez & Arias, 2004; Färe et al., 1990; Lee & Chambers, 1986; Farrell, 1957). Among others, this unrealistic assumption precludes the effect of technical efficiency on input demands (Alvarez & Arias, 2004) because it assumes away relative differences among producers in terms of resource endowments and possible constraints in acquiring additional inputs, which indirectly affect the capacity of producers to attain desired level of technical efficiency. In addition, short-term efficiency indices are estimated within a framework of a given production technology. This also ignores the fact that the capacity of farmers to choose appropriate and more efficient technologies can be constrained by bounds of their resources (e.g. Alene and Hassan, 2006), one of such bounds being credit constraints.

However, it is a common knowledge that asymmetric information and incentive compatibility problems lead to capital market imperfections, which in turn bring about credit constraints faced by borrowers (Blancard et al., 2006; Stiglitz & Weiss, 1981). Given underdeveloped infrastructure, inadequate institutional environment, and less competitive market situation in developing countries, credit market imperfections are common phenomena. Of course, credit constraint is not only a problem of developing countries. As evidence from various studies (e.g., Blancard et al., 2006; Gloy et al., 2005; Jappelli, 1990; Taur & Kaiser, 1988; Lee & Chambers, 1986) shows, farmers in developed countries, especially small farmers, also face credit constraints, since developed countries' credit markets are not yet as perfect as often assumed in standard economic theories. For example, Blancard et al. (2006) observed that 67% of the farmers in their sample of 178 French farmers were financially constrained in the short run. In light of this, the presence of credit constraints is less debatable than its extent in the literature (see e.g., Pal, 2002; Swain, 2002; Kochar, 1997). This is mainly because access to credit market may not be translated automatically into one's participation in the credit market, given considerable information asymmetry and incentive compatibility problems (Diagne & Zeller, 2001; Barry and Robinson, 2001), and taking loans may not also lead to automatic solution to credit constraints

(Guirkinger & Boucher, 2005; Freeman et al., 1998). For example, Barry & Robinson (2001) argue that access to external financing resources being limited, farmers' operations and investments heavily depend on internal financing.

Farmers in developing countries are internally also constrained due to meager resources they command. Credit being fundamental to the operation of all production circuits and networks (Dicken, 2007: 379), credit constraint, on the contrary, can have direct and indirect effects on, for example, farm production. Directly, it can affect the purchasing power of producers to procure farm inputs and finance operating expenses in the short run and to make farm-related investments in the long run; and indirectly, it can affect risk behaviour of producers (Guirkinger & Boucher, 2005; Eswaran & Kotwal, 1990), thereby affecting technology choice and adoption by farmers. In this connection, for example, Binswanger & Deininger (1997) argue that an unequal distribution of initial endowments in environments where financial markets are imperfect and credit is rationed can prevent a large proportion of the population from making productive investments. Thus, a credit-constrained farmer is more likely to invest in less risky and less productive rather than in more risky and more productive technologies (Dercon, 1996). This risk behaviour affects technical efficiency of the farmers, thereby limiting the effort of the farmer in attaining maximum possible output. The notion that a credit constraint influences agricultural production has long been observed in the literature (see e.g., Blancard et al., 2006; Petrick, 2005; Barry & Robinson, 2001; Färe et al., 1990; Lee & Chambers, 1986); however, empirical studies of its influence on efficiency are generally limited, scarce in most developing countries and particularly lacking in Ethiopia. In particular, most previous efficiency studies in Ethiopia (Haji, 2007; Haji & Andersson, 2006; Alene & Hassan, 2006; Gavian & Ehui, 1999; Admassie, 1999; Hailu et al., 1998) use pooled full sample data, which aggregates all farmers as homogenous in terms of credit constraint status. They instead used a dummy variable for access to credit, measuring whether or not farmers took credit in producing outputs. This implicitly assumes that farmers who obtained loans would have their effective credit demand satisfied and would become credit-unconstrained. Obviously, this will not disentangle the difference between borrowing status and credit constraint condition (Diagne & Zeller, 2001; Freeman et al., 1998). Using a dummy variable in this way can only allow capturing whether or not the farmer had access to a credit facility or had obtained the credit. It does not show whether or not access to credit satisfies effective credit demand and alleviates credit constraints of the farmers. For example, Freeman et al. (1998) noted absence of relationship between farmers' borrowing and credit constraint status in Ethiopia, and suggested that significant proportion of those who borrowed still faced credit constraint in their economic activities. This also suggests that one needs to look into credit transactions and learn more from the borrowers in

order to assess their credit constraint status (Boucher et al., 2005; Iqbal, 1986), and this paper used this approach.

In light of the preceding arguments, this study estimated technical efficiency of credit constrained (CCFH) and unconstrained farm households (CUFH) by disaggregating the full sample on the basis of credit-constraint status of the farm households, and identified factors additionally affecting their technical efficiencies. Results indicate that the CCFH had mean technical efficiency score of 12% less than that of the CUFH. Given the largest proportion of CCFH in Ethiopian farming population, the gap is a considerable potential loss in output due to technical inefficiency, which the country cannot afford to ignore because of the food deficit problem it has currently faced.

The result suggests that improving technical efficiency of all farm households in general and more of the CCFH in particular is desirable. Beyond the country in focus, i.e., Ethiopia, the results have important implications for credit, education, and land policies in developing countries, where credit constraints are also widely observed. With this, the paper enriches the existing empirical literature by explicitly investigating the existence of technical efficiency differential among CCFH and CUFH, which most previous efficiency studies have not explicitly addressed having used pooled full sample data in estimations. The rest of the paper is constructed as follows. Related theoretical and empirical literature is briefly reviewed in the next section. In section 3, the theoretical framework of technical efficiency is presented, followed by the empirical model in section 4. Describing the data in section 5, results and discussion are presented in section 6. Finally, conclusions and policy implications are suggested.

2. Credit constraint, access to credit and efficiency effect: a review of related literature

Credit market literature distinguishes between access to credit and participation in credit markets (e.g., Diagne & Zeller, 2001). A farm household has access to credit from a particular source if it is able to borrow from that source, whereas it participates in the credit market if it actually borrows from that source of credit. This implies that access to credit can be a constraint externally imposed on the farm households, while participation in a credit market is a choice made by a farm household. Thus, a household can have access but may choose not to participate in the credit market for such reasons as expected rate of return of the loan and/or risk consideration. In this connection, Eswaran & Kotwal (1990) argue that a non-participating household that has access to credit will still benefit if the knowledge of access increases its ability to bear risk, as it can be encouraged to experiment with riskier, but potentially high-yielding technology. The ability to borrow will also alleviate the need for accumulation

of assets that mainly serve as precautionary savings, yielding poor or negative returns (Deaton, 1991).

Duca & Rosenthal (1993) argue that a farm household is credit constrained only when it would like to borrow more than lenders allow or if its preferred demand for credit exceeds the amount lenders are willing to supply. Stiglitz & Weiss (1992), on the other hand, describe credit constraints in two terms -- redlining and credit rationing. Redlining refers to excluding certain observationally distinct groups from credit markets, rather than offering them a contract that require higher interest payments and collateral guarantee. Credit rationing refers to a situation in which, among observationally identical borrowers, some get loans and others are denied.

Zeller et al. (1997) distinguish four groups of farm households in relation to credit constraints. The first, referred to as voluntary non-borrowers, are those who decline to borrow at will either because they have strong risk aversion and fear of getting into debt or because they are prudent and only would like to consume up to what they earn. Others who want to borrow less than their combined available credit lines from all lenders are known as non-rationed borrowers. Rationed borrowers are those who want to borrow more than their available credit limit at a particular point in time. The last type of farm households, referred to as involuntary non-borrowers, are non-borrowers with no access to credit, or those who perceive that they are highly unlikely to get credit, so that the perceived borrowing costs outweigh the expected benefits of the loan.

On the supply side, quantity, transaction costs and risks are identified as relevant factors in the existing credit market literature (e.g., Feder, 1985; Foltz, 2004). First, farm households are credit-constrained if they face a binding supply constraint as limited by lenders' considerations. Second, as lenders may pass on transaction costs associated with screening, monitoring, and enforcing loan contracts to borrowers, as in the case of group lending scheme (Besley & Coate, 1995), farmers with investments profitable when evaluated at the contractual interest rate may not be profitable when transaction costs are factored in and thus decide not to borrow but remain credit-constrained. Finally, even for households with access to credit, risk may reduce loan demand and hence productivity. For example, Boucher et al. (2005) analytically show that in the presence of moral hazard lenders require borrowers to bear some contractual risk, and if this risk is sufficiently large, farmers will prefer not to borrow even though the loan would raise their productivity and expected income. Lenders assess creditworthiness of their clients based on observable characteristics (Bigsten et al., 2003), and extend loans at certain interest rate. This means that borrowers are credit-constrained if, at specific interest rate, they would have liked to

borrow larger amount than the lender supplied. In this case, the borrower exhausts this supply and then looks for another lender. However, the fact that this borrower exhausts its supply from one source, at specific interest rate, makes it a risky borrower for another lender.

Credit markets in developing countries are inefficient due to market imperfections such as interest rate ceilings imposed by governments, monopoly power often exercised by informal lenders (Bell et al., 1997), large transaction costs incurred by borrowers in loan acquisition, and moral hazard problems (Carter, 1988; Carter & Weibe, 1990). Stiglitz & Weiss (1981) argue that the problem where the lender bears risk of the transaction and the borrower obtains project benefits can be seen as an information problem. The asymmetries of information in credit market imply that first-best credit allocation is not possible, and this leads to the need for partial or full collateral. Then, inadequate collateral or lack of it implies that some individuals will be denied credit, being otherwise identical to those who have the collateral and obtain the credits. In this connection, Banerjee (2001) argues that high-income individuals can borrow large amounts at low costs whereas low-income ones are able to borrow a small amount at high cost. This suggests that income or wealth level of borrowers has a direct relationship with the amount of available credit and an inverse relationship with cost of credit.

Moreover, lenders may not be allowed legally to charge above certain limits on loans, although informal lenders in practice may do so, as, for example, Emana et al. (2005) noted in Ethiopia. If there is no interest rate allowed for the lender to charge at which the expected return is positive, then there will be credit rationing. Even if allowed to do so, lenders may be affected by adverse selection and/or incentive problems so that the expected return on a loan may not monotonically increase with interest rate. That is, lenders may try to avoid selection and incentive problems by rationing credit.
In general, the theoretical literature above shows that credit market failures give rise to heterogeneous resource allocation and different outcomes among farm households with varying characteristics. That is, a farm household that faces a binding credit constraint, ceteris paribus, will misallocate its resources and under-invest compared to its unconstrained peer. Availability of finance and its accessibility crucially affect production start-up and subsequent performances of the farmers. Barriers to access adequate loans will have adverse effect on technical efficiency of the farm households. Increased output production following improved access to credit is therefore evidence of binding credit constraint.

Most empirical literature reviewed below also support that credit constraints could affect resource allocations, risk behaviour and technology choice and adoption in

production, which may lead to lower output of CCFH compared to the CUFH. For example, better access to credit resulted in higher income and consumption in Bangladesh (Diagne & Zeller, 2001) and in higher farm profitability in Cote d'Voire (Adesina & Djato, 1996), Malawi (Hazarika & Alwang, 2003) and in Tunisia (Foltz, 2004). Examining sources of efficiency differentials among basmati rice producers in the Punjab province of Pakistan, Ali & Flinn (1989) found significant effect of farmers' access to credit and later Parikh et al. (1995) also found that farmers with greater loan uptake were less cost inefficient than those with smaller loan size. Another study in Pakistan by Khandker & Faruqee (2003) reported formal credit's positive impact on household welfare outcomes. It was also found that formal credit increased rural income and productivity and that overall benefits exceeded costs of the formal credit system by about 13 percent in India (Binswanger & Khandker, 1995). Significant difference in productivities of credit-constrained and unconstrained households was observed in China (Feder et al., 1989, 1990). In Bangladesh, Pitt and Khandker (1996) examined the impact of credit from the Grameen Bank and other two targeted credit programs and found significant effects on household welfare, including education, labour supply and asset holding. Freeman et al. (1998) found that the marginal contribution of credit to milk productivity was different among credit-constrained and non-constrained farmers in east Africa.

More recently, studying the effect of credit constraints in Peruvian agriculture, Guirkinger & Boucher (2005) found that productivity of credit-constrained households depended on their endowments of productive assets and the credit they obtained from informal lenders. In Ethiopia, for example, Alene and Hassan (2006), studying the efficiency of traditional and hybrid maize production in eastern Ethiopia, found significant difference in farmers' technical efficiency due to differences in technology choice. The hybrid maize technology required adoption of a package of improved seed, chemical fertilizers, and cultural practices that farmers did not equally adopt, resulting in low technical efficiency differential. Part of the reason for the farmers' differential adoption of modern technology could be the credit constraints they face. Similarly, Holden & Bekele (2004) observed that households with access to credit compensated for increasing risk of drought by reallocating their production in such a way that crop sales were lower in good years to reduce the need to buy the crops in bad years, and they argued that the households would be less able to do so without access to credit. Other efficiency studies in Ethiopia, which was referred to earlier, also identify access to credit as an important factor affecting efficiency of farmers.

It can also be seen that credit constraint is not only a problem of developing countries, where credit market imperfection is the norm rather than exception. The problem is present also in the developed world, where credit market imperfection is

considered to be significantly lower (see e.g., Lee & Chambers, 1986; Tauer & Kaiser, 1988; Färe et al., 1990; Jappelli, 1990; Blancard et al., 2006). For example, Blancard et al. (2006), studying short- and long-run credit constraints in French agriculture, where 67% of 178 sample farms were financially constrained in the short-run and nearly all farms face investment constraints in the long run, found that financially unconstrained farms are larger in size and better in economic performance than financially constrained small farmers, resulting in a difference of about 8.34% in profit. However, the nature and extent of credit constraints in developed countries are significantly different from those in developing countries, where the imperfection is also prevalent in other factor markets.

In general, although credit is mostly identified as one of the socioeconomic factors affecting different outcomes such as farm productivity and profitability, household welfare, and so on, only few studies have directly focused on the effects of credit constraints on technical efficiencies. The recent paper by Blancard et al. (2006) is directly related to ours but since it focuses on developed economy it cannot represent developing countries' conditions. The generally limited studies explicitly addressing the effect of credit constraints on technical efficiency suggest that more studies are still desirable.

3. Theoretical framework

In economic theory it is often assumed that producers maximize revenue, minimize cost or maximize profit. However, not all producers equally succeed in this optimization process. Given the same inputs and technology, some produce more outputs, more efficiently than others. In the literature, there are different methods of estimating efficiency. At a broader level, one can find parametric, semiparametric and nonparametric methods based on whether or not one can assume a functional form for an underlying technology and a specific distribution for the error terms. In the parametric family, one can also find deterministic and stochastic efficiency measures depending on whether or not random terms are accounted for. The stochastic estimation techniques take into account the fact that deviations of observed choices from optimal ones are due to failure to optimize (i.e., inefficiency) and random errors, while in deterministic models deviations from optimal levels are attributed solely to inefficiencies, despite that random errors are present.

Moreover, productive efficiency literature (Farrell 1957; Aigner et al. 1977; Bravo-Ureta & Pinheiro 1993; Sharma et al. 1999; Wadud 2003) distinguishes between technical, allocative and economic efficiencies. In this paper we focus on technical efficiency, taking into account the credit-constraint status of the farm households

affecting input use as given. Technical efficiency is defined as the ability to avoid waste by producing as much output as input usage allows, or by using as little input as output production allows (Farrell 1957).

This study makes use of stochastic frontier analysis (SFA)[5], which requires a parametric representation of the production technology and incorporates stochastic output variability by means of a composite (two-part) error term. In particular, we estimate technical efficiencies of the sample farm households, given their difference in credit constraint status. Based on stochastic efficiency method, a general stochastic frontier model is defined as:

$$y_i = f(\mathbf{x}_i;\boldsymbol{\beta})exp(v_i - u_i); \qquad (i = 1, 2, \cdots, n) \tag{1}$$

where y_i represents the output of the i^{th} farm household, *n* being the sample size, $\mathbf{x}_i$ a vector of variable inputs, $\boldsymbol{\beta}$ is a vector of technology parameters, $f(\mathbf{x}_i;\boldsymbol{\beta})$ is the production frontier. The symmetric random error v_i accounts for random variations in output, which is assumed to be independently and identically distributed as $N(0,\sigma_v^2)$ independent of the u_i s; the u_i s are non-negative random variables, associated with technical inefficiency in production, which are assumed to be independently and identically distributed and truncations at zero of the normal distribution with mean, μ, and variance, σ_u^2, (i.e., $|N(\mu,\sigma_u^2)|$). The variance parameters of the model are parameterized as $\sigma^2 = \sigma_v^2 + \sigma_u^2$; $\lambda = \sigma_u^2 / \sigma^2$ and $0 \le \lambda \le 1$. Given the distributional assumptions of v_i and u_i, the estimate of u_i can be derived from its conditional expectation, given the composite $\varepsilon_i (= v_i - u_i)$, applying the standard integrals (Jondrow et al. 1982).

$$E(u_i \mid \varepsilon_i) = \mu_i^* + \sigma_i^* \left[\frac{\phi(-\mu_i / \sigma_i^*)}{1 - \Phi(-\mu_i / \sigma_i^*)} \right] \tag{2}$$

[5]Empirical efficiency studies usually utilize either Data Envelopment Analysis (DEA) or SFA. DEA is a nonparametric approach employing linear programming to construct a piecewise-linear, best-practice frontier for each economic unit (Färe et al. 1985). Although, it does not impose a functional form on the data, it attributes all off-frontier deviations to inefficiency by assuming away the possibility of noisy data. SFA explicitly accounts for random shocks and is thus more appropriate in an environment such as our study area, where data can be noisy.

where $\mu_i^* = \frac{\mu\sigma_v^2 - \varepsilon_i\sigma_u^2}{\sigma_v^2 + \sigma_u^2}$, $\sigma_i^{*2} \equiv \frac{\sigma_v^2\sigma_u^2}{\sigma_v^2 + \sigma_u^2}$ and $\Phi(.)$ and $\phi(.)$ represent cumulative distribution and probability density functions, respectively. Therefore (1) provides estimates for v_i and u_i after replacing ε_i, σ_ε and λ by their estimates. That is, the output-oriented technical efficiency of the i^{th} farm household (TE_i), given the levels of inputs, is defined as the ratio of observed output to maximum feasible output in a state of nature depicted by $exp(-v_i)$ (Battese et al. 1996) as follows.

$$TE_i = \frac{y_i}{f(\mathbf{x}_i;\boldsymbol{\beta})exp(v_i)} = exp\{-(u_i \mid \varepsilon_i)\} \qquad \textbf{(3)}$$

The distribution of u_i limits the estimated technical efficiency of a farm household i between 0 and 1, which is inversely related to inefficiency. The inefficiency scores (IE_i) of credit-constrained and unconstrained farm households are defined as $1 - exp\{(-u_i \mid \varepsilon_i)\}$ and are used as dependent variables in the inefficiency effects models.

4. Empirical model

4.1 Econometric model specification

To assess farm household-specific technical efficiencies using parametric approach, the log-linear Cobb-Douglas stochastic production frontier[6] is specified as

$$ln Y_i = \beta_0 + \sum_{k=1}^{6} \beta_{ik} \, ln \, x_{ik} + v_i - u_i \qquad \textbf{(4)}$$

where y_i is the aggregated value of farm outputs of the i^{th} farm household in the sample, measured in Ethiopian Birr[7] and x_{ik} are the input variables, i.e., land, human labour, fertilizer, seed, herbicides and pesticides; the βs are parameters to be estimated; and v_i and u_i are as defined earlier in equation (1). To compare technical efficiencies of credit-constrained and unconstrained farm households,

[6] The log-linear Cobb-Douglas specification was preferred to other alternatives such as the translog due to its convenience to readily interpret the estimates.
[7] The exchange rate was at 8.80 Birr =1US$ in January 2007.

equation (4) is estimated using maximum likelihood estimator (MLE) separately for the two sub-samples, identified by a variable indicating their credit constraint status.

To investigate the effect of farm households' demographic, socioeconomic and institutional factors on technical efficiency, the following inefficiency effects model is separately estimated for the two groups of farm households using least squares method.

$$IE_i = \delta \mathbf{Z}_i + \eta_i \quad \textbf{(5)}$$

where IE_i is inefficiency scores defined earlier; $\mathbf{Z}_i$ is a vector of proposed household demographic, socioeconomic and institutional variables affecting efficiency; and η_i is a random error term, assumed to be normally and independently distributed with mean zero and variance, σ_η^2.

4.2 Model variables and hypotheses

4.2.1 Dependent variable

It was hypothesized that CUFHs would be more efficient than CCFHs. To test this, data were collected from farm households classified as credit-constrained and unconstrained as self-reported by the sample farm household heads. Farm output was measured as annual farm revenues, by accounting for the value of unsold and home-consumed outputs. Assuming same average output price in a season at which the farm households could sell their outputs, the used revenues allowed aggregation of multiple outputs (Parikh et al. 1995), which otherwise was difficult to aggregate. This farm revenue per hectare was used as dependent variable in the estimation of the stochastic frontier production function, as used by other researchers (e.g., Alene & Hassan, 2006; Wadud & White, 2000; Feder et al. 1990). Assuming that production technologies are homogeneous within the sample and output prices are the same in a season, the difference in per-hectare revenue is believed to capture technical efficiency differential among credit-constrained and unconstrained farm households. In the inefficiency effects models of equation (5), the dependent variable is the inefficiency score defined earlier.

4.2.2 Independent variables and hypotheses

The independent variables for both the stochastic frontier production function and the inefficiency effects models are explained and their effects hypothesized as follows.

Production inputs

Land, labour, seed, fertilizer, herbicide and pesticide are inputs in the stochastic frontier production function specified in equation (4). The inputs are expected to have positive effect on the value of outputs in the production function. However, suboptimal use of some inputs may result in negative output effect and inefficient production. Land (*LAND)* is the total land area operated by the household, including that owned, rented in, contracted in and obtained through gift, and measured in hectare (ha). Labour (*LABOR*) is family labour force and external labour supply (hired, exchanged, or gift), measured in man-days. Fertilizer (*FERT*) is the quantity of chemical fertilizers called UREA and DAP applied to the crop, measured in kilograms (Kg). Seed (*SEED)* is the measure of improved and local seed varieties used by farm households, measured in Kg. Pesticides (PEST) and herbicides (HERB) are measures of the quantities of pesticides and herbicides, respectively, used by the sample farm households, both measured in millilitres (ml). The quantities and qualities of the inputs, and the technical skills of the farm households to properly use the inputs determine technical efficiency of the farm households.

Land is an important input to agricultural production affecting farm output (Wadud 2003), but the effect of farm size on efficiency is mixed. Some studies suggest that small farms are more efficient than large ones, but others oppose this. However, undoubtedly, one can see that use of external inputs increases with farm size, and economies of size may be attained as farm size increases. Moreover, larger farms may positively affect lenders' valuation of borrowers' creditworthiness (Khandker & Faruqee 2003), as do farm outputs and income. Here, it is expected that farm households with larger farms would allocate resources more efficiently than smaller farmers, since they would have better access to credit and can better finance farm operations and on-farm investments.

Agricultural production in developing countries is a highly labour-intensive economic activity. In addition to its direct effect, farm labour supply may also have indirect effect on efficiency since it is complementary to other farm inputs. However, all farm households are not equally endowed with family labour. A farm household with inadequate family labour may wish to satisfy its farm labour demand externally, and to pay for this, will demand credit. Therefore, if the farm household is constrained in the credit market, it may also be constrained in the labour market.

The other variable inputs are often not family supplied, except SEED where farmers may use from their own outputs; they are rather purchased from the market. Credit constraint will have direct effect on their use (Demeke et al. 1998) and their suboptimal use in turn will affect the use of land and labour inputs, and thus production efficiency. Farmers who are unconstrained in the credit market are more likely to choose optimal levels of these inputs than their credit-constrained counterpart.

Inefficiency factors

After technical efficiencies are estimated for the two groups of farm households, sources of inefficiency differentials among farm households, besides credit constraint, are estimated using inefficiency scores as a dependent variable. As referred to earlier, the efficiency studies in Ethiopia and elsewhere (e.g. Coelli & Battese, 1996) show that several household demographic, socio-economic and institutional factors affect efficiency differentials among farmers. However, the effect of these factors varies in time and space, depending on specific situations in the study countries, making it imperative to test their effects also in this study area.

Demographic factors

Traditional farming has evolved over years through farmers' own experience of continuous experimentation and learning. Farmers develop and accumulate experiences including farm financing over time, and learn about farm technologies and subsequent productivity effects, market behaviours, and general physical and economic environments to make choices. Farmers may enhance their productive efficiencies, as they get more experienced, learn how to increase income-generating capacities and become able to use cost-effective strategies to cope with adverse shocks. For example, experience in borrowing may help farmers to effectively use external sources to smooth output and income fluctuations. Controlling for this, the age of the farm household head (*AGEH)* is hypothesized to increase productive efficiency. Previous studies (Kalirajan & Shand 1985; Stefanou & Saxena 1988; Battese et al. 1996) also indicate positive effect of experience on farmer efficiency.

Education is also expected to increase labour productivity by influencing managerial skills of farm operators, as skilled farmers are more likely to allocate resources more efficiently. Hence, education level *(EDUCL)*, measured in farm household head's years of schooling is included with a positive effect. Nevertheless, results from previous empirical studies are mixed. For example, while Bravo-Ureta & Pinheiro (1993), Ali & Flinn (1989), Parikh et al. (1995) and Battese et al. (1996) show that education has a positive effect on farmer's efficiency, others such as Kalirajan & Shand (1985) and Adesina and Djato (1996) found no significant effect.

Another factor possibly affecting technical efficiency of farm households is household size *(HHSZ).* Family labour is often an important source of labour supply in farm households in developing countries. In a situation where rural labour market is underdeveloped, which is also the case in the study area, coupled with credit constraint, farm households with inadequate family labour will experience farm labour deficit, others may experience idle labour surplus. Household size is expected to have a positive effect.

Socioeconomic factors

Here, household wealth and land fragmentation are included. Household wealth (WEALTH) captures the market value of total household physical properties such as farm implements, machineries and other stocks. Household wealth is expected to ease credit constraint in two ways. On the one hand, wealthier farmers are expected to own more assets, and will thus have more potential for equity financing, which in turn will generate more income. On the other hand, if equity finance falls short of total financial requirement, since wealthier farmers own more farm assets, this will increase their probability of obtaining external finance through its positive influence on lenders' valuation of creditworthiness. Thus, wealth is expected to have a positive effect on efficiency of particularly credit-constrained group, who often have smaller wealth.

Fragmentation of landholdings (LANDFRAG) is commonly regarded as a major obstacle to growth in agricultural production in developing countries (Tan et al. 2006). The more the number of plots per total land a farm household operates and the smaller the plot size, the higher the degree of land fragmentation and the less likely is the opportunity to apply new technologies (especially indivisible ones) such as irrigation facilities. Therefore, a negative effect is expected.

Institutional factors

Institutional factors are important determinants of productive efficiency (Fulginiti et al. 2004). One such factor is access to extension service (*EXACSS*). In this service, farm households often obtain information on improved crop varieties and breeds of animals. However, individual variations among farm households in accessing, searching and utilizing extension services are expected. To the extent technology adoption depends on this service, those with access are expected to be more efficient than those without it. Based on results from previous studies (e.g. Bravo-Ureta & Pinheiro 1993; Bindlish & Evenson, 1993; Parikh et al 1995), a positive effect is hypothesized.

Efficiency may also be affected by farm households' access to credit information. A farm household cannot apply for loan without any information. Those with access to credit information (*CREDINFO*) will be in a better position to optimally decide in view of external financing and become more efficient than others, hence a positive effect is expected. A farm household may be quantity (loan size) rationed as the amount of credit obtained becomes inadequate for optimal choice of other variable factors of production, for desirable economies of scale require proportionate change in all factors of production. To see this, loan size *(CREDSZ)* is controlled for and a positive effect is hypothesized. Interest rate is a cost of capital to borrower farm households, and depending on choice of lenders they may incur higher costs inefficiently. In this connection, for example, Gloy et al. (2005), studying the costs and returns of agricultural credit delivery in U.S., concluded that many of the largest borrowers have access to credit at more favourable rates than their smaller peers. So, we expect interest rate (*INTEREST)* to have negative effect on production efficiency. In Ethiopia, in general, and in the study areas, in particular, since communication and transportation infrastructure are less developed, access to available credit may be affected by physical proximity of the borrower to the location of the lender. To control for temporal and monetary costs of transportation, which are transaction costs to an individual borrower, distance to a credit facility *(DISCREDF)* is controlled for with expected negative effect.

5. Data

Ethiopia is one of the low-income developing countries where farmers and rural entrepreneurs operate under very poor infrastructure, with considerable adverse effect on their access to formal and semiformal lenders. Moreover, according to the existing land property rights law, farmers do not own land and this does not allow them to use land as collateral to obtain formal credit. This, among others, contributed to the rural credit market failure. The property rights problem, coupled with low level of the necessary infrastructure, entailed other forms of credit supply mechanism, such as third-party guarantee scheme[8], joint liability of co-borrowers often used by microfinance institutions and inventory-based credit supply[9].

The data used in this paper were obtained in a survey of farm households conducted during September 2004 to January 2005 in Merti and Adamitullu-Jido-Kombolcha (AJK) districts of Oromia region, Ethiopia. These study areas are located at about 200 km and 160 km, respectively, to the southeast of the capital, Addis Ababa (Finfinnee).

[8] Regional states offer third-party guarantee to commercial banks against possible defaults, enforcing repayment through local administrative machinery.

[9] This is a credit delivery mechanism in which farmers, who face temporary liquidity problem at times of low output prices, can borrow against a deposit of farm outputs at a common storage facility until higher output prices are received.

The farm households were selected randomly from six Farmers Associations (FAs) in the two districts – four from Merti and two from AJK. Using FA-level list of farm households as a sampling frame, 240 sample farm households were randomly selected. Survey enumerators administered the questionnaire to heads of sample households visiting them at their farmsteads. As shown in Table 1, large fractions of the sample farm households grow several crops such as maize (61%), onion (38%), barley (36%), wheat (31%), teff[10] (30%), haricot beans (25%), sorghum (19%), and faba beans (15%) while relatively smaller proportions also grow other crops such as rapeseed, tomatoes and green beans. The farm households grow multiple crops to diversify their outputs in light of minimizing risks in yields and prices.

Table 1: Proportion of farm households growing different crops

Crop	Grower farmers (%)[a]	Crop	Grower farmers (%)[a]
Maize	61	Sorghum	19
Onion	38	Faba beans	15
Barley	36	Rapeseed	9
Wheat	31	Tomatoes	8
Teff	30	Peas	8
Haricot beans	25	Green beans	3

[a] Percentages are sample proportions of farmers growing a particular crop and do not add up to 100%, as most farmers diversify by producing multiple crops. Source: Own survey, 2004/05

In addition to the usual demographic and socioeconomic variables, farm household heads were interviewed on whether or not they had information about lenders, whether or not they applied for credit from any external source in the last 12 months prior to the survey, whether or not their applications were accepted, and if so, the amount they obtained and whether or not they were constrained after receiving it. Moreover, information on location of the lender, interest rates charged, type of credit obtained and repayments were collected.

Based on descriptive results shown in Table 2, next we will present and discuss the characteristics of credit-constrained and unconstrained sample farm households. The overwhelming majority of the sample farm households (70%) reported as credit constrained, which is not surprising, given the low level of rural credit market development in the study areas. Although there is no statistically significant difference between credit-constrained and unconstrained farm households in terms of average age, household size and level of education, the two groups have significant differences in other characteristics, as can be seen from the value of the t-statistics

[10] *teff* (*Eragrostis tef*) is an annual cereal crop of grass family often used in production of *injera*, a major staple food in Ethiopia.

testing the mean difference[11], which are reported in the last column of Table 2. The credit-constrained farm households operate more fragmented farmland, as measured in the number of plots. The proportion of credit-constrained farm households that applied for credit (65%) is significantly smaller than that of the credit-unconstrained farm households (71%). Since there is no significant difference in terms of access to credit information, this suggests that some credit-constrained farm households did not apply for credit for reasons other than lack of credit information. This can possibly be due to farm households' fear of being rejected or transaction costs considerations in application decisions. However, the absence of significant difference between the two groups' access to credit information does not imply that they both had adequate information. About 60% and 53%, respectively, of credit-unconstrained and constrained farm households had obtained loans and the difference is also statistically significant, as the mean difference test confirms (Table 2). However, the evidence of quantity rationing is not strong as the difference in credit size between the two groups of farm households is statistically different from zero at only unconventional 11% level of significance.

In terms of production inputs, there is clear statistically significant difference between the two groups of farm households. The credit-constrained farm households operated more land and used more labour but applied lower levels of seeds, fertilizers, pesticides and herbicides than their credit-unconstrained peers. In Ethiopia, land is government-distributed to the farm households based on household size, although there are possibilities of informal land markets, which can result in different holdings among households with same size. In light of this, more land operated by the credit-constrained farm households are more likely due to larger household size, which is also the source of household labour supply. The variable inputs require more capital to purchase and it was observed that the credit-constrained group applied them in lower levels than their credit-unconstrained peers.

As a result, on the output side, the credit-constrained farm households obtained less revenue per hectare of land than the credit-unconstrained farm households. This pattern is similar to the finding by Feder et al. (1989), in which credit-constrained farmers were observed to have used lower levels of inputs and obtained lower outputs than unconstrained farmers in China. Moreover, credit-constrained farm households had less wealth than their credit-unconstrained peers. This result also conforms with Banerjee's (2001) theoretical claim, where it is argued that wealthier farm households get more access to credit because they can afford fixed transaction costs, bear more risk and are less risky to lenders than less wealthy farm households.

[11] Independent t-test was used to test the null hypothesis of no difference between the means of the two groups, where the reported t-ratios were derived as $t = (\bar{x}_U - \bar{x}_C) / SE(\bar{x}_U - \bar{x}_C)$, and $\bar{x}_U$ and $\bar{x}_C$ are sample means of the variables for credit-unconstrained and constrained groups, respectively.

Table 2: Sample descriptive statistics by credit constraint status

Variable name	Variable definition and measurement unit	Unconstrained	Constrained	Full sample	Mean difference test
		Mean[§]	Mean[§]	Mean[§]	t-ratio
AGEH	Age of household head (years)	42.23 (14.95)	43.69 (13.76)	43.25 (14.12)	-.734
HHSZ	Household size (No. of members)	7.58 (3.01)	8.02 (3.97)	7.89 (3.70)	-.863
EDUCL	Household head's education (years)	4.04 (4.13)	3.13 (3.44)	3.41 (3.68)	-.717
LANDWN	Total land owned (ha)	1.62 (1.17)	1.89 (1.34)	1.81 (1.29)	-9.615***
SEED	Crop seed used (kg)	141.10 (192.78)	137.63 (138.51)	138.68 (156.60)	-9.070***
FERT	Chemical fertilizer used (kg)	165.58 (259.40)	129.42 (217.19)	140.42 (230.90)	10.077***
PEST	Pesticides used (100ml)	66.64 (69.05)	6.49 (18.03)	24.79 (49.31)	10.491***
HERB	Herbicides used (100ml)	1.69 (3.86)	0.10 (0.23)	1.18 (3.31)	-3.750***
LABOR	Total labour worked (man-days)	127.45 (75.82)	132.62 (97.81)	131.05 (91.55)	2.449***
LANDSZ	Total land operated (ha)	1.73 (1.35)	1.83 (1.18)	1.80 (1.23)	-9.266***
OUTPVAL	Value of total farm output (100 Birr)	66.27 (82.03)	60.83 (83.62)	62.49 (83.01)	7.319***
WEALTH	Household wealth (1000 Birr)	26.23 (17.23)	9.56 (6.93)	14.63 (13.48)	6.705***
LANDFRAG	Land fragmentation (No. of plots)	2.65 (1.58)	3.13 (1.70)	2.98 (1.67)	-2.003**
CREDSZ	Size of credit obtained (Birr)	323.71 (596.22)	299.71 (573.88)	307.01 (579.62)	-1.529
CREDINFO	% of households with credit information	90	84	86	1.344
CREDAPPL	% of households applied for credit	71	65	67	-2.916***
CREDAPPR	% of households who obtained credit	60	53	55	-4.527***
EXACSS	% of households with extension visit	29	44	40	-8.432***

[§]Standard deviation of the means in brackets; sample means for dummy variables indicate fractions taking value 1 in the sub-sample. *** and ** indicate 1% and 5% significance levels, respectively, for test of mean difference between the two groups. Credit-constrained and unconstrained groups have sample sizes of 167 and 73, respectively.

Source: Own survey, 2004/05

Nevertheless, these summary statistics are unconditional means and little can be learned to compare the relative efficiency of credit-constrained and unconstrained farm households. To obtain a better insight, the average figures need to be evaluated conditional on relevant demographic, socioeconomic and institutional characteristics of the farm households, which is the focus of the econometric estimation in the next section.

6. Results and discussion

6.1 Estimated technical efficiencies

Maximum likelihood estimates of the parameters of the stochastic frontier production function specified in equation (4) are obtained using LIMDEP version 7.0 software (Greene 1995). The estimated values for the variance parameters, λ, in the stochastic frontier production model are significant, which indicate that technical inefficiency affects outputs of the two groups of farm households. The estimates for CCFHs and CUFHs are presented in Table 3. In the case of credit-unconstrained farm households, all input variables but the herbicide and land variables turned out to be statistically significant and all but the land and seed variables showed the expected positive signs. The labour variable has the highest input elasticity of production and herbicide has the lowest, although the effect of herbicide is not statistically significant. This implies that more farm revenue can be obtained by using more labour on the farm, as the production system in the study area is labour intensive.

The dependent variable is the natural logarithm (ln) of the value of total farm output per hectare (in Birr). Sample size for credit-constrained and unconstrained groups is 167 and 73, respectively.

For credit-constrained farm households, all variables except herbicides are statistically significant and all but land and seed variables have the expected positive signs. The relatively more capital-intensive inputs such as fertilizer, pesticide and herbicide have higher output elasticities for this group of farm households. It is intuitive to see a credit-constrained group to use lower levels of capital-intensive inputs due to binding financial constraint. The relatively higher marginal effects of the limited capital inputs suggest that the credit-unconstrained farm households could choose variable inputs more proportionally than their credit-constrained peers, yielding higher mean productive efficiency.

Table 3: MLE estimates of stochastic production frontier

Variable	Credit-constrained	Credit-unconstrained
	Coefficient (t-ratio)[a]	Coefficient (t-ratio)[a]
Intercept	6.95 (12.51)***	5.61 (11.78)***
LnLAND	-0.34 (-1.66)*	-0.11 (-0.86)
LnFERT	0.13 (2.02)**	0.13 (4.47)***
LnSEED	-0.27 (-1.87)*	-0.19 (-2.77)**
LnHERB	0.04 (0.72)	0.02 (0.70)
LnPEST	0.07 (1.70)*	0.05 (2.24)**
LnLABOR	0.58 (4.15)***	0.69 (9.13)***
λ	0.76 (12.82)***	0.67 (11.16)***
σ	1.48 (11.43)***	0.90 (10.98)***
Log Likelihood	-351.15	-259.16

[a] Values in brackets are t-ratios and ***, ** and * indicate 1% , 5% and 10% significance levels, respectively.

Policymakers are often interested in ranking firms in terms of their efficiencies to devise appropriate policies (Dorfman & Koop 2005). In view of this, frequency distributions of the farm household-specific productive efficiencies for both credit-constrained and unconstrained farm households are reported in Table 4 and Figure 1. It can be observed that productive efficiency varies widely among sample farm households in both groups. The mean technical efficiency score of credit-unconstrained farm households (67%) is higher than that of credit-constrained ones (55%), suggesting a significant deterrent effect of access to credit on the efficiency of the farm households. The two groups, which mainly differ in their credit constraint status, have a difference in average technical efficiency of about 12%, and given the largest proportion of credit constrained group, narrowing this gap by improving the credit access will have considerable effect on output growth, a result which is also related to other empirical studies (e.g., Blancard et al. 2006). The average inefficiency scores for credit-unconstrained and credit-constrained farm households, respectively, are 33% and 45%, indicating the presence of significant difference in the average inefficiency between the two groups of farm households. While the credit-

unconstrained farm households, on average, have a loss of 33% of potential maximum farm revenue due to their technical inefficiency, the credit-constrained ones have a corresponding value of about 45%.

Table 4: Frequency distribution of efficiency estimates

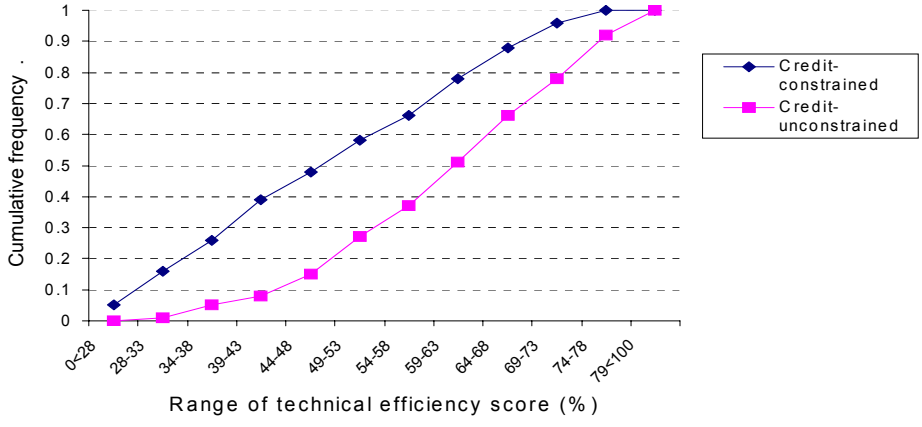
Efficiency Score (%)[§]	Credit-constrained		Credit-unconstrained	
	No. of farm households	Percent	No. of farm households	Percent
0<28	8	5	0	0
28-33	18	11	1	1
34-38	17	10	3	4
39-43	21	13	2	3
44-48	15	9	5	7
49-53	16	10	9	12
54-58	13	8	7	10
59-63	20	12	10	14
64-68	16	10	11	15
69-73	14	8	9	12
74-78	8	5	10	14
79<100	0	0	6	8
Mean	55		67	
Min	20		28	
Max	75		85	
SD	13		11	

[§]The mean, minimum, maximum and standard deviation of the efficiency scores are in percentages. Sample size for credit constrained and unconstrained are 167 and 73 respectively.

The estimated technical efficiencies for the two groups of farm households also revealed different spreads. While the minimum and maximum technical efficiency scores, respectively, are 28% and 85% for the credit-unconstrained farm households, the corresponding scores for credit-constrained farm households are 20% and 75%, respectively. Comparing the minimum and maximum efficiency scores, the two groups have a difference of about 10% in both measures. About 65% of the credit-constrained farm households have 58% and less productive efficiencies while only about 30% of the credit-unconstrained farm households have equivalent efficiencies,

indicating bigger loss in potential farm revenue due to inefficiency of the credit-constrained than the unconstrained farm households (Figure 1). Moreover, the distribution of the efficiency scores for credit-unconstrained farm households is concentrated near the highest scores while towards lower scores for the credit-constrained ones. Knowing efficiency scores is not an end by itself, and, therefore, next we will see additional factors contributing to the differences.

Figure 1: Cumulative frequency of farm households in technical efficiency score range



6.2 Factors affecting inefficiency

The parameter estimates of the relationship between technical inefficiency and farm households' demographic, socioeconomic and institutional factors are reported in Table 5. In this table, the equations have high R-squared values, showing higher explanatory power of the covariates and thereby strong goodness-of-fit of the model to the data. The F-test for joint hypothesis that all non-intercept coefficients in the model is zero was also rejected, indicating that the observed inefficiency differential among credit-constrained and unconstrained farm households is not due to chance but explained by the included covariates. The fourth column of Table 5 shows estimates for the full sample, where a dummy variable indicating whether or not a farm household has obtained a credit is included for comparison. However, the effect of this dummy turned out to be statistically insignificant, although the positive sign of the coefficient may be taken as indication of the presence of more efficiency for those who borrowed than those who did not. But, as argued before, since this variable does not show the credit-constraint of a borrower, we cannot rely on these estimates.

Now focusing on the second and third columns of Table 5, we will look at the specific variables of the models. In passing, it should be noted that technical inefficiency scores were used in the regression, and therefore when we interpret the coefficients a negative effect of the estimate on technical inefficiency simply means a positive effect on efficiency. Contrary to the hypothesis, the age of the farm household head showed a positive effect on technical inefficiency of the credit-constrained farm households. For credit-unconstrained farm households, age had not significant effect. A positive age effect for the credit-constrained group of farmers suggests that older farmers were less efficient than younger ones. A possible explanation could be that the older farmers, although more experienced, might be more conservative and less receptive to modern technologies and farm practices enhancing technical efficiency than their younger peers. In Eastern Harangue zone of Ethiopia, Seyoum et al. (1998) also observed a similar result in a study that compared technical efficiencies of farmers within and outside SG-2000 project, a pilot extension project later widely adapted in most agricultural regions of the country.

Household size had significant negative effect on the inefficiency of credit-unconstrained farm households, whereas it had insignificant effect on that of credit-constrained farm households. It means that inefficiency decreases with household size of the credit-unconstrained group. This is possibly because the credit-unconstrained group could choose optimal levels of labour, since they were not financially constrained to do so. For the credit-constrained ones, labour supply did not matter for their optimal choice because they could not proportionally choose optimal levels of other inputs due to their financial constraints. As expected, education level of the heads of farm households showed significant positive effect on technical efficiency of both groups of farm households but with higher effect for the credit-constrained group. It indicates that technical efficiency increases with formal schooling of the farm household heads.

Table 5: Parameter estimates of inefficiency effects model

Variable	Credit-constrained	Credit-unconstrained	Full sample
	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)
Constant	0.53 (1.82)**	0.73 (1.88)**	0.59 (3.55)***
AGEH	0.09 (2.25)**	0.05 (0.63)	0.06 (3.06)**
HHSZ	-0.05 (-0.61)	-0.07 (-2.33)**	-0.04 (-2.12)**
EDUC	-0.06 (-2.04)**	-0.03 (-2.04)**	-0.05 (-2.56)**
LANDFRAG	0.09 (3.11)***	0.07 (3.50)***	0.08 (3.17)***
EXACSS	-0.08 (-0.73)	-0.12 (-0.55)	-0.12 (-0.68)
CREDSZ	-0.10 (-2.11)**	-0.05 (-2.11)**	-0.07 (-2.32)**
WEALTH	-0.03 (-3.00)***	0.02 (0.44)	-0.03 (-2.71)**
CREDINFO	-0.07 (-0.44)	-0.04 (-0.27)	-0.05 (-0.93)
INTEREST	0.06 (1.20)	0.03 (0.90)	0.07 (0.67)
DISCREDF	0.07 (0.70)	0.05 (0.53)	0.05 (1.30)
CREDAPPR[§]			-0.24 (-1.56)
Number of observation	167	73	240
R^2	0.89	0.86	0.83

*** and ** indicate 1% and 5% significance levels, respectively. The dependent variable is inefficiency score (IE_i) as defined in the methodology part.
[§]This is a dummy variable taking value of 1 if the household obtained credit and 0 otherwise, included in the model using the full sample.

Moreover, education, as a human capital factor, is also expected to have multiple effects on the performance of the farm households, including acquisition, processing and utilization of information and farm managerial skills. It will improve the quality of decision-making capacities and hence their productive efficiency. This suggests that

public policy facilitating investment in farmers' education can also decrease farmers' technical inefficiency. Ethiopia is currently working towards establishing farmers' technical training centers at the lowest rural administrative units, the Farmers' Associations, and out result is in line with this current endeavour.

Land fragmentation exhibited statistically significant positive effect on technical inefficiency of both groups of farm households, as expected. It means that efficiency decreases with number of farm plots. That is, fragmentation of a given fixed size of total farmland has inverse relationship with efficiency. Two possible explanations can be offered. First, land fragmentation can deter optimal use of indivisible technologies, such as irrigation equipment. Second, considerable amount of time and effort can be lost in coordinating farm operations at different plots, especially with increased distance between the plots. This result suggests that for improved technical efficiency of the farmers, plots of farmland allocated to a household need to be aligned to each other. For Ethiopia, where the farm households are being certified to use farmlands, plots of land allocated to a farm household need to be aligned to each other as close as possible. In a country where land markets function well, farmers may be advised to consider such effects on their efficiency in deciding locations of their land purchases.

The amount of loan obtained significantly and negatively influenced technical inefficiency of both groups of farm households, which means that efficiency increases with loan size. This effect is more pronounced in the case of CCFH. The negative effect of the loan size can be seen in two ways. First, as the loan size increases, the unit cost of borrowing, including transaction costs, decreases because some of these costs are fixed regardless of the amount of loans and with increased loan size, the total cost thinly spreads over large loan size and reduces average unit costs. Second, as the amount of loan increases, farm households could be less constrained to acquire improved technologies and choose optimal levels of inputs, making them less inefficient than others. The result suggests that for the loan to bring about significant impact on the technical efficiency of a farm household, credit suppliers need to increase the amount of loan per farm household to the extent it can meet its effective credit demand. A larger loan size will also have a cost reduction implication for lenders in that with increased loan size per borrower farm household, unit cost of credit delivery will fall, which can also make the lender more profitable. Ultimately, this can also create an incentive for the lender to reduce the lending interest rate in view of increased loan volume.

The wealth variable had a negative and significant effect on the technical inefficiency of CCFH but no significant effect on that of the CUFH. This means that for CCFH, technical efficiency increases with their wealth. Intuitively, as wealth increases, credit

constraint tends to ease both from the demand and supply sides. That is, farmers' capacity to self-finance internally may increase as they get wealthier, and demand for credit may decrease, and if, however, there is demand for credit as the wealthier expands their farm operations requiring additional external finance, wealthier farmers will be less rationed out in the credit market due to their relatively higher creditworthiness than their less wealthy peers. The insignificant effect of wealth on that of CUFH implies that their inefficiency was independent of their wealth, because they could still attain desired efficiency levels since they can optimally choose input levels, for they were not credit constrained. The significant effect of wealth on the productive efficiency of CCFH implies that because this group has financial constraints, their efficiency depends on their wealth levels. It means that within the CCFH, relatively wealthier farm households are more efficient than less wealthy ones.

The effects of the variables extension visit, credit information, interest rate and distance to a lender turned out to be statistically insignificant, which suggests that these variables did not matter for both groups' technical inefficiency. However, we can also suggest some possible reasons for their insignificance. Extension visit and credit information might be insignificant perhaps because farmers had only a few visits to extension offices and had only limited credit information that perhaps did not add much to his/her existing information base. It may also be the case that farmers' technical efficiency may not improve by mere increase in farmers' extension visit and credit information. In this connection, for example Alene & Hassan (2006) argue that poor communication skills of extension agents and low extension-agent-to-farmer ratio would pose a limit to the number of beneficiary farmers in extension service. Similarly, lack of organized credit market information and farmers' lack of it can also contribute to the insignificant effect of the variable. This in turn implies that better qualities, rather than mere presence, of these services can have more relevance. As regards the variable *distance to lenders*, perhaps it was insignificant because there was no considerable variation among farmers to equally inaccessible lenders. If not, it suggests that distance may not matter if other components of the transaction costs (such as paper works, speed of loan processing and disbursement) can be significantly reduced. Similarly, costs or some barriers other than the interest rates might be more important to improve the credit constraint situation and its subsequent efficiency effects.

7. Conclusions and policy implications

In this paper we estimated technical efficiencies of credit-constrained (CCFH) and unconstrained farm households (CUFH) using parametric stochastic frontier technique. We found that the mean technical efficiency scores for CCFH and CUFH

were estimated at 55% and 67%, respectively, which means that the two groups of farm households, on average, had technical efficiency difference of 12 percent. Although the credit constraint was the main focus of this study, additional factors were also controlled for. It was found that the technical efficiencies of both groups of farm households were significantly affected by farmers' education, land fragmentation and loan size. Besides, the efficiency of the CCFH was influenced by their farm experience and wealth, and that of the CUFH was affected by household size, as related to family labour supply. The results suggest that credit availability and loan size, farmers' education and landholding structure need to be improved for all farmers. Moreover, especially for CCFH, farm experience (as related to farm management skills) and household wealth (e.g., through better facilities and incentives to increase saving and capital accumulation) require improvement. The study enriches the existing empirical literature dealing with credit constraints by explicitly treating credit constraint of the farm households, which often enter in earlier studies merely as a dummy variable. The direct elicitation method used allowed explicit comparison of farm households based on their credit constraint status. In general, the study demonstrated that farmers are not homogenous in their demand for credit and subsequently in their credit constraints, and this has important effect on their technical efficiency. The study also suggests that in efficiency analyses, more could be learned by explicitly considering credit constraint of farm households.

Agricultural credit policies generally aim at alleviating credit constraints of farmers in order for farmers to be able to increase their output production by producing at maximum possible technical efficiency. In light of this, the results of this study suggest that for a loan to result in higher technical efficiency, it needs to adequately satisfy the effective credit demand of the farmers. Given the largest proportion of the CCFH in the Ethiopian farming population, the 12% gap in technical efficiencies of CCFH and CUFH suggests that there are considerable potential loss in output due to inefficiency, which calls for a policy measure that would address credit constraint problem of both groups of farm households in general, and those of the credit-constrained group, in particular.

An important policy concern in developing countries in general and particularly in Ethiopia is raising agricultural production, given limited resources, to meet the ever-increasing demand for food due to increasing human population. However, attaining maximum possible output using a given level of inputs, in which relative variation among farm households in resource endowments and access to credit results in efficiency differential, requires careful studies. On the one hand, a "blanket supply" of credit to all farm households without considering their difference in effective credit demand and constraint status would not guarantee that such a credit supply would

result in alleviation of farmers' credit constraints. On the other hand, and more importantly, the credit-constrained group would be less efficient than the unconstrained ones, resulting in low level of outputs. This, in turn, will adversely affect the capacity of farmers to repay the debt. At the aggregate, this will also affect the effectiveness of credit supply.

The fact that the CUFH are more technically efficient than the CCFH suggests that a credit supply that is responsive to effective credit demand of farm households would result in higher outputs, which would also increase creditworthiness of the farmers. An increase in farmers' creditworthiness can raise lenders' incentive to extend more loans to the extent that can meet effective credit demand of the farmers. In other words, adequate credit would solve credit constraint and this would increase technical efficiency, farm outputs and creditworthiness of borrowers to repay the debt. On the contrary, it would be economically unattractive for farmers to receive a loan that cannot meet their effective credit demand, as they will remain credit-constrained and cannot increase their efficiency. The implication of this result for lenders is that the farmers' effective demand for credit needs to be identified for different types of farmers before determining the size of loans to the farmers, since farmers are not homogeneous in their demand for credit. In developing countries, government intervention in a credit system, especially agricultural inputs credit, spurred by credit market failure, often becomes ineffective, mainly because it is often delivered based on the implicit assumption that the farmers have similar demands for credit, thereby ending up in one-fits-all credit supply. This often does not match with effective credit demand of some farmers. This is evident from the fact that a considerable proportion of respondents who received credit also reported being credit-constrained. More often, there were also reports of significant credit default in the formal credit sectors in developing countries, which, among others and in view of the results of this study, can also be argued that if the loans cannot meet farmers' effective credit demand, the farmers cannot attain the necessary technical efficiency to enhance their debt repayment capacity. In fact, this argument needs a caveat to add: ability to repay a credit, as related to higher output, could only be a necessary, not a sufficient, condition for debt repayment. Besides one's ability to repay, factors affecting repayment incentives also need to be assessed, in view of possible credit risk.

Another important implication of the results for credit policy is related to the cost of credit supply. The insignificant effect of interest rates on the efficiency of farmers suggests that factors other than the direct cost of borrowing may be important to consider. For example, some farmers may find monetary and non-monetary transaction costs (such as paper works, loan processing speed and speed of loan disbursement) considerably higher relative to the interest rates, so that lenders need

to consider the effect of such costs on the demand for credit of the borrowers. A case in point here is the use of information technology (IT), which has a potential effect on cost reduction. In developing countries, IT use is at a rudimentary stage in general, but severely lacking particularly in rural areas of these countries. A wider use of IT may have important impact on lowering costs of credit transaction, monitoring and evaluation. On the contrary, its absence means that the geographic location of lenders relative to borrowers may be more important than it appears under improved infrastructural settings where IT can be widely used to reduce such costs. This has relevance for decision on branch expansion of formal lenders and associated costs.

References

Adesina, A. A. & Djato, K. K. 1996. Farm size, relative efficiency and agrarian policy in Cote d'Ivoire: Profit function analysis of rice farms. *Agricultural Economics* 14, 93-102.

Admassie, A. 1999. Sources of efficiency differentials in smallholder agriculture. *Quarterly Journal of International Agriculture* 38, 203-220.

Aigner, D., Lovell C. A. K. & Schmidt, P. 1977. Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics* 6, 21–37.

Alene, A. D. & Hassan R. M. 2006. The efficiency of traditional and hybrid maize production in eastern Ethiopia: An extended efficiency decomposition approach. *Journal of African Economies* 15, 1(March), 91-116.

Ali, M. & Flinn, J. C. 1989. Profit efficiency among basmati rice producers in Pakistan Punjab. *American Journal of Agricultural Economics* 71, 303–310.

Banerjee, A. 2001. Contracting constraints, credit markets and economic development. Massachusetts Institute of Technology, Department of Economics. Working Paper Series, 02-17.

Battese, G. E., Malik, S. J. & Gill, M.A. 1996. An investigation of technical inefficiencies of production of wheat farmers in four districts of Pakistan. *Journal of Agricultural Economics* 47, 37-49.

Bell, C., Srinivasan, T. N. & Udry, C. 1997. Rationing spillover and interlinking in credit markets: The case of rural Punjab. *Oxford Economic Papers* 49 (4), 557-585.

Besley, T. & Coate, S. 1995. Group lending, repayment incentives and social collateral. *Journal of Development Economics* 46, 1-18.

Bindlish, V. & Evenson, R. 1993. Evaluation of the performance of T & V Extension in Kenya. World Bank Technical Paper 208, Africa Technical Department Series, The World Bank, Washington, D.C.

Blancard, S., Boussemart, J., Briec, W. & Kerstens, K. 2006. Short- and long-run credit constraints in French agriculture: A directional distance function framework using expenditure-constrained profit functions. *American Journal of Agricultural Economics* 88, 2(May), 351-364.

Bigsten, A., Collier, P., Dercon, S., Fafchamps, M., Gauthier, B., Gunning, J.W., Oduro, A., Oostendorp, R., Patillo, C., Söderbom, M., Teal, F. & Zeufack, A 2003. Credit constraints in manufacturing enterprises in Africa. *Journal of African Economies* 12 (1), 104-125.

Binswanger, H. P. & Khandker, S. R. 1995. The impact of formal finance on the rural economy of India. *Journal of Development Studies* 32 (2), 234–262.

Boucher, S., Guirkinger, C. & C. Trivelli. 2005. Direct elicitation of credit constraints: Conceptual and practical issues with an empirical application to Peruvian agriculture. Selected paper presented at the American Agricultural Economics Association Annual Meeting, Providence, Rhode Island, July 24-27, 2005.

Bravo-Ureta, B. E. & Pinheiro, A. E. 1993. Efficiency analysis of developing country agriculture: A review of the frontier function literature. *Agricultural Resource Economics Review* 22, 88-101.

Carter, M. R. 1988. Equilibrium credit rationing of small farm agriculture. *Journal of Developing Economies* 28, 83–103.

Carter, M. R. & Weibe, K. D. 1990. Access to capital and its impact on agrarian structure and productivity in Kenya. *American Journal of Agricultural Economics* 72, 1146–1150.

Coelli, T. J. & Battese, G. E. 1996. Identification of factors which influence the technical inefficiency of Indian farmers. *Australian Journal of Agricultural Economics* 40, 103-128.

Deaton, A. 1991. Savings and Liquidity Constraints. *Econometrica* 59 (5), 1221-1248.

Demeke, M., Kelly, V., Jayne, T. S., Said, A., LeValle´e, J. C. & Chen, H. 1998. Agricultural market performance and determinants of fertilizer use in Ethiopia. Working Paper 10. Grain Market Research Project, Ministry of Economic Development and Cooperation, Addis Ababa.

Diagne, A. & Zeller, M. 2001. Access to credit and its impact on welfare in Malawi. *International Food Policy Research Institute*, Washington D.C. Research Report 116.

Dorfman, J. H. & Koop, G. 2005. Current developments in productivity and efficiency measurement. *Journal of Econometrics* 126, 233–240.

Duca, J. V. & Rosenthal, H. H. 1993. Borrowing constraints, household debt, and racial discrimination in loan markets, *Journal of Financial Intermediation* 3, 77-103.

EEA (Ethiopian Economic Association), 2004. *Industrialization and Industrial Policy in Ethiopia: Report on the Ethiopian Economy*, Vol. III 2003/04, Addis Ababa, Ethiopia.

Emana, B., Gemtessa, K., Lemessa, D. & Ayele, G. 2005. Informal finance in Ethiopia. *Occasional Paper No. 13.* Association of Ethiopian Microfinance Institutions, Addis Ababa, Ethiopia.

Eswaran, M. & Kotwal, A. 1990. Implications of credit constraints for risk behavior in less developed economies. *Oxford Economic Papers* 42 (2), 473-482.

Färe, R., Grosskopf, S. & Logan, J. 1985. The relative performance of publicly owned and privately owned electric utilities. *Journal of Public Economics* 26, 89–106.

Färe, R., Grosskopf, S. & Lee, H. 1990. A nonparametric approach to expenditure-constrained profit maximization. *American Journal of Agricultural Economics* 72, 574-81.

Farrell, M. J.1957. The measurement of productive efficiency. *Journal of Royal Statistical Society* 120, 253-290.

Feder, G. 1985. The relation between farm size and farm productivity. *Journal of Development Economics* 18 (Aug.), 297-314.

Feder, G., Lau, L. J. Lin, J. Y. & Luo, X. 1990. The relationship between credit and productivity in Chinese agriculture: A microeconomic model of disequilibrium. *American Journal of Agricultural Economics* 72, 1151-1157.

Feder, G., Lau, L. J. Lin, J. Y. & Luo, X. 1989. Agricultural credit and farm performance in China. *Journal of Comparative Economics* 13, 508-525.

Foltz, J. 2004. Credit market access and profitability in Tunisian agriculture. *Agricultural Economics* 30, 229-240.

Freeman, H.A., Ehui, S. K. & Jabbar, M.A. 1998. Credit constraints and smallholder dairy production in the east African highlands: application of a switching regression model. *Agricultural Economics* 19, 33-44.

Fulginiti, L. E., Perrin, R. K. & Yu, B. 2004. Institutional and agricultural productivity in Sub-Saharan Africa. *Agricultural Economics* 31, 169-180.

Gavian, S. & Ehui, S.1999. Measuring the production efficiency of alternative land tenure contracts in a mixed crop-livestock system in Ethiopia, *Agricultural Economics* 20, 37-49.

Gloy, B. A., Gunderson, M. A. & Ladue, E. L. 2005. The costs and returns of agricultural credit delivery. *American Journal of Agricultural Economics* 87, 3(August), 703-716.

Guirkinger, C. & Boucher, S. 2005. Credit constraints and productivity in Peruvian agriculture, Department of Agricultural and Resource Economics, University of California – Davis, Mimeo.

Greene, W. H. 1995. *LIMDEP 7.0 User's Reference Manual*. Econometric Software Inc, New York.

Hailu, G., Storck, H., Kassa, B. & Vischt, K. 1998. Technical efficiencies of smallholder annual crop production in moisture stress areas of eastern Oromia of Ethiopia: A Stochastic Frontier Analysis. *Ethiopian Journal of Agricultural Economics* 2, 91-115.

Haji, J. 2007. Production efficiency of smallholders' vegetable-dominated mixed farming system in eastern Ethiopia: A Non-parametric approach. *Journal of African Economies* 16 (1), 1-27.

Haji, J. & Andersson, H. 2007. Determinants of efficiency of vegetable production in smallholder farms: The case of Ethiopia. *Acta Agriculturae Scand Section C – Food Economics,* (forthcoming).

Hazarika, G. & Alwang, J. 2003. Access to credit, plot size and cost inefficiency among smallholder tobacco cultivators in Malawi. *Agricultural Economics* 29, 99–109.

Holden, S. & Bekele, S. 2004. Land degradation, drought and food security in a less-favoured area in the Ethiopian highlands: a Bio-economic model with market imperfections. *Agricultural Economics* 30, 31–49.

Iqbal, F.1986. The demand and supply of funds among agricultural households in India. In: *Agricultural Household Models: Extensions, Applications and Policy.* I. Singh, L. Squire and J. Strauss (eds.). John Hopkins University Press, Baltimore and London.

Jabbar, M. A., Ehui S. K. & Von Kaufmann, R. 2002. Supply and demand for livestock credit in Sub-Saharan Africa: Lessons for designing new credit schemes. *World Development* 30 (6), 1029-1042.

Jappelli, T. 1990. Who is credit constrained in the U.S. economy? *Quarterly Journal of Economics* 55, 1 (February), 219–234.

Jondrow, J., Lovell, C. A. K., Materov, I. S. & Schmidt, P. 1982. On the estimation of technical inefficiency in the stochastic frontier production function model. *Journal of Econometrics* 19, 233-238.

Kalirajan, K. P. & Shand, R. T. 1985. Types of education and agricultural productivity: A quantitative analysis of Tamil Nadu rice farming. *Journal of Development Studies* 21, 232-243.

Khandker, S. R. & Faruqee, R. R. 2003. The impact of farm credit in Pakistan. *Agricultural Economics* 28, 197-213.

Lee, H. & Chambers, R. G. 1986. Expenditure-constraints and profit maximization in U.S. agriculture. *American Journal of Agricultural Economics* 68, 857-65.

Parikh, A., Ali, F. & Shah, M. K. 1995. Measurement of economic efficiency in Pakistani agriculture. *American Journal of Agricultural Economics* 77, 675–685.

Pitt, M. M. & Khandker, S. R. 1996. Household and intrahousehold impact of the Grameen Bank and similar targeted credit programs in Bangladesh. *World Bank Discussion Paper no. 320*, Washington, D.C.

Pitt, M. M. & Khandker, S. R. 1998. The impact of group-based credit programs on poor households in Bangladesh: Does the gender of participants matter? *Journal of Political Economy* 106 (5), 958–996.

Seyoum, E. T., Battese, G. E. & Fleming, E. M. 1998. Technical efficiency and productivity of maize producers in Eastern Ethiopia: A Study of farmers within and outside the Sasakawa-Global 2000 Project. *Agricultural Economics* 19, 341-348.

Schrieder, G., & Heidhues, H. 1995. Reaching the poor through financial innovations. *Quarterly Journal of International Agriculture* 34 (2), 132–148.

Sharma, K. R., Leung, P. & Zelleski, H. M. 1999. Technical, allocative, and economic efficiencies in swine production in Hawaii: A Comparison of parametric and non-parametric approaches. *Agricultural Economics* 20, 23-35.

Stefanou, S. E. & Saxena, S. 1988. Education, experience and allocative efficiency: A Dual approach. *American Journal of Agricultural Economics* 70, 338-345.

Stiglitz, J. E. & Weiss, A. 1981. Credit rationing in markets with imperfect information. *American Economic Review*, 71 (3), 393-410

Stiglitz, J. E. & Weiss, A. 1992. Asymmetric information in credit markets and its implications for macroeconomics, *Oxford Economic Papers*, New Series, Special Issue on Financial Markets, Institutions and Policy 40, 694-724.

Tan, S., Heerink, N. & Qua, F. 2006. Land fragmentation and its driving forces in China. *Land Use Policy* 23, 272–285.

Tauer, L. W. & Kaiser, H. M. 1988. Negative milk supply response under constrained profit maximizing behavior. *North-eastern Journal of Agricultural and Resource Economics* 17, 111-17.

Wadud, A. 2003. Technical, allocative and economic efficiency of farms in Bangladesh: A Stochastic Frontier and DEA Approach. *The Journal of Developing Areas* 37 (1), 109-126.

Wadud, A. & White, B. 2000. Farm household efficiency in Bangladesh: A Comparison of Stochastic Frontier and DEA Methods. *Applied Economics* 32, 1665-1673.

Zeller, M. 1994. Determinants of credit rationing: A study of informal lenders and formal groups in Madagascar. *World Development* 22 (12), 1895–1907.

Zeller, M., Sumiter, B. & Sharma, M. 1996. Financial services for the rural poor: Implications for policy and future research. Final report to the German Agency for Technical Cooperation (GTZ). International Food Policy Research Institute, Washington, D.C.

Zeller, M., Schrieder, G., von Braun, J. & Heidhues, F. 1997. *Rural Finance for Food Security for the Poor: Implications for Research and Policy, Food Policy Review*. International Food Policy Research Institute, Washington, D.C., USA.

SOME THOUHGTS IN THE SOCIO-ECONOMIC ENGINEERING OF FRAGILE STATES IN AFRICA: THE CASE OF UGAND

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Abstract

In pre-colonial sub-Saharan Africa [SSA], with the possible exception of Ethiopia and Eritrea, shifting cultivation and nomadic mode of production precluded the emergence of formed agrarian social classes and states based on the production, exchange and distribution of agricultural surplus in the mould of the other two developing regions of the world, Asia and Latin America. The colonial state in SSA overlaid itself on mostly loosely inter-connected social structures. In the post-independence period, the inherited fragility of the state has been manifested in military coup de etats espousing ethnic hegemony, nation building, socialism, Marxism, democracy and other political discourses. However, with the exception of some, most failed to establish a stable polity for economic development. The worst expression of the fragility of the modern state and its attendant negative consequences have been manifested in no other countries than in Uganda under Idi Amin and currently in Somalia.

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

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

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development on the path to building a stable polity while evolving further policies and fine-tuning of instruments.

The mainly anecdotal observations are discussed around five main themes - ***Access to Land and Livelihoods****,* ***UPE & Poor Households****,* ***Poverty & Life Cycles****,* ***Three Hours as a Working Day*** *and* ***A Very Poor Village in a Rich District.*** *By doing so, the paper attempts to bring into focus some of the operating institutions in the process of the social reconstruction of the country and derive implications for policy. It interfaces the observed institutional realities with the demands of sustainable economic development with far reaching implications for institution building.*

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

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

Traditional institutions must be understood as the diverse mechanisms by which Africans regulated social and economic affairs, exercised and controlled political power. They included, for example, village councils which promulgated and enforced access rules that regulated the balance between livestock, water, and forage, assuring that overgrazing was minimized; local councils which required livestock owners to regulate their animals, protect crops and complex rules of access and use that assured young men over most of Africa access to fallow land, rules of organization, financial obligation ad authority which were used to organize vast markets which sustained trade over thousands of miles (Wunsch, 1990, p 62)

1. General Context[2]

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

Since democratization in the 80s, Latin America has been on a speedy march to social democracy this time largely led by the Native Indians and other democratic grass root based social organizations. Unlike Europe where social democracy gradually emerged on the throes of the capitalist nation state, in Latin America, it appears to have preceded the European social formations which had formed the bedrocks for social democracy. The potential fragility of the Latin American state has been countered by formed social classes, albeit to the detriment of Native Americans and the not so far successful agrarian transition which otherwise could have ushered the path towards industrial capitalism.

The dominant pre-industrial national land-lords in Asia have been swept away by revolutions [China, Vietnam, Laos], transited to agrarian bourgeoisie on the path to industrial capital in Japan and is still an important fraction of the dominant political class in India. In both Latin America and Asia, the land lord social class and a formed peasantry established an antagonistic but a relatively solid social structure both for revolutionary and reformist social changes.

By contrast, in pre-colonial sub-Saharan African [SSA] countries, with the possible exception of Ethiopia and Eritrea, shifting cultivation and nomadic mode of production precluded the emergence of formed agrarian social classes and states based on the

[2] Originally prepared for the National Workshop on the 10th anniversary of the Development Network of Indigenous Voluntary Associations [DENIVA], while the author was a Senior Research Fellow at the Economic Policy Research Centre [EPRC], Kampala, Uganda. The writer wishes to acknowledge the homely environment of the EPRC and the financial contributions of Action Aid Uganda [AUU] which funded the EPRC/AAU Poverty and Structural Adjustment study from which the observations herein are culled from. The results of the wider study can be found in 2007. Rural Human Resources and Relative Poverty in Ethiopia and Uganda" Proceedings of the t4th Ethiopian Economic Association; 2000. "Resources, Poverty & Human Development in Rural Uganda", Africa Development, CODESRIA, XXV, (3 & 4) pp 31-76; 1999a. "Structural Adjustment & Rural Poverty in Uganda", 1999. Journal of Development Economics for Southern Africa, I(1), pp39-83; 1999b. "The Quest for Adaptive Institutions: Observations from Rural Uganda" Occasional paper No 2, DENIVA, [Development Network of Voluntary Association of Uganda] 33p.

production, exchange and distribution of agricultural surplus in the mould of the other two developing regions above. The colonial state overlaid itself on mostly loosely inter-connected social structures and states. In the post-independence period, the fragility of the state has been manifested in military *coup de etats* espousing ethnic hegemony, socialism, Marxism, democracy and other political discourses. However, with the exception of some, most failed to establish a stable polity for economic development.[3] The worst expression of the fragility of the modern state and its negative consequences have been manifested in no other countries than in Uganda[4] under Idi Amin and currently in Somalia.

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

Backed by sound macro-economic policies, in 1964-71, before the ascendance of Idi Amin, the economy registered an annual growth rate of over 5% [GoU: 1998:84]. The country's flourishing smallholder agriculture had backward and forward linkages with industry, including manufacturing – laying the foundation for a home market paving the way for an auto-centric mode of industrialization. A concomitant vibrant service sector was expanding rapidly. As foreign exchange earner, tourism ranked third only to coffee and cotton.

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

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

[4] For more on the political economy of Uganda under Amin and the current economic and institutional construction efforts, see Twaddle, M. 1988. Uganda Now: Between Decay and Development; Twaddle, M. 1991. Changing Uganda; World Bank. 1993. Uganda: Growing out of Poverty and Mamdani, M. 1883. Imperialism and Fascism in Uganda.

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

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

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

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

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

this is not the case, the history of development programmes is littered with many perverse outcomes.

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

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

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

2. Institutions and Economic Development

The role of institutions in the development process has varied according to the prevailing paradigm(s) of the period. In the tradition of classical political economy, the organization of society in terms of its structures and functions, the distribution of power, the formation and dynamics of the social/cultural values and their political & economic relations with nations beyond its shores[5] were important components of economic discourse. In such analytical frameworks, the nature of the state, the social foundations on which it was erected, in summary its institutions and their policy were of paramount importance.

The ascendance of Neo-classical economics, first as a competing paradigm, albeit as a dominant one, in the post War period and as a singular orthodoxy in the last decade

[5] The early developers such as England and Holland were all maritime powers.

has shifted the terrain of the focus of the development debate from state to market institutions. In the latter's analytical domain, since the social/institutional framework is given under its *ceteris paribus* assumption, physical and in its latest version also human capital & technology are binding constraints on the path of growth.

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

More recently, there has been a resurgence of interest in institutions, including the state, in the context of their critical roles in the development process. This has arisen from the apparent weaknesses of earlier theories to explain the empirical evidence from late industrializing countries. The variable(s) explaining the poverty or otherwise of nations has successively moved from that held for a very long time - access to natural resources to physical capital[6], the acquisition and sustainability of technology, the development of human capital, generation of sound policies and more recently to institutions.

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

[6] The approach was popular in the immediate post-War period informing many of the planning models adopted by the then newly independent countries of the Third World.

Policies and institutions appear to have had critical roles in shaping the development experiences of many countries.

The trend towards "bringing back"[7] the state to lay down the basic institutional framework in development process is now articulated by none other than the World Bank. According to its annual report on the bill of health of the global economy, the Bank observes that interest in the state as a partner institution in the development of policy and implementation has been promoted both by negative and positives experiences to its role across differing economic systems *inter alia*;

1. The collapse of control-and-command economies,
2. The fiscal crises of the welfare state in most of the established industrial economies
3. The important role of the state in the East and South East Asian miracle economies
4. The collapse of states[8] and the explosion of human emergencies

In such a historical conjecture, it is essential that the construction of novel/reformed institutional/governance systems in Africa make the social, cultural ad economic specificities of their respective stake holders as points of departure[9]. Premising African development from the social trajectories of other societies and planting them of African soils have so far been fraught with many problems[10]. This has been accentuated by the popular cultures of dominant ideologies which portray non-capitalist and non-state socialist societies as "primitive" and their institutions unable to transcend their current economic and political predicaments.

[7] World Bank. 1997. "The State in a Changing World". World Development Report.

[8] A case in point is Somalia, where the collapse of the state has reached its highest manifestation. Paradoxically, telecommunication and banking are now more efficiently run and there is a boom in the export of livestock. Was the collapse in any case that of an 'unformed state' or the state itself was an operating constraint? An interesting arena of research approaching a laboratory type controlled experiment on the theory of the formation of the state for students of political economy

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

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

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

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

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

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

3. Access to Land and Livelihoods

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

In front of us, about 2 kms away, was a majestic mountain. Recognizing that in most traditional African societies such lands are communal, we asked the group about using the mountain which appeared to be uncultivated and uninhabited. They pointed to a three years old girl in front of us whose grandfather they said owned it. That

happened about 29 years ago when the said person was a “Big man” in government. How that land came to be individually owned is anybody’s guess. Although agricultural undertaking by the landlord was not apparent, since use by the villagers will symbolize its traditional communal ownership, the new owner did not allow its use. In the circumstance, the peasants suggested that the heifer project be changed to one based on the rearing of chicken.

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

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

This has had its antecedents in the closing years of the nineteen century when large holdings in America were enjoying unprecedented growth. Agrarian experts on the Left and right of the political spectrum were unanimous that this was the right way forward. Both positions considered the mode of operation of small subsistence farmers as obsolete and primitive which had to be done away with swiftly. The creation of alienated land and peasantry was said to be necessary conditions for the transition towards modernization. Although their political motivations and goals were different, the development of large capitalist farming and the collectivization of agriculture following socialist revolutions obtained their cues and logic about the organization of agriculture from the above premises. Hundred years later, African modernizers of different shades of political colour carry this political and ideological baggage derived from the experience of late 19th century Europe and America.

In the context of developing countries and the so-called green Revolution Technology in Asia[11], Latin America and to a limited extent in Africa, there is now sufficient evidence to appraise the effect of such agricultural technologies and gauge their effects on poverty and agricultural modernization which are the avowed policies of the Ugandan government.

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

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

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

[11] The term refers to the increasing use of a package of bio-chemical inputs [new seeds, fertilizer, insecticides etc] and associated mechanization in some areas of the poor countries with favourable ecological endowment and infrastructural settings.

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

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

Uganda can draw from the adverse lessons of contemporary South Asia[12] and Latin America on the one hand and from the positive historical experience Meiji Japan, East Asia in the sixties and post-revolutionary but especially post Maoist China. In the latter cases, agricultural technology, under very small plots (handkerchief size as some refer to them) but equitable land entitlement regimes, has become a bulwark of the modernization of agriculture and industry. These took place without sacrificing the welfare of the peasantry as was during collectivization in the Eastern European countries or large-scale eviction and alienation of the peasantry in early European industrialization.

Unlike other land constrained Asian countries such as today's China. Japan under similar stage of development and other East Asian successful economies, Uganda has vast cultivable but uncultivated land. It can hence pursue a bi-modal agrarian strategy which combines small holder based agrarian development with large scale commercial farming to meet macro-economic objectives such as growth, export and employment[13].

However, in the context of a bi-modal strategy, careful thinking will be required to retain the customary right of the peasantry and structuring policies and institutions such that the tradeoffs between rapid growth and some level of inequity are at a minimum. Furthermore, such a strategy should enable the local people to directly and indirectly benefit from the modernization of agriculture by investors. The contours of

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

[13] It is vital that the momentum of rapid growth of agriculture along this path is not slowed down due to legal and institutional constraints towards access to land and other supporting measures.

agrarian transition of today's Uganda can be mapped by taking into account is own specificity but learning from the success and problems of contemporary developing economies which have combined high growth rates and human development under a predominantly small holder based farming systems.

4. UPE, Poor Households, Allocative Efficiency & Equitable Distribution of Primary Education

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

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

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

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

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

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

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

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

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

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

Children at all levels are important source of labour in the rural households. The vast majority of them will operate in similar areas as their centres of education but hopefully at higher levels of income and development in the years to come. In contrast to middle class households, where the necessities of life are purchased, those in the rural areas produce them within the village and
the household. Children's contribution in this process is vital[14]. With the usual 8a.m-5p.m lesson delivery, those with few children or not yet in the life cycle to have many, are confronted with the choice of losing their children altogether for education.

If parents take out their children from school, thereby raising the dropout rate, it is because they are faced with a win or lose situation[15]. The scaling down of what goes

[14] This is notwithstanding the discourse about the "problem of child labour" espoused by urban middle class bureaucrats and the ILO. It must be noted that given the institutional framework and the deficiency of capital, such labour input at least in the short term is a make or break input in the household economy. The calamities of AIDS has not made matters any better.

into the primary school curriculum may be considered in conjunction with reduced contact hours. This way, the same resources can provide access to education, practical experience and children could avail themselves for a continued support of the household economy. Could the school calendar be adjusted to suite that of agricultural and domestic tasks?

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

5 Poverty and Life Cycles: The Lives of Two *Wazees* [Plural of Elderly Persons in Swahili]

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

Having recognized us, acknowledged our presence and listened the objectives of our visit, the *MZee* disappeared into the house, changed his clothes in the manner befitting when meeting urban people and sat with us. The discussion was later joined

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

by the only wife, the older of the two described above. It transpired that he had P4 education and had for a long time combined the position of school cook with farming in his village. He has put his hands in a variety of crops around the homestead and virtually all types of livestock from the area.

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

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

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

Towards the bustling end of the village, young fishermen appeared well dressed and happy. Most had dropped out of school because of their inability to pay school fees and lack of interest and motivation. The local shopkeeper informed us that in some days their fish catch could earn them as much as Ush60,000/day[16]. Most of this is spent on booze preferring beer to *waragi* (strong alcoholic local Ugandan brew) on such occasions. They drank beyond mid-night and like the old *Mzee*, they obtained their warmth by the fish smoking stove. Having seen the 'retired' fisherman without

[16] This was higher than the monthly wage in Kampala but partly balancing out non fish catch days in the low ebb season.

anything to fall on in old age, one begins to feel for the fate of the apprentice fisherman who come from similar family backgrounds and spending habits.

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

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

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

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

6. Three Hours as a Working Day

We were discussing the loss of oxen power during the civil strife of the 1980s. A question was then raised about the cost of the complementary input with oxen power, labor. The common daily wage rate was said to be Esh900/day. The logical question

following it was the length of the working day. It was reported that hired labor usually began working at 7a.m and put down tools at about 10 a.m. What about the afternoon segment of the work day? There was said to be none. Even given the humid nature of the climate in the area, three hours of work a day without any substantial animal or mechanical power is surely a very low labor input. This is particularly so considering the seasonal nature of agricultural tasks given the low productivity of the above arrangement, in another district; certain agricultural tasks are contracted out on a piece rate basis. However, when a given piece rate was completed, there was not a second piece of work undertaken in order to obtain more income. It reminds one the contrast with the renting of a bed by three Asian students in Europe to be used on a shift basis in order to maximize income through saving from the cost of accommodation. They studied in one shift and worked in the other. When they left for home, whereas most African students departed with consumptive electronic goods, the Asians did so with working capital, equipment or savings to open up business in their countries. Part of the contrast in the dynamic development of Asia and Africa's backwardness is found in this motivation and capacity for hard work

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

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

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

technology and a liberalized labour market. The reform of the curriculum and educational institutions could make significant contributions along this line.

7. A Very Poor Village in a Rich District

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

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

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

Until recently, the place was the preserve of wild animals. Yet, despite its 'remoteness', a bottle of coke was still only Ush500. How the profit margin of the poor is so low! The good news is that the message about the benefit of education was getting across. The community was in the process of expanding the primary school. Most of the children in P1 and P2 appeared to be overage for their class. The village had the only non-English speaking Local Councillor [LC1] chairman among the studied villages to the detriment of this writer whose command of the local language was not yet up to standard.

A bunch of *matooke* was about Ush500 while most urban made goods are much more expensive. Part of the reason for poverty here is adverse terms of trade caused by its 'remoteness' and attendant high transport cost. Subsistence rather than commercialization is the norm. The key input to orient the area towards the national economy is access road and reduced fuel price to bring down transfer costs. In order

to overcome the circular causation of underdevelopment in the periphery of an otherwise better off district, a regional policy to address the needs of disadvantaged sub-units within a district is imperative. In the context of decentralization, the further refinement of the Equalization Grant[17] could be a step in the right direction.

8. Conclusion

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

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

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

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

[17] This is a grant given based on the relative poverty of districts. It may have to be further sub-divided to take into account very poor villages within better off districts.

Reference

Clapham, Christopher (1985). Third World Politics

Bromley, Daniel (1989). "Property Relations and Economic Development", *World Development*, Vol. 17, No. 6.

Mamdani, M. (1883). Imperialism and Fascism in Uganda.

Roth, G. (1968). "Personal Rulership, Patrimonialism and Empire Building in the New States" *World Politics,* Vol. 8, No. 2 pp 194-206;

Sandbrook, Richard (1986). "The State and Economic Stagnation in Tropical Africa" *World Development*, Vol. 13, No. 4.

Twaddle, M. (1988). Uganda Now: Between Decay and Development;

_____. (1991). Changing Uganda;

World Bank. (1993). Uganda: Growing out of Poverty

_____. (1997). "The State in a Changing World". World Development Report.

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