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The Impact of Regional Economic Cooperation on the Ethiopian Manufacturing Sector: The Case of Common Market for Southern and Eastern Free Trade Area (COMESA-FTA)*

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Abstract

A computable partial equilibrium (CPE) model is employed to quantify the welfare implications of COMESA-FTA on the Ethiopian manufacturing sector. The results of the model indicate that the value of imports have expanded as a result of tariff elimination on imports from COMESA member countries. This increase in value of imports led to consumption expansion, implying an increase in consumer's surplus. There is also negative budgetary implication implied by the loss in tariff revenue. The net welfare effect, which is the combined effect determined by the relative magnitudes these effects, reveals a welfare loss of 0.06% of GDP.

Over all, the static welfare effect of complete tariff removal on commodities imported from COMESA member countries appeared to be welfare depressing. However, this should be treated with caution since it does not show the dynamic effects relating to market size, efficiency gains and economies of scale that might have been attained in the long run. Moreover, this analysis focuses only on the manufacturing sector, it does not indicate the economy wide effects of complete tariff removal on imported commodities from COMESA member countries.

Key words: COMESA, FTA, welfare, tariff, region, and integration.

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1. Introduction

The regional integration issue in Africa mooted in 1958 with vigor and sensation. The Monrovia Declaration, The Lagos Plan of Action and The Final Act of Lagos have underlined economic integration and co-operation as indispensable for the economic transformation of African countries. As reflected in the treaty establishing the African Economic Community, integration remains a key solution to overcoming the problems of economic fragmentation and promoting economic diversification and inter-linkages among production sectors in member countries.

During the early 1960s, the eastern and southern African sub-region had already begun to make some commendable initiatives towards the formation of a sub-regional common market. The UNECA's inter-disciplinary mission on industrial coordination in 1963, the Ministerial meeting in 1965 in Lusaka/Zambia for the promotion of sub-regional co-operation and economic integration, the events of May 1966 Interim Council of Ministers, and the 1968 and 1969 summits of the Central and Eastern African States had an impact on route to the establishment of the PTA. Though the progress towards this end slowed down in the period between 1970 and 1977 due to the escalation of the liberation struggle in the southern Africa sub-region and the collapse of the East African Community (EAC) in 1977, which to a certain extent dampened the spirits of proponents of sub-regional co-operation and integration.

The Common Market for Eastern and Southern Africa Free Trade area (COMESA-FTA) was launched on 31st October 2000 by nine participating member states of Djibouti, Egypt, Kenya, Madagascar, Malawi, Mauritius, Sudan, Zambia, and Zimbabwe. These countries have all reduced tariff by 100% accordingly. Nevertheless, the remaining COMESA member states, including Ethiopia, have not yet joined the FTA launched by COMESA. This is mainly because these countries do not clearly understand their gains from the integration process. Further more, the question of equitable distribution of costs and benefits (for example, intra-trade imbalance, loss of customs revenue, polarization effect), among countries participating in the FTA is also of great concern to the Member States, in which case whether genuine or perceived, may result in the implementation of inconsistent policies and treaties among member countries. This could hinder the implementation of the various treaties signed in relation to the economic integration effort in the region. Although a growing number of countries have been exploring and participating in regional trading agreements, the causes and consequences of regional integration have given rise to an extensive and vigorous debate among researchers, policy

makers, the business community and citizens of countries at large. One of the reasons for such concerns could be that the impacts on member countries, including Ethiopia, are not well assessed. The main purpose of this paper is thus to examine the cost and benefit of COMESA-FTA on the Ethiopian manufacturing sector. In so doing, there are a number of empirical questions that this study will try to address.

The first sets of questions are concerned with the nature and type of imports. What is the effect of COMESA-FTA on the volume of imports? Will the volume of imports increase, decrease, or stay unchanged as a result of Ethiopia's accession to the COMESA-FTA? If the volume of imports changes, then what type commodities will be highly affected as a result of the trade arrangement? The later is an important question since the size of imports could affect the domestic consumption structure and producers. For example, as the volume of imports increases, consumers will enjoy expanded range of goods with reduced prices. On the other hand, expansion of imports could displace uncompetitive domestic producers while competitive producers will exploit extended market opportunities and increase their efficiency. The second important area of concerned is related with loss of government revenue. What is the revenue impact of joining COMESA-FTA? If there is revenue reduction, are there alternatives of compensating or nullifying revenue losses? Finally, the effect on consumers, producers or government revenue alone cannot be a sufficient condition for evaluating regional trade arrangements. What is more important is the net welfare effect of trade agreements. What is the net impact of COMESA-FTA on the Ethiopian economy?

The paper is structured as follows: following the introduction, section two deals with the conceptual framework. Section three provides review of empirical evidence. Section four discusses the database and methodology followed by discussion of results in section five. Conclusions and policy implications are provided in the section six.

2. Conceptual Framework

Regional economic integration occurs when different countries come together to form free trade areas or customs unions, offering members preferential trade access to each other's markets. In other words, regional economic agreements are groupings of countries formed with the objective of reducing trade barriers between members (Venables, 2000). In the post-war period, developments were led by the European Union, which was originally founded in 1958 as European common market, and since then especially in the 1960s and 1970s a number of regional economic agreements were established between developing countries.

At the centre of economic analysis of regional economic integration arrangements there lie the concepts of trade creation and trade diversion. Essentially, these concepts are the extensions of the theory of comparative advantage and the gains from trade. Trade creation can occur within regional economic integration arrangements (RTA). Production efficiency improves when RTA member countries import more from lower cost RTA partners, and less efficient domestic production falls. Consumption efficiency improves when consumers in an RTA can buy imports at prices that are lower than those for domestic products (Cernat, 2001 and Canovas, 2001). On the other hand, trade diversion occurs when RTA members switch their imports from more efficient non-member countries to less efficient partner countries within the RTA. This reduces the overall production efficiency and harms consumers within the RTA, who now import from high-cost members of the RTA.

Regional economic arrangements have been subject of considerable research and analysis in the economic literature since the seminal contributions of Viner (1950) and Mead (1955); see also DeRosa, 1998, 2001. Viner introduced the idea of trade creation and trade diversion as a result of customs union and free trade arrangements. Figure 1 below illustrates the idea of trade creation and trade diversion which is usually referred to as the Venerian (1950) analytical framework of trade analysis. The Venerian framework is based on a computable partial equilibrium (CPE) analysis identifying demand, supply, and trade of homogenous goods which are final consumption goods by three representative countries, namely the home country (H), the partner country (P), and the rest of the world (W) representing a non-member country. It is assumed that increasing cost of production¹ is applicable in regional trading countries since their natural resource base and other productive endowments are limited as compared to the rest of the world in general. The regional trading partners are price-takers in the world markets since they are small and cannot affect the world price of products. Following Baldwin (1997), let us consider two potential sources of imports, namely country A and country B. Assume that the home country

¹ The effect of regional economic integration on welfare can be modeled under constant cost assumptions. In fact, the original Viner (1950) analysis was based on this assumption. It is argued that "under constant cost conditions, a free trade are established among "small" countries unable to affect the rest of the world will be entirely trade-creating and hence, welfare improving for the trading bloc and its individual member countries if member countries are predominantly least-cost producers of exportables. If one or more member countries are inefficient producers of exportables which tend to cause significant trade diversion with non-member countries, then the inefficient member countries will gain from regional economic integration. On the other hand, efficient member countries will not necessarily gain because welfare improvements resulting from trade creation might not be sufficient enough to offset welfare and the tariff revenue losses resulting from trade diversion. Hence, it is also uncertain in such circumstances whether the trading bloc as a whole will gain" (DeRosa, 1998: 11-12). However, such type assumption is very restrictive and cannot represent the prevailing realities of developing countries such as Ethiopia (see Baldwin, 1997; DeRosa, 1998, and DeRosa and Saber, 2000).

introduces a trade barrier, that is, a tariff which raises the domestic price of imports above the world price by the amount of the tariff. As indicated in the figure below, domestic or home consumers pay P^a+T to import from country A and P^b+T to import country B. This implies that all imports would come from country A. The domestic price of imports from country A is fixed at P^a+T and the magnitude of imports is given by Q_3-Q_2 .

Suppose that the home country signs a free trade agreement with country B but not with country A. This arrangement entails a reduction of local price of goods imported from country B, that is, they cost only P^b . However, goods imported from country A cost higher price domestically. Home consumers switch their imports from country A to country B and this changes the relative competitiveness of goods from countries A and B. This has four effects: The first effect is that reduction of tariffs by the home country for its partner will increase competition from imports and decreases the price of domestically made goods to P^b . Secondly, high-cost home production goods are replaced by cheap imports from country B with the magnitude of Q_2-Q_1 . Thirdly, imports from country A are completely diverted to country B. Finally, domestic consumption has increased to Q_4 (see Baldwin, 1997).

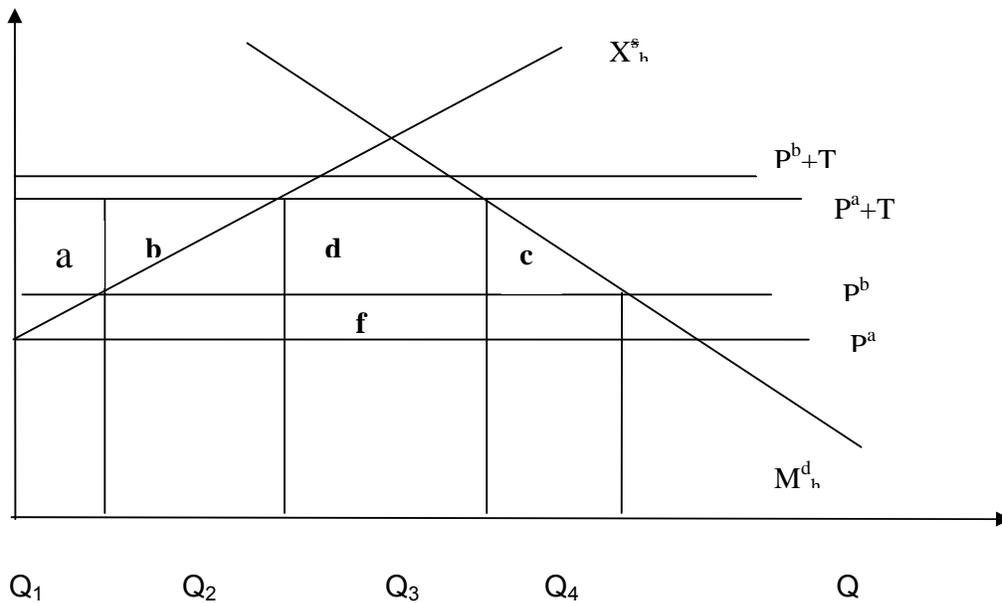


Figure 1: Trade creation and trade diversion

According to the traditional analysis, the elimination of tariff on the imported goods on a partner country has an impact on the welfare of member countries and non-member countries². This effect can be classified into trade creation, trade diversion and loss of government revenue. As indicated in the figure, the home country imports none of the good from the country with which it signs the free trade agreement. However, after the free trade agreement, home country diverts all of its imports from country A to country B. This is what is known as trade diversion. As a result, the government loses all tariff revenue due to the switch of import sources. The magnitude of the loss is equivalent to the areas d and f. Because of tariff reduction, domestic consumers in the home country benefit from lower-price of goods by an amount equal to the areas a, b, c, d, and e while domestic producers are adversely affected which is equivalent to the area a and b. Hence, the net effect on the home country is equal to the areas c and e.

In the above analysis, the cost of trade diversion is equal to the area f which emanates from the fact that after free trade, the home country imports goods from the high cost supplier. Similarly, the trade creation gains are areas c and e, consisting of reduced producer distortion, represented by area C and reduced consumer distortion, represented by area e. A discriminatory tariff reduction could lead home consumers to switch from low-cost supplier to a high-cost supplier. This would bring the possibility of welfare loss for the home country. Suppose the home country has signed a free trade agreement with country A instead of B. Because country A was the low-cost supplier, there is no possibility of that the tariff reduction would lead to switching of imports and hence, the home country would be better off.

It is clear from the preceding discussion that RTAs have both trade-creating and trade-diverting effects. The issue is which effect dominates and this depends upon a number of factors, including production cost differences, rates of initial tariffs, and relative supply and demand responses. Apart from static effects of regional economic integration, there are also long-term effects such as increased competition, economies of scale, stimulus to investment, and efficient use of resources.

²It has been documented that “under increasing cost conditions, a free trade area established among “small” countries unable to affect the rest of the world will be entirely trade-diverting so long as non-member countries continue to supply imports to member countries. Although member country producers whose exports to other member countries are increased under regional economic arrangement will enjoy welfare gains, the welfare of member countries will typically decline because they give up significant tariff revenues and enjoy no overall increase in their imports. ...[T]he certainty of welfare losses occurring under increasing cost conditions is greater, the less highly protectionist are, initially, the countries forming the regional economic arrangement” (DeRosa, 1998: 18).

3. Empirical Evidence

In the preceding section, an attempt has been made to highlight the basic theoretical underpinnings of the economics of regional economic integration and their theoretical benefits and costs. Regional economic arrangements have both static and dynamic effects and consequently their impact on welfare. The theoretical predictions of the effects of regional economic arrangements on welfare are not, however, certain in general.

The empirical evidence of the welfare implications of trade reforms take two main forms: results derived from econometric studies and those of computable equilibrium models.

Although there are a variety of different econometric methods employed to evaluate the effects of RTAs, gravity models and growth regressions are the most widely used in the empirical literature. Gravity models estimate bilateral trade between countries as a function of the size of the two economies (usually measured by their GDPs), and the distance between them. Empirical evidence using this method appears to indicate that regional economic cooperation has both welfare-enhancing effects (Cernat, 2001; Sayan, 1998; Burfisher and Jones, 2000; Paas, 2002; and Augustine, 2001) and welfare reducing effects (Alemayehu and Haile, 2001; and Choudhri and Hakura, 2000). On the other hand, results from growth regressions and factor decomposition methods indicate that regional economic integration stimulates economic growth and reduces poverty (Badinger, 2001; Dollar and Kraay, 2001; Stryker and Pandolfi, 1999; Gwartney and Skipton, 2000; Blackburn and Hung, 1996; Hertel et al., 2003a; Hertel et al., 200b; and Frankel et al., 1996). In other words, more open economies enjoy higher per capita GDP growth than the closed ones. However, while recognising the positive correlation between openness and growth, few are sceptical about the relationship between trade and growth (Rodriguez and Rodrik (1999) and Irwin (2002).

Empirical evidences using computable partial equilibrium model and mathematical models indicate that the effects of free trade area on welfare are mixed. For instance, DeRosa (1998); Ngeno et al (2002); Lyakurwa et al. (2002); and Antingi-Ego et al. (2001) used a mathematical model to estimate the revenue implications of free trade area of East African Community (EAC). Their results show that although there is welfare loss in the form of government revenue loss, there are countries who gain (e.g. Kenya and Tanzania) and lose (e.g. Uganda) from trade arrangement and hence, the effects are mixed.

On the other hand, Sunny et al. (1998) used computable partial equilibrium model and found that the fear of government revenue loss has not been supported by the experience of three African countries: Botswana, Zambia and Zimbabwe over the six-year period, 1985-1990. It has been argued that revenue loss is simply a redistribution of income from government to consumers as the latter benefit from reduced price of imported goods.

In the Ethiopian context, little is known about the economic effects of the country's accession to COMESA Free Trade Area, however. The only exceptions are studies by Girma Zewdie (1976) and Zewdie and Associates (2000). The former used a partial equilibrium model to assess the revenue effects of Ethiopia's accession to the East Africa Common Market (EACM). The interesting aspect of this study is that the estimation is based on the highly disaggregated imported manufactured commodities. The results of the study indicated that the shift by Ethiopia from national tariff to East African Common External Tariff caused imports to expand and hence, loss of customs revenue. The study, however, failed to address other important issues such as the effect of common external tariff on consumers' and producers' welfare, and did not show the total economic impacts of introducing common external tariff.

Girma (2000) used the residual imputation model to examine the trade creating and diverting effect of Preferential Trade Arrangement (PTA) on intra and extra-regional imports of member countries. The study found virtually little or no evidence of trade creation and diversion among the PTA member countries. However, there has been significant external trade creation, i.e., after integration, a move has been observed from high-cost partners to low-cost non-partner countries.

Despite the current wave of regional economic arrangements or free trade areas in both developed and developing countries, the above empirical evidences suggest that the static welfare gains of regional economic integration are below expectations or in some cases minimal and some countries experienced loss, implying that empirical evidence on the effects of free trade area on welfare shows mixed results.

4. Database and Methodology

4.1 Database for the Study

The basic data employed in this study to analyze trade flows consists of three-year averages for the years 1998 to 2000 on international trade by Ethiopia and its principal trading partners, namely, COMESA member countries and the rest of the

world. A three-year average is considered in order to smoothen up the year-to-year fluctuations of trade statistics for various reasons.

The data is disaggregated by categories of commodities denominated in local currency. The data on imports from and export to COMESA member countries and rest of the world are obtained from the Ethiopian Customs Authority. The data are provided at the two-digit level of the harmonized system that recorded the bilateral trade flows. Data on values of domestically produced import substitutes are obtained from various publications of the Central Statistical Authority on manufacturing industries. Similarly, the averages of 1998 to 2000 data are used for the values of domestically produced import substitute commodities.

4.2 Methodology

In light of the theoretical and empirical discussions, a computable partial equilibrium (CPE) model has been employed to assess the static effects of COMESA-FTA on the manufacturing sector of Ethiopia. The model is used to assess the likely impacts on welfare of the home country (Ethiopia in this case) of reducing and/or elimination of tariff on imports of commodities originating from the COMESA member countries. The model considers three actors in the trading arrangements between the home country and COMESA. These are the home country (Eth), the trading partners of COMESA member countries taken together as a single trading bloc (COM) and the rest of the world (ROW).

The effects of Ethiopia-COMESA trade arrangement have three components, namely, consumption effect, a trade diversion effect of and a trade creation effect.³ The first effect occurs when COMESA member countries are globally efficient and hence, the dominant supplier prior to the imposition of discriminatory tariff, we have the consumption effect only following complete cessation of tariff on imports from COMESA member countries. Accordingly, the welfare (ΔW^{ceo}) effects that are associated with the complete cessation of tariff on imports from COMESA member countries are given by:

$$\Delta W^{ceo} = \frac{1}{2} \sum t_{0,i}^{com} \left(\frac{t_{0,i}^{com}}{1+t_{0,i}^{com}} \right) e_{m,i}^d M_{0,i}^{com} P_i^{com} \quad (1)$$

³ The specifications of trade effects, revenue, producers' surplus and consumers' gain have been left out. The equations of these variables can be obtained from the authors on request.

Where $t_{0,i}^{com}$ = current non-discriminatory (ad-valorem) tariff on commodity i on COMESA imports; $e_{m,i}^d$ = own price elasticity of demand for import of commodity i ; $M_{0,i}^{com}$ = current volume of import of commodity i from COMESA associated with tariff t_0 ; and P_i^{com} = current duty free unit value of commodity i from COMESA member countries.

For those commodities where the ROW is the dominant supplier, assuming that $P^{com} < P_0^{row}$, complete cessation of tariffs on commodities imported from COMESA member countries results in a complete trade diversion from ROW to the partner countries. The welfare (ΔW^{TD0}) impact of trade diversion with consumption effects on the home country as a result of the complete elimination of tariff from commodities imported from COMESA member countries can be estimated by:

$$\Delta W^{TD0} = \frac{1}{2} \sum \left[(1 + t_{0,i}^{row}) P_i^{row} - P_i^{com} \right] \left(\frac{(1 + t_{0,i}^{row}) \cdot P_i^{row} - P_i^{com}}{(1 + t_{0,i}^{row}) \cdot P_i^{row}} \right) e_{m,i}^d \cdot M_{0,i}^{row} - \sum (P_i^{com} - P_i^{row}) M_{0,i}^{row} \quad (2)$$

For commodities where the home country is not relatively minor supplier, the effects of trade creation (i.e., trade source substitution) with consumption are estimated the same as that of trade diversion. Here, it is assumed that the COMESA member countries are more efficient supplier than the rest of the world, which is to mean that the supply curve of COMESA lies below that of the rest of the world. The welfare (ΔW^{TC0}) effects of this trade can be stated as:

$$\Delta W^{TC0} = \frac{1}{2} \sum t_{0,i}^{com} \left(\frac{t_{0,i}^{com}}{1 + t_{0,i}^{com}} \right) e_{m,i}^s \cdot P_i^E \cdot M_{0,i}^E + \frac{1}{2} \sum t_{0,i}^{com} \left(\frac{t_{0,i}^{com}}{1 + t_{0,i}^{com}} \right) e_{m,i}^d \cdot P_i^{com} \cdot M_{0,i}^{com} \quad (3)$$

where $M_{0,i}^E$ = current quantity of domestically produced import substitute of commodity i when the tariff rate on imports from COMESA is t_0 ; and $P_{0,i}^E$ = current price of domestically produced import substitute of commodity i when the tariff rate on imports from COMESA is t_0 .

Finally, the overall estimate of the trade effects due to consumption, trade diversion and creation can be obtained by aggregating these effects over all commodities.

Similarly, the government revenue and welfare effects can also be aggregated over all commodities to give us the net welfare effects of the Ethiopia-COMESA trade arrangement.

5. Discussion of Results

For the purpose of introducing to the model results, it is important to note that the magnitude of imports from COMESA member countries is very small. It accounted for, on average, 4.55% of the value of total imports during 1998-2000 while the average share of imports from the rest of the world was 95.45% of the value of total imports during the same period. If one looks at imported manufactured goods, the structure basically remains the same. The average share of manufacturing imports from COMESA member countries accounted for 4.53% of the value of total imports during 1998-2000 and the remaining (95.47%) was from the rest of the world.

The type of imported manufactured goods from COMESA member countries revealed that they are mainly food items, textile products, tobacco, wood and wood products, printed books and the like. Imports of machinery, equipment, and other capital goods are non-existent from COMESA member countries. This is not surprising since COMESA member countries do not have the capacity to produce capital goods. The import demand for these types of goods is satisfied from the rest of the world. In general however, the trading relationship among COMESA member countries is not strong.

Similarly, the average share of duty collected from imports of COMESA member countries accounted for 6.26% of the total duty collected during 1998-2000 while 93.74% was collected from goods imported from the rest of the world. Duty collected from imports of manufactured goods from COMESA member countries has been negligible (accounted for on average 6.21% of the total duty collected during 1998-2000). The main source of duty for the Ethiopian government has been imports of manufactured goods from the rest of the world, accounted for on average 93.79% of the total duty during the indicated period.

On the export side, Ethiopia exported commodities worth of Birr 467.07 million to COMESA member countries as compared to Birr 3.34 billion to the rest of the world in 1998-2000. In other words, Ethiopia's export to COMESA member countries represented only 12.22% of the total value of exports to the world or 23% of the total volume of exports during 1998-2000. This indicates that Ethiopia is highly dependent

on the rest of the world for its imports and exports. Bearing these facts in mind, we will now examine the potential effects of tariff elimination on imports from COMESA countries on trade, revenue and the overall welfare effects on Ethiopia, on the basis the based outcomes of the model.

5.1 Trade, Revenue and Welfare Effects of Tariff Elimination on Imports from COMESA

It has been argued that regional integration is assumed to occur via complete elimination of tariff on imports from member countries in the free trade area. To this end, Ethiopia's accession to COMESA-FTA would require a zero-tariff rate for commodities originating from COMESA member countries, while maintaining its tariff rates with the rest of the world. The model is used to estimate the potential trade, revenue and welfare effects of the Ethiopia-COMESA trade partnership that involve the elimination or reduction of tariff on imports from COMESA member countries.

The following assumptions are made in the foregoing analysis. It is assumed that the volume and value of Ethiopia's exports will not be affected significantly by tariff changes in the short-run. Similarly, the structure of the domestic manufacturing sector does not change in the short-run. Moreover, the composition of imports from COMESA member countries and the rest of the world are assumed to remain unchanged in the period under consideration. It is also assumed that the rate of tariff on commodities coming from the rest of the world remains unchanged in the short-run. Furthermore, it is assumed that the COMESA member countries have the capacity to meet import demands of Ethiopia that is created for COMESA member countries as a result of this trade arrangement. It is also assumed that the commodity groupings at the two-digit level of the harmonized system imported from COMESA member countries and the rest of the world are perfect substitutes.

Regional integration through complete elimination of tariff has different impacts on different sectors of the manufacturing activities. On those commodities where COMESA member countries are efficient and are the main suppliers before any trade arrangement, the model estimates consumption effect only, resulting from reduced prices on imported commodities. According to these results, there appears to be an expansion of imports (by about 0.03% of GDP or 0.15 % of the total value of imports) as result consumption has expanded marginally by about 0.002% of GDP (Table 5.1). This would benefit domestic consumers considerably. This is so since as price of

imports falls, quantity demanded increases for normal goods and hence consumers enjoy more goods at reduced prices.

Those commodities where significant expansion of imports occurs include rubber and articles, other made up textile articles and worn clothing, salt, sulphur, plastering, cosmetics, lime and cement and articles of iron and steel. In these sectors, it is expected that domestic producers anticipate greater competition from imports from COMESA member countries.

Table 5.1: The result on commodities with consumption effects only

| Variables | Amount (in '000'Birr and %) |
|------------------------------------|------------------------------------|
| Change in value of imports | 15,451.60 |
| (% of 2000 total imports) | 0.15 |
| Change in consumption | 1,140.56 |
| (%of 2000 GDP at market prices) | 0.002 |
| Change in tariff revenue | -9,705.37 |
| (% of 2000 total tax revenue) | -0.15 |
| Change in welfare | 1,140.56 |
| (% of 2000 GDP at constant prices) | 0.002 |

Source: Model result

On the other hand, there exists a loss in government revenue amounting to 0.002% of GDP or 0.15% of the total tax revenue collected in the year 2000. As indicated, elimination of import tariffs on COMESA member countries has both positive and negative effects on these sectors, i.e., an increase in consumption and a loss in tariff revenue. The net welfare effect depends on the relative magnitudes of the gain in consumers and the loss in tariff revenue. Since the loss in tariff revenue is offset by the gain in consumers, the net welfare effect is an increase in consumption, which is positive. In fact, however small it may be, welfare has increased by about 0.002% of GDP.

For those commodities where the rest of the world is currently the major supplier, complete cessation of tariffs from COMESA member countries result in trade diversion from rest of the world to COMESA member countries as well as consumption effects on domestic consumers. As a result, imports tend to expand by about 0.34% of GDP or 1.73% of the total value of imports (Table 5.2).

A significant expansion of imports occur in the commodities: man-made staple fibers (such as woven fabrics, plain weave fabrics, dyed weave fabrics, yarn and the like),

miscellaneous chemical products (such as insecticides, fungicides, herbicides, disinfectant, finishing agents used in the textile and similar industries, etc), foot wear, gaiters and articles of such parts (such as sports footwear with plastic or rubber soles and textile uppers, training shoes, sandals with leather soles and straps, etc), animal and/or vegetable fats and oils (such as edible animal fats and oil, edible vegetable fats and oil, glycerol and like), art of apparel and clothing access (such as women's or girls suits of synthetic fibers, men's or boy's trousers and breeches of other textiles, men's or boy's ensembles of cotton, men's or boys' jackets and blazers of wool or fine animal hair, etc) and the like.

Table 5.2: Results for commodities with trade diversion and consumption effects

| Variables | Amount (in '000'Birr and %) |
|------------------------------------|------------------------------------|
| Change in value of imports | 175,944.21 |
| (% of 2000 total imports) | 1.73 |
| Change in consumption | 14,926.84 |
| (%of 2000 GDP at market prices) | 0.03 |
| Change in tariff revenue | -177,433.41 |
| (% of 2000 total tax revenue) | -2.74 |
| Change in welfare | -69,014.77 |
| (% of 2000 GDP at constant prices) | -0.13 |

Source: Model result

In these sectors it is expected that greater market opportunities for COMESA suppliers would occur via displacing non-COMESA suppliers, i.e., diversion of imports from the rest of the world. Because of the increase in imports, consumption has also expanded by about 0.01% of GDP. On the other hand, government revenue has reduced by 0.34% of GDP or 2.74% of the total tax revenue, implying a negative net welfare effect amounting to 0.13% of GDP. This is because the duty-inclusive price of the rest of the world is less than the tariff-free unit value of COMESA member countries.

The third effect of tariff elimination is related to trade creation for COMESA member countries and consumption effect for domestic consumers. To this end, the model has identified manufacturing commodities that have trade creating with consumption effects (Table 5.3).

For these sectors, the value of trade created for COMESA member countries is about 1.68% of GDP or 8.59% of the total value of imports. This is the main source of trade

expansion for Ethiopia, with an estimated Birr 875.5 million value of additional imports from COMESA member countries. This has come as a result of displacement of domestic industries that are more expensive than their counterparts and consumption expansion in the country. The maximum possible effect for trade creation for COMESA member countries or source substitution is identified in these commodities. If, however, COMESA member countries are not competitive with domestic producers, then this maximum creation of trade will not occur.

Table 5.3: Results for commodities with trade creation and consumption effects

| Variables | Amount (in '000' Birr and %) |
|------------------------------------|------------------------------|
| Change in value of imports | 875,536.59 |
| (% of 2000 total imports) | 8.60 |
| Change in consumption | 25.96 |
| (%of 2000 GDP at market prices) | 0.00 |
| Change in tariff revenue | -406.15 |
| (% of 2000 total tax revenue) | -0.01 |
| Change in producer's surplus | -260,078.71 |
| (%of 2000 GDP at market prices) | -0.50 |
| Change in welfare | 38,530.38 |
| (% of 2000 GDP at constant prices) | 0.07 |

Source: Model result

Industries that are likely to be displaced by imports from COMESA member countries include: food (mainly manufacture animal feeds), tobacco (tobacco products), and textiles (spinning, weaving and finishing of textiles and manufacture of cordage, rope, twine and netting). These local manufacturing sectors might face greater competition from COMESA suppliers. The loss in producer's surplus due to tariff elimination amounts to 0.50% of GDP. The increase in the value of total imports for these sectors is estimated to be 1.69% of GDP or 8.60% of the total value of imports in 2000. Despite the increase in the value of imports from member countries, the change in consumption as a proportion of GDP is insignificant. The loss in tariff revenue as a percentage of the total tax revenue is 0.01% or 0.001% of GDP. Since the losses in producer's surplus and revenue are offset by the gain in consumers' surplus, the magnitude of welfare effect is determined by the relative sizes of trade creation and consumption effects. The net welfare effect is, thus, found to be positive for these sectors, which amounting to 0.07% of GDP.

Finally, the combined welfare impact of tariff change resulted from changes in consumption; trade diversion and trade creation can be obtained by aggregating these effects over all commodities (Table 5.4).

Because of tariff elimination, the value of imports tends to expand to the amount of 2.05% of GDP or 10.48% of the total value of imports. This increase in value of imports leads to consumption expansion that is equivalent to 0.03% of GDP, implying an increase in consumer's surplus due to tariff elimination.

Ethiopia's accession to COMESA-FTA has also negative budgetary implications that are implied by the loss in tariff revenue. The magnitude of the foregone tariff revenue is about 0.36% of GDP or 2.89% of the total tax revenue collected by the government in the year 2000. In principle, tariff revenue effect should not be taken as the only and main criterion for assessing the importance of joining COMESA-FTA since the government could offset the loss due to COMESA-FTA by imposing other forms of taxes or devising mechanisms of compensating such losses with member countries. The net welfare effect, which is the combined effect determined by the relative magnitudes the above effects, reveals a welfare loss of 0.06% of GDP.

Table 5.4: Results for aggregate effects of complete tariff elimination

| Variables | Amount (in '000'Birr and %) |
|----------------------------------|------------------------------------|
| Change in value of imports | 1,066,932.41 |
| (% of 2000 total imports) | 10.48 |
| Change in consumption | 16,093.37 |
| (%of 2000 GDP at market prices) | 0.03 |
| Change in tariff revenue | -187,544.93 |
| (% of 2000 total tax revenue) | -2.89 |
| Change in welfare | -29,343.83 |
| (% of 2000 GDP at market prices) | -0.06 |

Source: Model result

The above discussion appears to indicate that static welfare effect of complete tariff removal on commodities imported from COMESA member countries is welfare depressing. However, caution must be taken in using this welfare loss due to tariff elimination as the only tool for evaluating the country's association with COMESA-FTA. This welfare loss, being static in nature, does not show the dynamic effects relating to market size, efficiency gains and economies of scale that might have been attained in the long run. Moreover, since this welfare loss is only for the manufacturing sector, it does not indicate the economy wide magnitudes of complete tariff removal on imported commodities from COMESA member countries.

6. Conclusions

The main objective of the study was to examine the benefits and costs of Ethiopia's accession with the COMESA-FTA. Specifically, the study tries to assess the impact of COMESA-FTA on government revenue, domestic manufacturing sector, on domestic consumers and the overall welfare effects of the trade arrangement. To this end, a static computable partial equilibrium model has been employed to analyze these effects.

Recent trends on Ethiopian trade statistics reveal that that the magnitude of imports from COMESA member countries is very small. Similarly, if one looks at the structure of imported manufactured goods, the picture basically remains the same. The average share of manufacturing imports from COMESA member countries is very small as compared to that of the rest of the world.

The theoretical and empirical examination points to similar concerns regarding Ethiopia's accession to COMESA-FTA. The findings of this study indicate that both imports and consumption tend to expand while showing a loss in government tariff revenue. Over all, the results of the static computable partial equilibrium model reveal that the benefit is less than the cost if Ethiopia joins the COMESA-FTA in the short-run. As such, the static outcome of Ethiopia's accession to COMESA-FTA is welfare depressing. The robustness of the results of the model was also examined by using different elasticities of demand and supply and was found consistent with the base case results.

Finally, the results of the model should be viewed along with the following important points. First, although the outcomes of study does not appear to support Ethiopia's association with COMESA-FTA, they are only limited to the manufacturing sector and by any means they do not indicate the economy wide effects of complete tariff removal on imported commodities from COMESA member countries. Hence, further investigation is required in other sectors (such as agriculture) in order to have a more complete picture of the probable impacts of joining COMESA-FTA.

Second, as noted earlier, the results of the model are static in nature and do not show the dynamic effects relating to market size, efficiency gains and economies of scale that might have been attained in the long run. In fact, it can be argued that many of the benefits of Ethiopia's accession to the COMESA free trade arrangement may be realized in a dynamic framework, which again requires further empirical evidence.

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Mechanisms for Land Transfer in Ethiopia: Implications for Efficiency, Equity and Non-Farm Development

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Abstract

We use data from Ethiopia to empirically assess determinants of participation in land rental markets, compare these to those of administrative land reallocation, and make inferences on the likely impact of households' expectations regarding future redistribution. Results indicate that rental markets outperform administrative reallocation in terms of efficiency and poverty. Households who have part-time jobs in the off-farm sector are significantly more likely to expect land to be taken away from them through administrative means. Eliminating the scope for administrative land reallocation may thus be a pre-condition for more vigorous development of the off-farm sector.

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1. Introduction

In poor agrarian economies, land is not only a key factor of production but also performs an essential role as an insurance device and a social safety net. Ownership of land can provide access to credit which will enable households to make indivisible investments they would otherwise have not been able to undertake (Galor and Zeira 1993, Banerjee and Newman 1993). Where markets for output or labor are imperfect, access to land, even if only through use rights, can help households make effective use of family labor, and improve their nutritional status (Burgess 2001). The social importance of land, together with the fact that patterns of land allocation will affect efficiency of agricultural production, have motivated governments in countries where, often for historical reasons, access to land was highly unequal, to intervene in the functioning of markets through land reforms that aimed to equalize the ownership distribution of land. While the impact did not always live up to original expectations, reforms that gave more secure rights to households have generally had a markedly positive impact on welfare, productivity, and social peace (King 1977, Lin 1992, Binswanger *et al.* 1995).

One issue that is not entirely clear in this context is whether, once an egalitarian ownership distribution has been attained, further intervention to maintain such equality will either be needed or even beneficial (Banerjee 2000). In fact, a number of arguments suggest that such intervention may be detrimental to growth and equity goals. Uncertainty about whether or not plots will be possessed in the future is likely to reduce investment incentives. Administrators may be unable to observe producers' agricultural ability and thus give land to households who are unable to make the best use of it. Moreover, the need to demonstrate a "need" for land or its "productive" use may in the longer term induce higher population growth and in a more immediate context, undermine incentives for migration and non-agricultural investment by households if they have to fear that, such activities will increase their risk of losing their land (Yang 1997).

This issue is of critical importance for Ethiopia where, a decade after the government has started to individualize land rights, allow land rental, and largely eliminate the scope for land redistribution, political pressure for renewed redistribution is building up in a number of regions (Ethiopian Economic Association 2002). To decide whether to continue pursuing an interventionist stance towards land rights and land markets or to move towards abandonment of administrative controls in favor of decentralized land allocation, it will be important to know how well markets function,

how they compare to administrative reallocation of land, and whether the threat of being subject to such intervention leads households to adjust their behavior. Few studies have tried to empirically explore this issue and this paper aims to contribute at filling this gap.

First, we are interested whether and to what extent land markets contribute to the dual goals of greater equity and efficiency in the rural economy. To assess whether concerns about a negative equity impact of land rental market functioning are justified, we explore whether such markets transfer land to households with lower land endowments and whether there is evidence of an “agricultural ladder” whereby it is possible for households to make the transition from sharecropping to fixed rent tenancy. To ascertain the impact on economic efficiency, we probe whether markets provide access to land for producers with higher levels of ability. We find that markets and administrative mechanisms tend to transfer land to more productive and poorer households. This would suggest that there is little reason to be concerned about potential negative effects of the emergence of rental markets as, with more and more off-farm migration and non-farm employment, the need for reallocation of land increases.

A second issue to be explored, based on the identification of factors contributing to land access via markets in contrast to other mechanisms, is to compare the historical performance of land markets to that of administrative land reallocation. In addition to descriptive evidence highlighting that rental markets have recently become more important than administrative land reallocation, we find that reallocation appears to have been undertaken largely on political grounds, contributing neither to higher levels of efficiency nor equity.

Finally, exploring factors that lead households to perceive a threat of future land loss (or gain) through administrative redistribution, we find that it is farmers who are more productive who have part-time jobs in the off-farm sector who perceive a threat of land redistribution whereas renting in land increases the expectation of gaining through land redistribution in the future. If, as is quite likely, households adjust their behavior to avoid actions that might increase the probability of them losing their land, our findings suggest that the danger of land redistribution is likely to retard the growth of the off-farm economy and, if realized, will also hamper agricultural productivity. This, together with the fact that it may be difficult to satisfy the expectation of those who expect to gain from administrative redistribution, suggests that a clear policy statement to reduce the scope for of land redistribution, together with proper

measures to increase households' tenure security may have an important effect not only to increase tenure security and land-related investment but also to help jump-start off-farm investment and labor markets.

The paper is structured as follows: Section two reviews the literature and develops a model and an estimation strategy to analyze land rental market decisions in a framework with off-farm employment opportunities, unobserved agricultural ability and non-zero probability of losing land that is rented out. Section three discusses data sources and provides evidence on descriptive statistics as well as the distribution of agricultural ability across producers. Section four discusses econometric evidence by comparing the determinants of administrative and market-based land reallocations, assessing the factors underlying hypothetical market participation, and quantifying the gains from better functioning of land rental markets. Section five concludes with policy implications.

2. Background and Conceptual Model

In this section we first present the background on land policy issues facing Ethiopia, their historical context, and the way in which exploration of land markets as compared to administrative transfers of land can help to provide insights and policy recommendations. We use this as a basis for formulating a conceptual model that allows us to derive empirically testable hypotheses which are related to the empirical literature on the subject of land markets and land reallocation. Finally, we discuss the strategy for estimation and linking the hypotheses to the data.

2.1. Review of the Literature

In a world of perfect information and complete markets, with zero transaction costs, the ownership distribution of land ownership will affect households' welfare but will not matter for efficiency outcomes, and everybody will operate their optimum farm size (Feder 1985). Government involvement in land markets has often been justified as a means to counter imperfections in capital and labor markets that are widespread in rural areas and which would prevent markets from bringing about socially desirable outcomes. We argue that market failures are more likely to be of policy relevance in land sales rather than in rental markets where sharecropping provides an opportunity to adjust to credit market imperfections in a flexible way with at most moderate productivity losses.

Imperfections in rural labor markets are mainly due to the cost of supervision which arises from the fact that, except in very limited circumstances, a wage workers' true effort is not easily observable. This implies that wage workers will have limited incentives to exert effort and either need to be supervised at a cost¹ or be offered contracts that provide higher incentives. Family members have higher incentives to provide effort than hired labor, implying that it would be advantageous for those who do not have enough land to fully utilize their family labor endowment to rent in land or for those who are relatively land abundant to rent out, rather than engaging in labor market transactions that incur supervision costs. Land markets would thus have a positive impact on improving land access by land-poor households. As long as imperfections affect only one market, everybody would still cultivate the same amount of land per capita.

Credit market imperfections can offset or even eliminate supervision cost advantages of family farmers. For example, if there is a need for up-front working capital (e.g. to acquire inputs in addition to land and labor) and access to capital depends on initial wealth, the optimal size of the operational holding would vary systematically with the size of owned holdings even if land rental markets operate perfectly. Recognition of the limitations of land markets in an environment characterized by multiple imperfections in other factor markets has led policy makers to try and impose restrictions on their unhindered operation. However, while such capital constraints are likely to be of relevance, and might be used to make at least a case in principle for government involvement, a large literature has demonstrated that adjustment of the contract terms, in particular the adoption of share-cropping contracts, provides households with an opportunity to overcome the working capital shortage at a relatively small cost. At the same time, it is well known that the scope for government intervention in land markets may be associated with a number of undesirable side-effects.

First, even if they achieve their short-term aims, such interventions are likely to reduce tenure security and impose disincentives for investment. In fact, a large literature on land tenure and investment demonstrates that higher levels of tenure security (though not necessarily formal title) will lead to greater investment by households. (Soule *et al.* 2000, Otsuka 2001, Place and Migot-Adholla 1998, Binswanger *et al.* 1995, Besley 1995, Migot-Adholla *et al.* 1994, Feder 1988). While

¹ In agricultural production, supervision is particularly difficult or costly due to the spatial dispersion of the production process and the vagaries of nature imply a need to constantly adjust to micro-variations of the natural environment.

much of this literature has focused on investment that is directly attached to land, insecure tenure, i.e. the risk of losing land if specific actions are undertaken, is also likely to lead households to avoid such actions. For example, if non-agricultural development does require discrete and risky investments (e.g. migration), the threat of land loss in case such land is rented out or if the household takes on an off-farm job is likely to lead to a less than optimal level of the activity of interest.

Second, experience all over the world helped policy-makers to recognize that the mere fact of markets not leading to optimum outcomes does not imply that other mechanisms will automatically be able to bring about a more desirable outcome. A key reason is that, even in a closely knit and purely agrarian economy, it is unlikely that village leaders will be able to observe cultivators' agricultural ability. Thus, especially where producers' ability varies a lot or where the high political and administrative cost of redistribution implies that such an action is undertaken only infrequently, administrative land reallocation can lead to large efficiency losses, compared to the operation of more decentralized rental markets. This has indeed been confirmed for China (Deininger and Jin 2002). The allocative inefficiencies inherent in administrative processes for land redistribution are likely to multiply if possible rent-seeking behavior by administrators is allowed for. For example, there are reports that bureaucrats may use the system for their own political goals both from China (Li 2002, Turner *et al.* 1998, Huang 1999, Chen and Davis 1998). In Mexico, long-standing restrictions on the functioning of rental markets converted the land reform sector into a refuge of poverty (Velez 1995) and political patronage (Gordillo *et al.* 1998, Zepeda 2000).

A third reason for reliance on administrative reallocation to be associated with potentially undesirable consequences is that such intervention may generate its own dynamics and associated (potentially perverse) incentives. The example of China demonstrates that a policy based on redistribution is feasible if it is combined with restrictions on population growth. Without such restrictions, the ability to obtain land will essentially be a function of household size, something that can lead to high rates of population growth as a strategy to obtain land. Although the long-run nature of the phenomena at stake makes it difficult to clearly disentangle cause and effect, a study from Mexico indeed finds rates of population growth to be significantly higher where population could be used as a means to access land than where this was not possible (De Vany and Sanchez 1979). Similarly, while greater involvement by households in the local or regional off-farm economy is widely recognized as a critical pre-condition for broad-based rural development, insecure land tenure can undermine

the ability to achieve this goal. While a number of studies draw this link at the conceptual level, e.g. for the case of China (Yang 1997, Murphy 2000) and there is weak empirical evidence pointing into the same direction for Ethiopia (Dessalegn 1997, Holden and Hailu 2001).

Even though there are few examples of reforms that aimed to liberalize land rental markets, existing evidence points towards a positive effect. In Mexico, abandonment of rental restrictions in the constitutional reform of 1992 had a positive impact on productivity, land market activity, and equity (World Bank 2002). In China, land use rights that had been given to individuals after the 1978 introduction of the Household Responsibility System were increasingly made more secure in a process that is still ongoing. Restrictions on the scope to exchange land which are imposed at the local level have been shown to reduce the scope for efficiency- and equity enhancing land transactions (Deininger and Jin 2003). Even though households' preferences over land rights are shaped by a complex set of factors (Kung 2000, Kung 2002), there is evidence that those who experienced more secure property rights and abandonment of administrative land reallocation approve of this measure by a wide margin (Deininger and Jin 2003). An impact of more secure land rights on greater rental market activity has also been confirmed in Nicaragua (Deininger and Chamorro 2002).

2.2. A Model of Agricultural Production and Land Market Participation

We formalize these ideas using a model with household-specific ability where those who rent out land stand a risk of losing their asset to redistribution. Let the representative household i be endowed with endowments of labor \bar{L}_i and cultivable land \bar{A}_i , a given level of unobservable agricultural ability α_i , and a vector of household characteristics and endowments \mathbf{X} . Egalitarian distribution of land endowments, together with administrative restrictions imply that there is no market for (permanent) farm labor. Income can be derived from farming, off-farm employment, and land rental. Agricultural production follows a standard production function and is also affected by household-specific ability α_i so household i 's agricultural production is given by $\alpha_i f(l_i^a, A_i)$ where l_i^a represents labor and A_i land used in agricultural production. And f satisfies standard assumptions: $f_{l^a} > 0$, $f_A > 0$, $f_{l^a l^a} < 0$, $f_{AA} < 0$, $f_{l^a A} > 0$ and $f_{l^a l^a} f_{AA} - f_{l^a A}^2 > 0$. A second possibility to generate income

is to devote labor time $\rho = \bar{L}_i - l_i^a$ to off-farm employment at an exogenously given wage w . Finally, rather than self-cultivate, households can rent out part of their land endowment or rent in additional land for agricultural production $\bar{A}_i - A_i$ at the competitive rental rate r . In addition, there is a non-zero threat ρ that the household's land will be subject to administrative redistribution. Taking all of these elements together, we obtain the expected utility of household i who aims to maximize current income plus future land wealth $Y+V(A)$ with $V(0)=0$, $V'(A)>0$. Suppose there exist an probability $\rho \in [0, 1]$ that a household who rent out part or all of its land will loss the part or all of its land, but ρ is irrelevant to those who rent in land or stay autarky. With further assumption of linearity of future land wealth function (or $V''(A)=0$), expected future land wealth of household i can be expressed as $V[\bar{A}_i + I_{out}\rho(\bar{A}_i - A_i)]$, where \bar{A}_i is the land endowment, and A_i is amount used for self-cultivation. While this expression is a constant for households who engage only in self-cultivation (or renting in of land), the ability of those who rent out land in the market to keep all of their endowment depends on ρ , households' security of tenure.

Household i will choose l_i^a , ρ as well as A_i by solving the income maximization

$$\text{problem: } \underset{l_i^a, A_i}{\text{Max}} p\alpha_i f(l_i^a, A_i) + wl_i^o + (\bar{A}_i - A_i)r + V[\bar{A}_i - I_{out}\rho(\bar{A}_i - A_i)] \quad (1)$$

Where I_{out} is a binary indicator equaling one if a household rents out land and zero otherwise, p is the price of agricultural goods, ρ is the amount of time allocated to off-farm labor ($= \bar{L}_i - l_i^a$), and all other variables are as defined above. Optimal choices l_i^{a*} , l_i^{o*} and A_i^* will solve the first order conditions (FOC)

$$p\alpha_i f_{l_i^a}(l_i^a, A_i) = w \quad (2)$$

plus, for households who rent in or stay autarky

$$p\alpha_i f_{A_i}(l_i^a, A_i) = r \quad (3)$$

or for households who rent out

$$p\alpha_i f_{A_i}(l_i^a, A_i) = r - \rho V'[\bar{A}_i - \rho(\bar{A}_i - A_i)] \quad (4)$$

In the appendix, we derive the following propositions which form the basis for our empirical tests.

Proposition 1. In an agrarian economy, the amount of land rented in is strictly increasing in α , and strictly decreasing in \bar{A} . On the other hand, the amount of land rented out is strictly decreasing in α , and strictly increasing in \bar{A} . In this setting, rental markets would transfer land to “poor but efficient” producers and overall product will be strictly higher than in an economy where rental markets do not exist. An empirically testable hypothesis emerging from this is that ability will affect outcomes in rental markets but not results from administrative land redistribution.

Proposition 2. Imposing restriction in rental, represented by a probability of losing land that is rented out will drive a wedge between the amount of land rent payment received by those renting out, therefore reducing the amount of land that is transferred through markets and overall economic welfare.

2.3. Estimation Strategy

Agricultural ability: To recover agricultural ability, we take advantage of the availability of plot level data on production to estimate a production function with household fixed effects.² We assume that households use the Cobb-Douglas technology:

$$Q_{jip} = \exp(\alpha_i + \alpha_j) A_{jip}^{\theta_1} L_{jip}^{\theta_2} K_{jip}^{\theta_3} \quad (5)$$

where Q_{jip} is agricultural output produced by producer i in village j on p^{th} plot; A_{jip} , L_{jip} and K_{jip} are land, labor and capital used by producer i in village j on plot p to produce output Q_{jip} , and $\exp(\alpha_i + \alpha_j)$ is the efficiency parameter which has a household- and a village-specific element.³ θ_1 , θ_2 , and θ_3 are technology coefficients common to all producers. Taking logs of both sides of equation, adding an *iid* error term, and letting q be the log of output, a , l , and k be the log of the inputs, and $\alpha_{ji} = \alpha_j + \alpha_i$, we obtain an estimable equation for production by producer i in village j on plot p as follows.

$$q_{jip} = \alpha_{ji} + \theta_1 a_{jip} + \theta_2 l_{jip} + \theta_3 k_{jip} + \varepsilon_{jip} \quad (6)$$

² This forces us to exclude the 142 households who reported to cultivate only one plot in 1999.

Availability of multiple observations per household allows to estimate this using household fixed effects.

$$q_{jip} - \bar{q}_{ji} = \alpha_{ji} - \bar{\alpha}_{ji} + \theta (Z_{jip} - \bar{Z}_{ji}) + (\varepsilon_{jip} - \bar{\varepsilon}_{ji}) \quad (7)$$

where Z is a vector consisting of a , l , k and θ is a coefficient vector including θ_1 , θ_2 , and θ_3 . The composite efficiency parameter α_{ji} can then be recovered for each producer. Given the fixed location of land, it is unrealistic to expect trades beyond the village level and what is relevant is therefore a producer's relative efficiency within the village. To eliminate village effects, we use a similar procedure at the village level to obtain α_j which can be used to obtain an estimate of $\alpha_i (= \alpha_j - \alpha_j)$ for each producer in the sample.

Land market participation: To identify determinants of land market participation as emerging from proposition 1, we specify a reduced form regression for transferring in or out land through land rental markets, including both cash rent and share cropping with a household's agricultural ability, its endowments of land, labor, other production factors, and available off-farm opportunities as right hand side variables. Signs on other covariates will provide evidence on the extent to which operation of markets also can satisfy equity concerns. Formally, we estimate

$$R_i = \beta_0 + \beta_1 \alpha_i + \eta X_i + \delta O_i + \varepsilon_i \quad (8)$$

where R_i is a dummy for renting or the actual amount of area rented in or out, α_i is agricultural ability as defined above, X_i is the vector of other household characteristics that includes educational attainments, family composition, land endowments, and total asset values, and O_i proxies for off-farm opportunities by indicating whether the household has past "migration" experience.⁴ We also estimate a separate set of regressions that distinguishes sharecropping and renting so as to check whether there is a progression from one to the other, possibly in the sense of an "agricultural ladder".

Since ability can not be transferred in markets, we expect that markets transfer land to producers with higher agricultural ability, i.e. $\beta_1 > 0$. Of the other variables included

³ The latter is likely to be related to infrastructure and market, soil quality, climate, and other village level characteristics.

⁴ As noted earlier, migration in Ethiopia is very limited, so the variable chosen is if the head of the household has ever worked outside the *woreda*.

in X the most important prediction is that the coefficient on land endowment be negative, in line with a redistributive function of land rental markets which would lead them to transfer land to producers with lower levels of endowments. Also, while the amount of agricultural asset ownership would be irrelevant if markets for such assets were perfect, imperfections in rental markets for productive assets, especially draft animals, as variously found in the literature (Rosenzweig and Wolpin 1993, Binswanger and Rosenzweig 1986) would lead to a positive coefficient on this variable. To the extent that rental markets help to bring about intergenerational land transfers, the age of the household head would be expected to be negative. Finally, past migration experience will increase the effective wage rate that can be earned, other things equal, make it more likely for households to join the off-farm labor market, thus leading to a positive expected sign for renting out and a negative one for renting in (Reardon *et al.* 2001).

Market vs. administrative reallocation: To compare determinants of market- as compared to non-market based land reallocation, we repeat estimation of equation (5) with the difference that R_i is now replaced by a dummy for whether the household has, during the last 5-year period received land through redistribution or through the market.⁵ This allows direct comparison between the productivity and equity impact to be expected from land markets as compared to administrative reallocation. We note, however, that, especially if past redistribution is only poorly correlated to the scope for future land market intervention, something that seems to be the case in Ethiopia, exploring determinants of reallocations in the past will be of interest to compare between different types of allocation mechanisms but is unlikely to have a direct impact on current household behavior.

Determinants of future land redistribution: More direct inferences on potential behavioral adjustments by households in response to perceived threats of land reallocation are available from an analysis of the factors leading households to expect that they will lose land in the future. To conduct this analysis, we estimate a probit equation similar to the one discussed above where R_i is replaced by an indicator of whether a household expects to be subject to land loss or gain via administrative action in the future. Also, we include an indicator for whether or not the household head had taken on off-farm employment in 1999, a variable excluded from earlier

⁵ The survey does not elicit the size of area transferred either in total or under different mechanisms and only provides space for the two most important reasons of a decrease or increase in land, respectively. As there are very few households (10% of those affected) who even give two reasons, it is justifiable to assume that households either participated in rental markets or were subject to government redistribution.

regressions because it is jointly determined with rental decisions and therefore endogenous to current household behavior but not to future expectations.

3. Background, Data, and Descriptive Statistics

The data used for this study is from the fifth round of the Ethiopia Rural Household Survey, conducted in 1999 by the Economics Department of Addis Ababa University. It covers 1680 households in 4 of the country's major regions, Tigray, Amhara, Oromia and SNNP. In addition to standard characteristics routinely included in household surveys, this survey provides information on output as well as inputs of labor, seed, purchased inputs (fertilizer, pesticide, etc.), and cultivation techniques (eg. double cropping) at the plot-level. This allows us to estimate a production function with household fixed effects to recover households' agricultural ability as discussed above. Moreover, information on past involvement in administrative reallocation or rental markets and on whether specific households expect to gain or lose through administrative reallocations in the future is included.

3.1. Land Policy in Ethiopia

Ethiopia has not only a very eventful recent history in which land issues have played an important role but, more importantly, also faces crucial decisions in the area of land policy and especially land markets. Historically, land tenure in Ethiopia falls into three broad periods. Before 1975, land was concentrated in the hands of absentee landlords, tenure was highly insecure, arbitrary evictions posed a serious threat, and many lands were severely underutilized. The land tenure system was characterized by great inequality which, through its impact on production and investment, not only affected productivity but was also considered to have been the most important cause of political grievances that eventually led to the overthrow of the regime (Adal 2001).

Following the overthrow of the imperial regime in 1975, the Marxist government (the *Derg*) transferred ownership of all rural land to the state for distribution of use rights to cultivators through local peasant associations (PAs). The transferability of rights received was highly restricted; transfer through lease sale, exchange, or mortgage, among others, was prohibited and inheritance allowed only to immediate family members. The ability to use land was contingent on proof of permanent physical residence, thereby for example preventing migration. More importantly, tenure security was undermined by the PAs' and other authorities' ability to redistribute land,

often for political reasons, something that is well documented for the case of Amhara (Ege 1997).

The government taking power in 1991, though committed to a free-market philosophy, has, with three notable exceptions, made few substantive changes to Ethiopian farmers' land rights which are therefore still considered to be quite inadequate (Hoben 2000). First, land was made a regional responsibility, implying that regional governments can enact laws relating to the nature of land rights and their transferability as well as land taxation. Second, the frequency of land redistribution was to be reduced; in fact Tigray declared an end to administrative land redistribution while Oromia restricted the scope for redistribution to irrigated land. Finally, rentals have been officially allowed (Pender and Fafchamps 2000) although local leaders and governments seem to have great discretion to impose restrictions on land transfers. For example, the region of Oromia allows farmers to rent out only up to 50% of their holding and stipulates maximum contract terms of 3 years for traditional and 15 years for modern technologies.

The Government's Poverty Reduction Strategy espouses the guiding principle that every farmer who wants to make a livelihood from farming is entitled to have a plot of land free of charge (Republic of Ethiopia 2002). Even though it may conflict with this goal, the strategy also mentions a need for greater tenure security and better functioning of land rental markets. Responsibility for implementation is left with regional states which have adopted very different implementation strategies.⁶ Whether the lack of a national policy on the issue is a cause for concern is very much an empirical issue of great relevance which we pursue in more detail below.

3.2 Household Characteristics

Table 1 provides key household characteristics and details on income and crop production. The average household is composed of 5 people, among which about 2 are aged less than 14 and 2.7 between 14 and 60. The average age of the head is around 50 and 77% of households are male headed. Levels of education are very low; only 40% of heads in the sample are literate, with an average of 1.35 years of formal education. However, the fact that the maximum level of formal education in any given household is 3.2 years suggests that levels of education are improving

⁶ "In order to protect the user rights of farmers, their land holdings should be registered and provided with certificate of user rights. In this regard, a guarantee *may* be given to the effect that land will not be re-divided for a period

among the younger generation. All of the descriptive statistics point to large differences between regions, with Tigray being by far the worst in terms of most social indicators.

These regional differences are more pronounced for total household income which, with an average of B 2280, varies between B 981 in Tigray and B 3116 in Oromia, implying not only a relatively high level but also large regional differences in poverty. Using the national poverty line, 36% of the households are classified as being poor, but 75% are so in Tigray. Agriculture remains the mainstay of the rural economy, accounting for about 70% of total income. While 29% of households complemented their agricultural income with some receipts from non-agricultural self employment, only 4% had their primary job in the non-farm sector, 6% received wage income from off-farm work, and 9% worked in other woreda including those who sent home remittance and those worked off-farm in other woredas. Within the agricultural sector, income from crop production is clearly the most important, accounting for 66% of total income, although with considerable inter-regional variation (from 46% in Tigray to 75% in Oromia). The endowment of arable land held by households, excluding grazing and garden land, is very small, 1.22 ha per household or 0.29 ha per capita. Per capita land holdings are larger in Amhara and Oromia (0.45 and 0.34 ha respectively) and very low in Tigray and SNNP (0.12 ha), in line with income levels. In addition to limits on land endowments, use of modern technology remains low. While 73% of households use fertilizer which is highly subsidized, only 19% used improved seed and 31% chemicals, suggesting that fertilizer may not always be used optimally. Regional differences (only 6% and 4% of households use seeds and fertilizer, respectively, in Amhara) further exacerbate these differences.

3.3. Land Market Participation

Past and current participation in market-based or administrative land transactions, as well as expectations for the future, are summarized in table 2. We find that, with the exception of Amhara where 19% of households lost land and 11% increased their endowment through land redistribution over the last 5 years, the extent of administrative reallocation of land during this period has been quite limited – only few households in Oromia and SNNP received or lost land through the same means, bringing the total of households affected to 4% and 6%, respectively. The share of households who, over the last 5 years, increased or decreased their cultivated land

ranging from 20-30 years. Some regional states have already started this aspect of the land use policy and it is a step in the right direction.” (Republic of Ethiopia, 2002:p.53; italics added).

area by renting in, a lower bound for activity in land rental markets,⁷ was above the share of those who received land through redistribution, with 11% of households reporting to have received land and 9% that they supplied land through either rental or sharecropping.

Current (i.e. 1999) participation in rental markets is even higher. Taking fixed rental and sharecropping together, 24% of households report to currently use somebody else's land through markets (7% through rental and 17% through sharecropping). The fact that this percentage is almost equal to the share of households (20%) who report to have supplied land to the market (6% for rental; 14% for sharecropping) suggests that migration remains extremely limited and that absentee landlords are virtually non-existent.⁸ With the exception of Oromia, sharecropping is more important than fixed rental, something that can be explained by the fact that agricultural production in Ethiopia, largely rainfed, is risky. The importance of sharecropping is reinforced by the fact that the area involved is much larger than for the case of rental, amounting to about half of the average per capita endowment.

Data on future expectations reveal two observations of interest. First, there is a resurgence of expectations of land reallocation through administrative means; 10% of survey respondents expect to lose land to administrative reallocation within five years. This is surprising given that land redistribution in the past decade was essentially limited to Amhara. Large inter-regional differences in the expectation of future redistribution (ranging from 20% in Amhara to 2% in Tigray) suggest that policy decisions affecting these issues are indeed taken at the regional rather than the national level. A second finding of at least equal interest is the large discrepancy between those who expect to receive additional land and those who expect to lose land from redistribution.

With the exception of Oromia, the share of producers who expect to gain from administrative land reallocation everywhere is at least double the share of those expecting to have to cede land in such a process. Since reallocation of land is a zero-sum game, i.e. it is impossible to give out more than what is taken away from others, this implies that any redistribution that will try to satisfy expectations will lead to

⁷ The survey asked whether the household's land size increased or decreased during the last 5 years and for the main reason for such a change. This implies that households who already rented in land but did not increase the amount rented would have answered negatively to this question.

⁸ The only exception is Tigray where the share of households reporting to rent out is much lower than the ones renting in. Given the small sample size we can not determine whether this is a significant deviation from national trends. Further examination of this issue with a different data set would be of interest.

significant further fragmentation of holding sizes in a situation where, with given technology, the amount of land available to households is often already too small to produce enough for subsistence (Ethiopian Economic Association 2002).

4. Econometric Evidence

We find that both the plot level production function as well as the participation equations provide results that are not only highly significant statistically but also in line with our predictions. Markets seem to transfer land from large and less efficient to small and relatively more efficient producers as predicted by the model and there is some indication of producers' progressing from sharecropping to cash rental with increased age and wealth that would be worth exploring further. By comparison to administrative reallocation which seems to have been driven mainly by political, rather than economic, concerns, land markets appear to have clear equity and efficiency advantages.

Exploration of the factors leading a surprisingly large number of individuals to expect losing or gaining land through redistribution in the future highlights that households who work in off-farm jobs for part of the time and more productive producers are significantly more likely to be concerned about losing land to redistribution. As they would adjust their behavior so as to minimize the danger of land loss, this would be expected to lead to delayed and stunted development of the non-farm economy and, to the extent that it reduces the extent of land transfers, possibly a reduction in agricultural productivity.

4.1. Market-based Land Transfers

Before discussing evidence regarding determinants of market participation, we review results from the plot-level production function with household or *woreda* fixed effects for the 1334 households who have on average 4.4 plots each (see appendix table 1). Crop dummies are included to control yield differences among crops. The parameters on main inputs are consistent with expectations. Application of modern seed, fertilizer, and chemicals all are estimated to significantly increase the value of production. Indicators for land quality are significant and of the expected sign; output from plots with "secondary" and "tertiary" land quality is about 8 % and 11% lower, respectively, than for plots with good soil quality, the default subsumed in the intercept. Plots used for two seasons produce slightly lower output for each individual season. We also note that α_i , the deviation of household *i*'s agricultural ability from

the village mean, ranges between -2.27 and 2.12 , pointing towards considerable scope for improvements in productivity through reallocation of land between producers.

To assess whether markets or administrative mechanisms contribute to such reallocation, table 3 reports results from probit (columns 1 and 2) and tobit (columns 3 and 4) equations for market land transfers where rental and sharecropping are lumped together. Results strongly support the hypothesis that markets transfer land from households with low agricultural ability and relatively abundant land endowments to those with high agricultural ability and scarce endowments. We also find a pronounced endowment effect whereby households who have little land available per capita use rental markets to gain access to more land and vice versa; notably the coefficients are significant at the 1% level throughout. This clearly counters fears that liberalization of land rental markets would cause land concentration that would leave the poor without land access.

Similarly strong effects are found for ability the coefficient of which is always very positive and highly significant in the renting in equation. It is always negative for renting out, although significant only at 10% in the tobit equation. This implies that productivity is not the only factor leading households to supply land to the rental market but that it is clearly the more productive ones who obtain land through rental. To illustrate the magnitude of the estimated coefficients, we note that, compared to the household with the lowest agricultural ability in the sample, the one with the highest ability is 23% more likely to obtain land through the rental market. Similarly, a household with per capita land one standard deviation above or below the mean is 15% and 8% more (or less) likely to rent in (or out) land, respectively, than the average household.

In addition to these coefficients, factors related to households' endowment with other factors and their composition are largely as expected. The coefficient on draft animals, which is positive for renting in (together with other assets) and negative for renting out implies that, due to imperfections in rental markets for animals, it is easier to transfer land than animals or associated capital equipment. Having one more draft animal will increase the probability of a household to receive in land by 8%. Male headed households are more likely to rent in land while female headed ones are more likely to rent out. Younger households are more likely to participate on the demand side of rental markets; the coefficients from the probit regression suggest that the probability to rent in land increases up to 26 years and slowly declines

thereafter. Once these factors are accounted for, a higher number of children below 14 years reduces the probability of renting in and increases the probability of renting out.

4.2. Administrative Land Reallocation

Table 5 allows us to compare the performance of administrative reallocation to land transfers through the market, something that is of particular interest with respect to the extent to which land was transferred to households with high agricultural ability and limited land endowments. We find that administrative land reallocation did not transfer land to more efficient or poorer producers but also that very few variables predict households' past receipt or loss of land through redistribution. In fact, the only variable significant at the 5% level, the number of draft animals, goes in a direction opposite from what one would expect from a measure that is supposed to equalize land access among households. Ability is insignificant, supporting the notion that this variable either can not be observed by community leaders or that increasing efficiency has not figured high as a goal of activities and policies aimed at land redistribution. Comparing this evidence to determinants of land rental (column 2) suggests that, even though the recall data are slightly less precise, the latter shifted land to those with lower endowments and higher levels of productivity, and was thus arguable more redistributive than administrative reallocation as noted before.

Similarly, the only variable that is highly significant for loss of land through redistribution is the household's educational level and the number of draft animals, supporting the notion that redistribution is motivated more by political than economic considerations. While low ability is not estimated to have been a driving factor behind supply of land to rental markets, the positive and significant coefficient on households' land endowment, the negative coefficient on male headship, and the negative coefficient on the number of draft animals owned in the renting out equation all suggest that, historically, land markets have performed much better than administrative means in benefiting the poor and increasing overall productivity. The above findings are not too surprising, given that it is widely acknowledged that land redistribution was largely a political exercise. Still, if the past is any guide to the future, we would not expect administrative land reallocation to have a positive impact on productivity or increased land access by the poor. To assess whether the scope of such redistribution may have a negative impact on household behavior through other channels, we turn to the analysis of factors affecting households' expectation regarding land redistribution in the future.

4.3. Future Land Redistribution

Factors that systematically increase households' expectation of experiencing an increase or a decrease in their land endowment through administrative measures are, to the extent that they affect household behavior, arguably important from a policy perspective. Results from regressions with regional and *woreda* dummies, respectively, are presented in table 6.

The most significant determinant that leads households to believe that land will be taken away from them is whether or not the head has a part-time, though by no means primary, job in the off-farm sector. According to our estimates, off-farm employment increases the subjective probability of future land loss by between 10% and 15%. To the extent that households base future actions on such beliefs, the fear of losing land is likely to lead to a considerable reduction in their willingness to take on off-farm employment which could have far-reaching implications for the emergence of the non-farm economy, a factor which, all observers agree, will be of critical importance for future development in Ethiopia.

It is also worth noting that contrary to what was found in China where administrative land redistribution clearly targeted larger farmers and had a negligible productivity impact (Deininger and Jin 2002d), the regressions suggest that it is not large but more productive farmers who feel most threatened by future land redistribution. The positive and highly significant coefficient on ability implies that, even though this would directly decrease overall productivity, productive farmers are most threatened by land being taken away from them. By comparison, farm size, as measured by the per capita land endowment, remains insignificant. In addition, higher levels of education and a lower number of members between the age of 14 and 60, is also found to have a significant effect on the probability of land loss.

While the fact that the dependent variable is a dummy precludes us from making inferences on the possible impact of such redistribution on production, we note that the increase in the probability of suffering a land loss that is associated with higher ability is quantitatively large; compared to the least productive producer in the sample, the most productive one is almost 20% more likely to lose land to reallocation. To the extent that fears of land expropriation by authorities lead households with comparative advantage in non-farm jobs to reduce their participation in non-farm employment, one would clearly expect reduced growth of the off-farm sector as a result of such high levels of tenure insecurity. Eliminating such fears

would, by increasing the scope for off-farm employment, result in a Pareto improvement.

Turning to determinants of households' belief in whether or not they will receive (rather than lose) land through administrative means, there is some indication that, within any given *woreda* it is indeed producers with less land who expect to gain in a future redistribution (column 4 of table 6). However, the fact that the number of household members between 14 and 60 years is negative suggests that these may not have the labor force to make use of the land. Also, households renting in land think they will be able to benefit from land redistribution in the future. Even though the link is less direct than for off-farm employment, this could contribute to undermining the future functioning of rental markets in the future. From all perspectives then, the prospect of future redistribution appears to be conducive neither to a more egalitarian distribution of land nor to higher levels of rural productivity.

5. Conclusion and Policy Implications

This study contributes to the literature in two ways. First, we demonstrate empirically that land rental markets in Ethiopia work better than administrative mechanisms to reallocate land among producers. Second, we document a link between higher levels of off-farm employment and lower levels of tenure insecurity in the form of a (individual) fear of being affected by land redistribution. To the extent that, for agrarian countries like Ethiopia, development of economic opportunities in the non-farm sector will be a critical element of any strategy aiming at higher economic growth, this suggests that land tenure could have implications that go beyond mere land-related investment.

We find that, despite some restrictions on their functioning, land rental markets did help to further equity and efficiency objectives in ways that are much superior to what has been accomplished by administrative reallocation of land. Contrary to fears that land markets might lead to accumulation of land in the hands of the rich and powerful, greater emphasis on rental markets as compared to administrative reallocation of land is shown to provide greater benefits to poor but efficient producers who have few alternative opportunities of using their labor endowment. Land transfers in rental markets were shown to provide greater land access to producers with higher levels of ability and lower endowments while administrative land reallocation was largely a political exercise that contributed to neither of these objectives.

Despite limited success of this measure in the past, support for administrative reallocation of land appears on the increase. In addition to the scant empirical basis to expect such allocations to contribute to either higher levels of efficiency or poverty reduction, this is of concern for two reasons: First, even in the best of cases, and assuming considerably improved mechanisms, Ethiopia's narrow land base will limit the scope for such a measure to lead to significantly improve the welfare of the large majority of producers. Second, unrealistic expectations about the potential impact of redistribution can easily lead to an inflation of expectations that might be problematic. Finally, and most importantly, our regressions show that the scope for administrative land redistribution will affect household behavior in ways that can undermine precisely the non-farm activities on which further development of Ethiopia's rural areas depends.

From a policy perspective, the economically and socially positive role of land rental markets suggests that taking further steps to eliminate obstacles to the functioning of such markets would be beneficial to broader rural development in Ethiopia. Also, irrespectively of a possible need for transitory arrangements, abandoning the scope for future land reallocation could have considerable economic benefits while losses associated with such a measure appear to be mostly of a political nature. A policy statement highlighting that there will be no land distributions in the future could thus actually benefit the poor.

There are three areas where future research may be of interest. First and most obviously, it would be desirable to confirm or refute the evidence on a potential link between land tenure security and off-farm participation for other settings. Second, it would be of interest to explore welfare implications of land rental markets in a dynamic context, specifically with regard to the existence or not of an "agricultural ladder" whereby households could proceed over time from being sharecroppers to cash rental and possibly towards land ownership. Third, recent evidence suggests that allowing transferability of land in sales markets is likely to be associated with considerable investment benefits. In view of high risk of agriculture and the fact that sales markets are more likely to be affected by credit market imperfections than those for rental, an extension to sales markets, linked to the effectiveness of existing safety nets and implications for household welfare, would be of interest. Our results suggest that it would be useful to focus policy discussion on these issues, rather than a model of redistribution which had very limited success in the past and may negatively affect the off-farm economy.

Table 1. Basic Characteristics of the Sample

| | <i>Region</i> | | | | |
|---|---------------|--------|---------|---------|---------|
| | National | Tigray | Amhara | Oromia | SNNP |
| Household characteristics | | | | | |
| Household size | 5.04 | 4.72 | 4.31 | 5.11 | 5.81 |
| No. of people less than 14 | 1.93 | 2.04 | 1.60 | 1.97 | 2.17 |
| No. of people between 14 and 60 | 2.75 | 2.19 | 2.32 | 2.82 | 3.31 |
| No. of people older than 60 | 0.36 | 0.49 | 0.40 | 0.31 | 0.33 |
| Has male household head | 0.77 | 0.51 | 0.73 | 0.81 | 0.85 |
| Age of household head | 49.26 | 51.53 | 50.28 | 48.38 | 48.52 |
| Illiteracy rate | 59% | 77% | 63% | 53% | 58% |
| Year of education of household head | 1.35 | 0.43 | 0.88 | 1.38 | 2.11 |
| Max. years of education of household | 3.21 | 2.45 | 2.39 | 3.08 | 4.51 |
| Income and its composition | | | | | |
| Total household income (Birr) | 2280.26 | 980.93 | 2446.17 | 3116.25 | 1360.01 |
| Share of poor ¹ | 36% | 75% | 30% | 21% | 52% |
| Share of agricultural income in total | 80% | 67% | 78% | 86% | 78% |
| Value of total household assets | 486.05 | 275.62 | 375.10 | 639.05 | 457.96 |
| Household head with non-ag. primary job | 4% | 2% | 5% | 3% | 5% |
| Household head worked off-farm | 6% | 7% | 9% | 4% | 6% |
| Share with self-employment | 29% | 12% | 25% | 28% | 40% |
| Household head migrated | 9% | 11% | 7% | 9% | 10% |
| Crop production Characteristics | | | | | |
| Share of crop income in total | 66% | 46% | 55% | 75% | 72% |
| Own cultivable land holding ² | 1.22 | 0.44 | 1.49 | 1.67 | 0.58 |
| Per capita own arable land holding ² | 0.29 | 0.12 | 0.45 | 0.34 | 0.12 |
| Share of households used improved seed | 19% | 10% | 6% | 24% | 28% |
| Share of households using fertilizer | 73% | 74% | 64% | 90% | 55% |
| Share of households using pesticides, | 31% | 1% | 4% | 62% | 22% |
| Share of households with draft animals | 85% | 94% | 98% | 92% | 57% |
| Number of draft animals owned | 3.87 | 4.63 | 6.52 | 3.61 | 1.45 |

¹Total household income less than national poverty line (1075 Br per household)

²Excludes grazing and garden land

Table 2: Past, current, and future changes in land holdings

| | Regions | | | | |
|---|---------|--------|--------|--------|------|
| | Average | Tigray | Amhara | Oromia | SNNP |
| Changes in land holding last 5 years | | | | | |
| Increased land through reallocation | 4% | 0% | 11% | 1% | 1% |
| Increased land through rental/sharecropping | 11% | 1% | 14% | 12% | 9% |
| Lost land through reallocation | 6% | 0% | 19% | 1% | 2% |
| Rented/sharecropped out land | 9% | 4% | 5% | 12% | 9% |
| Market participation | | | | | |
| Rented in land | 7% | 1% | 5% | 13% | 4% |
| Area rented in (ha) | 0.05 | 0.00 | 0.03 | 0.12 | 0.01 |
| Sharecropped in land | 17% | 3% | 35% | 10% | 12% |
| Area sharecropped in (ha) | 0.12 | 0.01 | 0.30 | 0.07 | 0.04 |
| Rented out land | 6% | 1% | 3% | 12% | 4% |
| Area rented out (ha) | 0.04 | 0.00 | 0.03 | 0.08 | 0.01 |
| Sharecropped out land | 14% | 15% | 24% | 12% | 8% |
| Area sharecropped out (ha) | 0.12 | 0.06 | 0.24 | 0.10 | 0.04 |
| Expectation regarding land changes | | | | | |
| Expects increase through redistribution | 11% | 13% | 14% | 11% | 5% |
| Expects decrease through redistribution | 10% | 2% | 7% | 20% | 3% |

Table 3. Determinants of Participation in Market-based land transfer

| | Probit Results | | Tobit Results | |
|--------------------------|---------------------|---------------------|---------------------|---------------------|
| | | | | |
| Agricultural ability | 0.051** (1.99) | -0.025 (1.53) | 0.251*** (2.81) | -0.170* (1.87) |
| Per capita land holding | -0.430*** (5.34) | 0.236*** (6.92) | -1.578*** (5.67) | 1.423*** (7.86) |
| Head's age (log) | 1.983* (1.80) | 0.399 (0.54) | 5.838 (1.52) | 2.110 (0.53) |
| Head's age (log) squared | -0.289* (1.95) | -0.049 (0.50) | -0.851* (1.65) | -0.253 (0.48) |
| No of people < 14a | -0.029*** (3.10) | 0.020*** (3.26) | -0.096*** (2.96) | 0.116*** (3.56) |
| No. of people 14 – 60a | -0.003 (0.32) | 0.001 (0.13) | -0.012 (0.34) | 0.015 (0.42) |
| No of people < 60a | -0.007 (0.22) | -0.002 (0.09) | -0.065 (0.55) | 0.023 (0.18) |
| Max years of education | 0.009* (1.78) | 0.002 (0.64) | 0.039** (2.31) | 0.017 (0.96) |
| Male headed | 0.134*** (3.76) | -0.080*** (2.96) | 0.524*** (3.48) | -0.370*** (2.96) |
| Migration | 0.037 (0.73) | 0.139*** (3.61) | 0.052 (0.30) | 0.537*** (3.42) |
| Value of assets | 0.000*** (2.87) | -0.000 (1.21) | 0.000*** (3.28) | -0.000 (0.87) |
| Number of draft animals | 0.022*** (3.49) | -0.014*** (3.59) | 0.097*** (4.53) | -0.087*** (4.18) |
| Constant | -13.812* (1.90) | -5.985 (0.79) | -11.900* (1.67) | -5.999 (0.81) |
| No. of observations | 1236 | 1236 | 1236 | 1236 |
| Log-likelihood | -537.73 | -418.61 | -755.46 | -485.52 |

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Regional dummies included throughout but not reported

Table 4. Determinants of area rented in/out or sharecropped in/out

| | Area rented in | Area sharecropped in | Area rented out | Area sharecropped out |
|--------------------------------------|---------------------|----------------------|---------------------|-----------------------|
| Agricultural ability | 0.204** (1.97) | 0.188** (2.08) | 0.070 (0.63) | -0.275* (1.92) |
| Per capita land holding | -1.520*** (2.83) | -1.592*** (5.49) | 1.042*** (4.07) | 1.170*** (4.35) |
| Head's age (log) | 0.096 (0.01) | 6.090 (1.56) | 1.231 (0.23) | 0.075 (0.01) |
| Head's age (log) squared | -0.024 (0.03) | -0.895* (1.71) | -0.112 (0.16) | 0.066 (0.09) |
| No. of people <14 | -0.023 (0.44) | -0.108*** (3.29) | 0.095** (2.03) | 0.111** (2.50) |
| No. of people between 14 and 60 | -0.007 (0.14) | 0.026 (0.76) | -0.029 (0.58) | 0.010 (0.20) |
| No. of people >60 | -0.307 (1.50) | 0.082 (0.70) | -0.055 (0.32) | -0.039 (0.23) |
| Max. years of education of household | 0.029 (1.00) | 0.025 (1.47) | -0.018 (0.66) | 0.010 (0.41) |
| Headed by male | 0.268 (1.10) | 0.531*** (3.31) | -0.137 (0.78) | -0.406** (2.42) |
| Household head migrated | -0.049 (0.16) | 0.105 (0.59) | 0.467** (2.17) | 0.531** (2.52) |
| Value of assets | 0.000*** (3.43) | 0.000 (0.99) | -0.000 (1.26) | 0.000 (0.28) |
| Number of draft animals | 0.076** (2.23) | 0.091*** (4.21) | -0.120*** (3.21) | -0.062* (1.94) |
| Constant | -2.861 (0.24) | -12.200* (1.68) | -4.884 (0.50) | -2.994 (0.28) |
| Observations | 1236 | 1236 | 1236 | 1236 |
| Log-likelihood | -616.83 | -301.17 | -245.10 | -313.76 |

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Regional dummies included throughout but not reported

Table 5. Determinants of past changes in land holding

| | Gained land through... | | Lost land through... | |
|-------------------------|------------------------|--------------------|----------------------|---------------------|
| | Redistribution | rental | redistribution | rental |
| Agric. ability | 0.002 (0.44) | 0.035* (1.94) | -0.003 (0.60) | -0.002 (0.14) |
| Per capita land | 0.005 (0.66) | -0.068* (1.70) | 0.012 (1.62) | 0.105*** (4.20) |
| Head's age (log) | -0.088 (0.66) | 0.707 (0.86) | 0.214 (1.05) | -0.034 (0.06) |
| Head age square | 0.010 (0.55) | -0.099 (0.91) | -0.027 (0.99) | 0.008 (0.11) |
| No of people < 14a | 0.000 (0.35) | -0.006 (1.00) | -0.002 (0.93) | 0.008* (1.91) |
| No. of people 14 – 60a | 0.002* (1.92) | 0.008 (1.35) | -0.000 (0.18) | -0.002 (0.40) |
| No of people < 60a | 0.006 (1.43) | -0.035 (1.36) | 0.006 (1.09) | -0.025 (1.28) |
| Max years of education | -0.000 (0.06) | 0.003 (1.17) | 0.002*** (3.30) | 0.002 (0.77) |
| Male headed | -0.010 (1.61) | 0.081*** (3.16) | 0.000 (0.08) | -0.050** (2.35) |
| Head migrated | -0.002 (0.27) | -0.006 (0.18) | -0.004 (0.48) | 0.042 (1.49) |
| Value of assets | 0.000 (0.10) | 0.000 (0.94) | -0.000 (0.08) | -0.000 (0.04) |
| Number of draft animals | 0.002** (2.30) | 0.001 (0.32) | 0.003*** (3.37) | -0.008*** (2.58) |
| Observations | 1236 | 1236 | 1236 | 1236 |
| Log-likelihood | -160.79 | -437.45 | -219.68 | -307.68 |

Absolute value of z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Regional dummies included throughout but not reported

Table 6. Determinants of household's expectations regarding future redistribution

| | Expects to | | | |
|---|--------------------|--------------------|--------------------|---------------------|
| | Lose land | | Gain land | |
| Agricultural ability | 0.021** (2.04) | 0.044*** (2.60) | -0.024* (1.81) | -0.019 (1.52) |
| Per capita land holding | 0.032 (1.13) | 0.028 (0.61) | -0.004 (0.15) | -0.106*** (2.74) |
| Head's age (log) | 0.022 (0.04) | -0.011 (0.01) | -0.012 (0.02) | -0.009 (0.02) |
| No. of people <14 | -0.005 (0.94) | -0.004 (0.45) | -0.005 (0.94) | -0.006 (1.12) |
| No. of people between 14 & 60 | -0.015** (2.52) | -0.021** (2.47) | -0.012** (2.02) | -0.018*** (3.04) |
| No. of people >60 | -0.011 (0.62) | -0.011 (0.42) | 0.005 (0.28) | 0.001 (0.04) |
| Maximum years of education of household | 0.009*** (3.39) | 0.005 (1.40) | 0.001 (0.45) | -0.000 (0.16) |
| Headed by male | 0.008 (0.42) | -0.007 (0.23) | 0.026 (1.31) | 0.032* (1.72) |
| Value of assets | 0.000 (0.40) | 0.000 (0.08) | -0.000 (1.29) | -0.000 (0.27) |
| Number of draft animals | -0.004 (1.20) | -0.002 (0.45) | -0.002 (0.63) | -0.003 (0.89) |
| Head w off-farm experience | 0.105*** (2.98) | 0.152*** (2.97) | -0.036 (1.18) | -0.031 (1.04) |
| Area rented out | -0.030 (1.04) | -0.020 (0.48) | | |
| Area rented in | | | 0.039*** (2.86) | 0.029** (2.09) |
| Observations | 1236 | 882 | 1236 | 1194 |
| Log-likelihood | -350.91 | -288.73 | -342.05 | -315.20 |
| Dummy | Region | Woreda | Region | Woreda |

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Crop dummies is included to control the yield differences among crops but not reported

Appendix 1. Results of Fixed Effect Panel Estimation of Plot Level Production Function

| | Household Fixed Effects | Woreda Fixed Effects |
|---------------------------|-------------------------|----------------------|
| Log of labor usage | 0.169*** (9.94) | 0.158*** (12.08) |
| Log of cultivated area | 0.457*** (22.08) | 0.439*** (27.94) |
| Log of value of seed use | 0.023*** (3.33) | 0.034*** (5.32) |
| Dummy modern seed use | 0.404*** (6.95) | 0.424*** (7.99) |
| Land quality secondary | -0.079** (1.99) | -0.052** (2.05) |
| Land quality tertiary | -0.110** (2.08) | -0.136*** (3.55) |
| Plot used for two seasons | -0.086 (1.64) | -0.026 (0.69) |
| Fertilizer used | 0.067* (1.89) | 0.067** (2.29) |
| Chemicals used | 0.199*** (4.31) | 0.239*** (6.23) |
| Observations | 5839 | 5839 |
| No of households/woredas | 1334 | 18 |
| R-squared | 0.37 | 0.36 |

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Crop dummies is included to control the yield differences among crops but not reported

Appendix 2: Proofs for main propositions

Proposition 1. Among the households who rent out land, the higher their ability, α , the less likely they will rent out. Alternatively, among households who rent in land, the higher α , the more likely they are to rent in.

To show this, totally differentiate (1) and (2) with respect to α , then reorganize the two

differential equations into a matrix form, yielding:

$$\begin{bmatrix} p\alpha f_{l^a l^a} & p\alpha f_{l^a A} \\ p\alpha f_{Al^a} & p\alpha f_{AA} \end{bmatrix}$$

$$\begin{bmatrix} \partial l^a / \partial \alpha \\ \partial A_i / \partial \alpha \end{bmatrix} = \begin{bmatrix} -pf_{l^a} \\ -pf_A \end{bmatrix}$$

Solving for $\partial A_i / \partial \alpha$ by Cramer's rule, yields:

$$\partial A_i / \partial \alpha = \frac{\begin{vmatrix} p\alpha f_{l^a l^a} & -pf_{l^a} \\ p\alpha f_{Al^a} & -pf_A \end{vmatrix}}{|H|} = \frac{-p^2\alpha f_A f_{l^a l^a} + p^2\alpha f_{Al^a} f_{l^a}}{|H|} > 0 \quad (\text{for } f_A > 0,$$

$f_{l^a} > 0, f_{l^a l^a} < 0$, and we know $|H| > 0$ by the sufficient second order condition of maximization problem.

Similarly for household who rent out land, totally differentiating (1) and (2)' with respect to α , then reorganizing the two differential equations into a matrix form,

yields:
$$\begin{bmatrix} p\alpha f_{l^a l^a} & p\alpha f_{l^a A} \\ p\alpha f_{Al^a} & p\alpha f_{AA} + \rho V''(\cdot) \end{bmatrix} \begin{bmatrix} \partial l^a / \partial \alpha \\ \partial A_i / \partial \alpha \end{bmatrix} = \begin{bmatrix} -pf_{l^a} \\ -pf_A \end{bmatrix}$$

Solving for $\partial A_i / \partial \alpha$ by Cramer's rule yields:

$$\partial A_i / \partial \alpha = \frac{\begin{vmatrix} p\alpha f_{l^a l^a} & -pf_{l^a} \\ p\alpha f_{Al^a} & -pf_A \end{vmatrix}}{|H|} = \frac{-p^2\alpha f_A f_{l^a l^a} + p^2\alpha f_{Al^a} f_{l^a}}{|H|} > 0$$

This implies that for all households that participate in rental markets (on either side), the amount of area operated will increase with ability.

For households renting in, the amount of land rented in is the difference between the amount of operational land and the land endowment, i.e. $A_m = A - \bar{A}$ (A1).

Total differentiation of both sides of (A1) with respect to α , yields $\frac{\partial A_{in}}{\partial \alpha} = \frac{\partial A}{\partial \alpha} > 0$, implying that for households who rent in land, the amount of land rented in is increasing in agricultural ability. Total differentiation of both sides of (A1) with respect to \bar{A} , yield $\frac{\partial A_{in}}{\partial \bar{A}} = -1 < 0$, implying that for the households that rent in land, the amount of land rented in is strictly decreasing in land endowment.

For those households that rent out land, the amount of land rented out is the difference between the land endowment and the land used for self-cultivation, or formally, $A_{out} = \bar{A} - A$ (A2). Total differentiation of both sides of (A2) with respect to α , yields $\frac{\partial A_{out}}{\partial \alpha} = -\frac{\partial A}{\partial \alpha} < 0$, which implies that for those households who rent out land, the amount of land rented out will decrease in agricultural ability. Total differentiation of both sides of (A2) with respect to \bar{A} , yields $\frac{\partial A_{out}}{\partial \bar{A}} = 1 > 0$ (for by assumption, individual household's operational land, A is not constrained by individual household's endowment), implying that for those households who rent out land, the amount rented out is strictly increasing in land endowment.

Proposition 2. Imposing restriction in rental, represented by a probability of losing land that is rented out, will cause households who would be better off in off-farm employment (e.g. due to low agricultural ability) to stay in farming, or $\partial A_{out} / \partial \rho > 0$ where ρ denotes the probability of losing land that is rented out.

Since this is only relevant for households who rent out land, we can prove the proposition by totally differentiating (1) and (2)' with respect to ρ , and then reorganizing the two differential equations into matrix form, which yields:

$$\begin{bmatrix} p\alpha f_{l^a l^a} & p\alpha f_{l^a A} \\ p\alpha f_{A l^a} & p\alpha f_{AA} + \rho V''(\cdot) \end{bmatrix} \begin{bmatrix} \partial l^a / \partial \rho \\ \partial A / \partial \rho \end{bmatrix} = \begin{bmatrix} 0 \\ -V'[\bar{A}_i + \rho(\bar{A}_i - A_i)] \end{bmatrix},$$

The first matrix is H , as defined earlier, and the sufficient second order conditions of the household's maximization problem imply that it is negative.

Solving $\partial A / \partial \rho$ using Cramer's rule, yields:

$$\partial A_i / \partial \rho = \frac{\begin{vmatrix} p\alpha f_{l^a l^a} & 0 \\ p\alpha f_{Al^a} & -V'(\cdot) \end{vmatrix}}{|H|} = \frac{-p\alpha f_{l^a l^a} V'(\cdot) - 0}{|H|} > 0.$$

Taking derivative of (A2) with respect to ρ yield $\partial A_{out} / \partial \rho = \partial \bar{A} / \partial \rho - \partial A / \partial \rho = -\partial A / \partial \rho < 0$.

Therefore households who would be better off renting out land will be forced to rent out less or even stay autarky due to the high restriction on land transfer (note that restriction increases as ρ is getting bigger).

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The Role Schooling in the Choice of Activities and Alleviation of Poverty in Rural Ethiopia

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Abstract

The impact of education on farmers' choice of activities and household welfare are modelled and estimated using farm household data for rural Ethiopia. We find that education has significant effects on household welfare. Schooling increases the adoption of new technologies and facilitates entry into highly profitable farm and non-farm activities, all of which may increase welfare and help farm households escape out of income poverty. An additional year of schooling in a household increases the welfare (measured in terms of consumption per adult equivalent) by 8.5 Percent. These findings provide a rationale to governments and donor organisations to include the expansion of rural schooling (through encouragement of parents to send their children to school) in their policy reform as a means of reducing material deprivation.

Keywords: Education, welfare, poverty and rural Ethiopia.

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1. Introduction

There is a growing concern that resources have to be mobilised in such away to have greater impact on poverty reduction so that poor countries can have long-term food security (World Bank, 2000). Long-term food security requires that farmers produce a surplus, which can be saved and invested. However, certain questions have to be answered first in order to design a mechanism on how to promote investment, bring economic growth and reduce income poverty. What are the factors that motivate farmers to adopt new technologies and to enter into profitable, but risky activities? Does education help farmers adopt new technologies, invest in profitable activities and there by reduce income poverty? What other factors determine income poverty?

Hence, it would be useful to know whether or not education (other factors) helps to raise rural incomes (and reduce income poverty) by encouraging the adoption of new technologies and enabling farmers to undertake risky, high-return activities. Such research is particularly timely for Africa, where food security is a persistent problem and where, to our knowledge, there have been no previous studies of the relationship between schooling and income poverty based on a well formulated representative data set.

There are several avenues by which education increases income and reduce income poverty. Education may lessen the inherent riskiness of agricultural activities by reducing uncertainty, (Knight, Weir and Woldehanna, 2003), as literacy and numeracy enhance the ability to receive, decode and understand information. Education also has non-cognitive effects upon attitudes and practices, which may enhance a farmer's willingness to take on risk. For example, education may increase achievement-orientation and facilitate openness to new ideas and modern practices. Education also helps to increase farm productivity and household income available from various sources, acting as a substitute for (or complement to) access to credit and providing a buffer against the danger of starvation if a prospective innovation is unsuccessful and there by reduce vulnerability of households to risk.

The objective of the study is to consider whether schooling (education) is correlated with household welfare and to analyse the role of education in the adoption of new technologies and in undertaking higher-risk and higher-return activities and in reducing poverty. The paper is organised as follows. In section 2 the conceptual framework is presented. In section 3 previous studies are reviewed. The data used for the study, along with a discussion of farm and non-farm activities in rural Ethiopia, are described in section 4. In section 5 we outline our hypotheses and methodology. The estimation results are presented in section 6. Section 7 concludes.

2. Conceptual Frame Work

2.1. Poverty

Poverty has many dimensions (World Bank, 2000): material deprivation (measured by an appropriate concept of income or consumption); low achievement in education and health; vulnerability (exposure to risk) and voicelessness (and powerlessness). These four dimensions of poverty might interact and reinforce to each other (World Bank, 2001). Low level of education and health can lead to low level of income and hence might lead to material deprivation. Reducing vulnerability may allow people to take advantage of higher-risk, higher-return opportunities and there by decrease the material deprivation by increasing income and welfare. Here in this paper the relationship between the income poverty and education as well as the role of education in reducing vulnerability of people and in encouraging entry into higher-risk, higher-return activities are assessed. Consumption (rather than income) is viewed as the preferred welfare indicator in this paper as consumption better captures the long-run welfare level than current income, better reflect households' ability to meet the basic needs and reflects the household's access to credit and saving at times when their income is very low. In most developing countries, an income report of households is understated compared to consumption expenditure report. Here in this paper, the objective is not to estimate the level of poverty, but to assess the determinants of poverty. Hence we use consumption as indicator of poverty for our econometric model estimation.

2.2. Portfolio Choice, Education and Welfare

The presence of risk-preference in a farmer's behaviour means that risk factors may affect production and investment decisions. All else being equal, risk-averse households will diversify more, choose a lower-risk/lower-return portfolio of activities, and have lower average incomes, particularly if individuals have few opportunities to smooth consumption given income (Alderman and Paxon 1994). Risk averse farmers may smooth their income ex ante through income diversification and/or through adoption of drought resistant seeds, or crop diversification. Risk-aversion, or credit and insurance market imperfections may force a farm household to diversify its income sources (Eswaran and Kotwal, 1989). Risk-averse farmers will be willing to trade lower incomes for lower variability of incomes. Lower variability may be achieved by engaging in activities, which are negatively correlated with farm income and wealth, such as low-paying off-farm work and migration to towns. It is useful to

distinguish between lower and higher return off-farm activities in order to determine whether risk factors or income factors prompt diversification of income.

Farmers often make adjustments within their cropping systems to reduce income risk. The cultivation of different crops or combining crop and livestock farming may be important risk management strategies.¹ Varying attributes of crops, such as the maturity period, drought tolerance, and the timing and quantity of labour and other inputs required, can affect the choice of crops.

Suppose that a farm household follows a von Neuman-Morgenstern utility function ($U=Eu(w)$), which is monotonically increasing with wealth (w), $Eu'(w) > 0$, and $Eu''(w) < 0$. Let us categorise household productive activities into two types: (1) those which are high-return and risky; and (2) those which are low-return and less risky. Assume that these two activities have distinct characteristics. Production in high return/risky activities (*HRA*) are characterised by constant returns to scale with labour (L), land (G), fixed capital (K), variable inputs (X), and others inputs (O) as the factors of production:

$$HRA = h(L, G, K, X, O) \quad (1)$$

Similarly, production in low return and less risky activities (*LRA*) are characterised by constant returns to scale with the same factors of production:

$$LRA = l(L, G, K, X, O) \quad (2)$$

The farmer allocates his labour among activities (or chooses among the activities) so that the marginal productivity of labour (weighted by the marginal utility of income) is equalised across activities. In other words, the first order optimal condition for labour allocation will equalise the marginal product of labour (weighted by the expected marginal utility) to each activity (see for example, Dercon and Krishnan 1995; Dercon 1996):

$$Eu'(w) \cdot \left(\frac{\partial h(\cdot)}{\partial L} \right) = Eu'(w) \cdot \left(\frac{\partial l(\cdot)}{\partial L} \right) \quad (3)$$

¹ Diversification of crops, while helping to lower income variability, can also increase farm income if crop diversification improves the match of crops with soil type.

If the farmer involve in high-return/risk activities only, the first order optimal condition for labour allocation can be written as:

$$Eu'(w) \cdot \left(\frac{\partial l(.)}{\partial L} \right) < Eu'(w) \cdot \left(\frac{\partial h(.)}{\partial L} \right) \quad (4)$$

The implications of this model are that (1) farmers' choice between these two activities can be attributed to their capacity to bear risk and (2) risk aversion. The impact of risk-aversion is shown in the model through the expected marginal utility of wealth ($Eu'(w)$). If a farm household is less risk-averse and is not constrained by capital and skill (education and/or ability), the utility of using labour in the higher-return, capital and skill intensive activities is higher than in low-return/less-risky activities. Farm households, which are relatively less risk-averse are most likely to be engaged in higher-return, risky activities. Furthermore, those with higher levels of education are likely to face fewer resource and skill constraints to investment in profitable activities. Hence, less risk-averse and more educated farmers will enjoy higher income. On the other hand, uneducated farmers are more likely to be employed in low-return/less risky activities and command lower returns to their labour and hence lower income.

3. Literature

In Tanzania, Dercon (1996) finds that there is a relationship between liquid assets and choice of less risky crops. Assets per adult decreases and the land-labour ratio increases the proportion of land allocated to the less risky crop (sweet potato), although the effect of the land-labour ratio is not statistically significant. The determinants of farmers' entry into cattle production, which is a higher-return activity (requiring lumpy investment and possibly entailing risk), are analysed for Tanzania by Dercon (1998). He finds those richer households own substantial cattle herds, while poor households specialise in low-return, low-risk activities. Households with lower endowments are less likely to own cattle, and the returns to their endowment are lower. The schooling of the household head increases income per adult in the cattle-owning group, but not in the non-owning group. The schooling of female adults increases the income of both the cattle-owning and non-owning groups, but the effect is three times larger for those who own cattle. The mean marginal return to male adult labour and land are considerably higher for cattle-owning households than for non-owners. This implies that cattle owners can allocate labour and land to higher return

activities, both because they are able to enter into cattle-rearing and because they are less concerned with risk in their activity mix. Dercon and Krishnan (1995) also analyse the portfolio choice of Tanzanian and Ethiopian farmers. However, they do not use education as an explanatory variable, owing to the absence of data.

Feder, Just and Zilberman (1985) review a few studies on the effects of risk, uncertainty and human capital on the adoption of technology. Among them only Binswanger et al. (1980), using data on Indian farmer, estimates risk-aversion and uses it to explain the adoption of fertiliser. However, their results are mixed. The review concludes that empirical studies have very rarely treated the role of subjective risk.

The human capital empirical literature relating to the adoption of new technologies is well integrated with theory. This literature is inspired by the writings of Schultz (1964) who argues that the introduction of new technologies results in disequilibrium and sub-optimal use of inputs and technologies, and those changes in technology increase the value of farmer's entrepreneurial ability. Welch (1970) extended and applied the concepts of Schultz, suggesting that formal schooling plays a role in determining allocative ability and that the value of education increases with technology. Lockhead, Lamison and Lau (1980), in their review of 18 studies representing 37 data sets, find that education has a positive and significant effect on output in areas where farmers are modernising. Phillips (1994) extended their review (with 12 additional studies) and concluded that the effect of schooling varies across regions, being stronger in Asia than in Latin America, irrespective of the degree of mechanisation in those regions. Ram (1976) finds that the returns to education are higher in the progressive districts of India than in the backward districts. Rosenzweig (1978) finds that the probability of adoption of high-yield grain in the Punjab Region of India was positively related to education of the farmers. Jamison and Lau (1982), using a logit model of adoption of chemical inputs, find for Thailand that education affects the probability of adoption positively, but only above a threshold level of four years of schooling. Appleton and Balihuta (1996) review several African studies and find that the effect of schooling on agricultural output is usually not significant, though in some cases it can be large. Gerhart (1975) finds that the likelihood of adoption of hybrid maize in Kenya is positively related to education. Croppenstedt et al. (1998), using data from a 1994 USAID fertiliser marketing survey, find that literate farmers in Ethiopia are more likely to adopt use of fertiliser than those who are illiterate.

This review of previous studies indicates that, despite the well-formulated theory of human capital, empirical evidence on the role of human capital in raising the return to

labour in peasant farming and consequently increasing the choice of high-return (but risky activities) is scarce. Furthermore, most of the literature is confined to Asia and Latin America. The mechanism by which education increases income and welfare of farm households and acts to encourage the choice of high-return (but risky) activities has not yet been adequately explored. Therefore, the role of education in reducing poverty through the choice of profitable (but risky) activities will be the focus of this paper.

4. The Data Set

The data for this study are drawn from the Ethiopia Rural Household Survey (ERHS) conducted by the Department of Economics, Addis Ababa University, in collaboration with the Centre for the Study of African Economies (CSAE), Oxford, in 1994. The survey covers 1477 households in 18 *Peasant Associations* (each composed of several villages) spanning 15 *woredas* (districts) in six regions. The 15 sites represent the most important agro-ecological zones in Rural Ethiopia.² The number of households surveyed in each site reflects the size of the *Peasant Association* (PA) in relation to the total size of all PAs surveyed. Female-headed households were also proportionally represented. Households were selected randomly using the PA registers. Each household was surveyed three times within approximately twelve months (early 1994, later in 1994 and early 1995), providing a picture of both current production and consumption activities and household characteristics. Topics covered included production, consumption, assets, credit, off-farm activities, migration, and livestock ownership. The first round also included a few questions on educational status and attainment. Further information on education, as well as historical recall on agricultural innovations, was provided in the second round of the survey (Dercon and Krishnan 1994).

Sixty-nine percent of farmers in the sample adopted new inputs such as fertiliser, insecticide, herbicide and fungicide, and 48 percent adopted more than one input at a time (Table 1). A negligible number of farmers stopped using the inputs adopted (2.7 percent). A large proportion of farmers also adopted a new crop, such as a vegetable, fruit (e.g., avocado) or cash crop (e.g., coffee and chat). The proportion of farmers who have adopted both inputs and a crop was 43 percent.

Maize, wheat, *teff* and barley are the most preferred crops in the four sites (Table 2). Among cereals, barley and maize are the most frequently grown crops. The riskiness

² Bevan and Pankhurst (1996) provide detailed information on each of the sites.

of activities can be partly evaluated using farmers' responses to the question "which crop is the worst affected by drought, pests and diseases"? Among the cereals, *teff*, maize and wheat are the worst affected (listed by 21, 25, and 30 percent of the respondents, respectively), while millet and barley are the least affected. Beans and sorghum are also quite vulnerable. Among the cash crops, coffee is the worst affected, but chat and *enset* are also mentioned.

Table 1: Adoption rate (percent) of new technology (1995)

| Technology | Percent |
|--|----------------|
| Adoption of at least one new input | 52.4 |
| Stop using new inputs | 2.9 |
| Adoption of more than one new input | 22.4 |
| Currently using fertiliser | 45.9 |
| Currently using fungicide | 2.6 |
| Currently using herbicide | 10.2 |
| Currently using pesticide | 5.4 |
| Currently using innovative crops | 65.2 |
| Stop growing at least one adopted crop | 30.2 |
| Adoption of avocado | 7.9 |
| Adoption of chat | 17.5 |
| Adoption of coffee | 26.8 |
| Adoption of potato | 14.4 |
| Adoption of sugarcane | 12.1 |
| Adoption of vegetables | 18.1 |
| Adoption of both new crop and inputs | 42.3 |
| Currently use both new crop and inputs | 37.5 |

Most extension activities in Ethiopia are related to crop production. Although Ethiopian agricultural research covers all crops and livestock production, the diffusion of technologies is limited at present to certain crops, such as *teff*, wheat and maize. The new technologies include fertiliser, improved seeds, fungicides and insecticides. *Teff*, which is the second most important crop (after maize), in terms of production output and the first in terms of area coverage, accounts for the highest share in total fertiliser consumed by farmers (Degefe and Nega 1999/2000). There are two types of *teff*: white *teff* and black (mixed) *teff*. Most of the fertiliser and almost all of the improved seeds are applied on white *teff*. The price of white *teff* is higher than the price of black *teff*, wheat and maize. Wheat also has a relatively high rate of input utilisation. Although maize is not characterised by high fertiliser application, it is second in the use of improved seeds. For barley and sorghum, the rate of application of fertiliser and the use of improved seed is very low.

We can surmise that white *teff* is a high-return/risky crop given that it commands the highest (but most volatile) price and the highest use of fertiliser and improved seeds and that it less drought-tolerant than other crops. If there is a failure in rainfall, farmers' investment in fertiliser and improved seeds is lost. Hence, it must be grown by relatively less risk-averse farmers. If farmers are highly risk-averse they may prefer to plant black *teff* or another cereal, which does not require high use of fertiliser and is more drought-tolerant. Hence, white *teff* is the best candidate to test whether risk-averse farmers have a lower probability of growing a high-return/risky crop.

Table 2: The percentage of farmers growing crops and riskiness of crops in Rural Ethiopia (n=1477)

| | Percentage of farmers growing the crop | Percent reporting problem of drought, pest and disease |
|------------|--|--|
| White teff | 26.3 | 21.0 |
| Black teff | 19.5 | - |
| Wheat | 27.0 | 30 |
| Barley | 37.4 | 6 |
| Maize | 40.8 | 26 |
| F. Millet | 4.5 | 0 |
| Coffee | 25.5 | 52 |
| Chat | 12.4 | 18 |
| Sorghum | 20.9 | 20 |
| Enset | 28.6 | 45 |
| Linseed | 6.4 | 0 |
| Lentils | 3.7 | - |
| Beans | 20.7 | 18.1 |
| Potato | 5.9 | 54.0 |
| Onion | 5.2 | |

Livestock production is another potential candidate for testing the impact of schooling on entry into higher-return/higher-risk activities. However, livestock production in Ethiopia is not riskier than crop production. Although capital is required to enter, risk associated with livestock is lower than risk associated with crop production. Most Ethiopian farmers keep livestock to hedge against risk. During drought years, farmers sell cattle to feed their families. In our data, no adoption of new technologies related to livestock husbandry is reported. Hence investment in livestock may indicate risk-aversion. Indeed the preliminary model estimation shows that schooling increases to entry into livestock production activity, but not statistically significant.

Beyond crop and livestock production, farmers participate in various off-farm activities (Table 3). We choose to distinguish between low-return and high-return off-farm activities. Employment as a farm worker by another household, unskilled wage employment, domestic wage employment, and food-for-work programme employment are categorised as low-paying off-farm activities. Those categorised as high-paying off-farm activities include skilled wage employment (e.g., carpentry and masonry), teaching, employment as a soldier, driver, or mechanic, as well as employment in own off-farm businesses, such as weaving/spinning, milling, handicrafts/pottery, trading, pack animal transportation and traditional healing. Participation of farmers in high-paying off-farm activities is more common than participation in low-paying off-farm activities both in terms of participation and income share. Detailed summaries of the description of the data are given in Tables 4. Grain trade is the most popular activity among the high paying off-farm activities in terms of participation and share of income. Farmers' rate of participation in off-farm activities is very low in general because they are rationed in the off-farm labour market (Table 3c) and constrained by start up capital for high paying off farm activities. A considerable number of farmers can not work off-farm because their labour is needed on the farm.

Table 3a: Summary of education, off-farm work participation, adoption, and sex of the head (percent)

| | Percent of participation |
|---|--------------------------|
| Percent of HHs with 1-3 years of sch.(Ed1_3) | 41.3 |
| Percent of HHs with 4-6 years of sch. (Ed4_6) | 11.5 |
| Percent of HHs with >6 years of sch.(Ed12) | 3.2 |
| Percent of HHs with 6-7 years of sch. (ED7) | 1.1 |
| Percent of HHs with >7 years of sch. (ED8) | 1.8 |
| Percent of female headed households (fehh) | 20.7 |
| Low paying off-farm work participation | 20.0 |
| High paying off-farm work participation | 42.3 |
| Over all off-farm work participation | 57.1 |
| Off-farm wage employment | 22.2 |
| Off-farm own business | 38.9 |

Table 3b: Participation rates of various off-farm activities

| Off-farm activities | % |
|--------------------------|------|
| Weaving | 5.4 |
| Milling | 0.5 |
| Handicraft | 5.8 |
| Trade in grain | 10.5 |
| Trade in livestock | 1.0 |
| Transport in pack animal | 0.8 |

Table 3c: Reasons for not seeking off-farm employment

| Reasons | % |
|--------------------|------|
| No opportunity | 47.9 |
| Needed on the farm | 23.4 |
| Jobs too far away | 2.0 |
| Wages too low | 1.5 |

Table 4: Description of variables

| Variable | Description | Mean |
|----------|---|---------|
| ADOPINCR | Rate of technology adoption | 0.42 |
| GROWUSE | Rate of technology adoption and still using r | 0.38 |
| Aequ | Adult equivalent family size | 4.85 |
| Agehead | Age of the household head | 46.26 |
| AWTEFF | Area allocated for white teff (hectare) | 0.18 |
| Cons | Total consumption (USD) | 445.59 |
| Consae | Consumption per adult equivalent (in USD) | 103.34 |
| Conspa | Income per working family members (in USD) | 155.17 |
| Deprat | Dependency ratio | 0.43 |
| Ed1_3 | Percent of HHs with 1-3 years of sch.(Ed1_3) | 41.3 |
| Ed12 | Percent of HHs with >6 years of sch.(Ed12) | 3.2 |
| Ed4_6 | Percent of HHs with 4-6 years of sch. (Ed4_6) | 11.5 |
| Ed7 | Percent of HHs with 6-7 years of sch. (ED7) | 1.1 |
| Ed8 | Percent of HHs with >7 years of sch. (ED8) | 1.8 |
| Fehh | Dummy for female headed household | 0.21 |
| Hhsize | Household size | 6.10 |
| Nudehh1 | Number household members \leq 15years old | 1.71 |
| Nufehh | Number female household members > 15 years old | 1.66 |
| Nufehh2 | Number female household members > 15 years old squared | |
| Numahh | Number male household members > 15 years old | 1.57 |
| Numahh2 | Number male household members > 15 years old squared | |
| School | The average number of schooling for a household | 1.7 |
| Soffin | Income from high-return off-farm work | 81.45 |
| Soffp | Participation in high-return off-farm activities (1 if household participates) | 0.42 |
| Tlandpa | Total land per adult equivalent in hectare | 0.49 |
| TOTLAND | Total land cultivated in hectare (a measure of farm size) | 2.03 |
| Totland2 | Total land cultivated squared | |
| Uoffin | Income from low-return off-farm work | 30.78 |
| Uoffp | Participation in low-return off-farm activities (1 if household participates) | 0.20 |
| Wealth | Wealth (value of livestock and farm implements) measured in Birr | 2292.48 |
| Wealthpa | Wealth per adult equivalent | 482.73 |
| Wteffp | Participation rate in growing of white teff (1 if a household grows white teff) | 0.26 |

5. Econometric Models and Methods of Estimation

The following hypothesis is tested: does schooling increase household welfare by enabling farmers to enter higher-risk/higher-return agricultural and non-agricultural activities? To answer this question, econometric models of technology adoption, entry into high-return/high-risk activities and household welfare are specified following the theoretical models discussed in section 2.

The adoption of new technologies by farmers can be modelled as:

$$U_i(A) = \alpha' X_{Ai} + e_{Ai} \quad (5)$$

where U_i is the net utility gain of a household from using a new technology (A); X_{Ai} is a vector of location, farm and household characteristics, physical capital (e.g., wealth) endowments, human capital endowments; and e_{Ai} is an independently and identically distributed household specific *ex ante* shock. If $U_i > 0$, a household adopts the new technology, whereas if $U_i \leq 0$, the household does not adopt. Consequently, the probability of adopting a new technology is given by:

$$\text{prob}(A_i = 1) = \text{prob}(e_{Ai} > -\alpha' X_{Ai}) = 1 - F(-\alpha' X_{Ai}) \quad (6)$$

where A_i is an index of technology adoption which is equal to 1 if the household adopts the new technology and zero if the household does not adopt the new technology; and F is the cumulative probability distribution function of e_{Ai} .

The model of portfolio choice can be used to build an econometric model of farmers' entry into high-return/high-risk activities. Assume that the expected marginal utility of allocating labour to high-return/high-risk activities is given by $U'(HRA)$ and the expected marginal utility of allocating labour to low-return/low-risk activities is given by $U'(LRA)$. Assume also that

$$U'(HRA) - U'(LRA) = \gamma' X_{Ci} + e_{Ci} \quad (7)$$

where X_{Ci} are variables affecting the expected marginal utility of undertaking both the high-return/high-risk activities and the low-return/low-risk activities; and e_{Ci} are identically and independently distributed household specific shocks. Consequently, the probability that a farm household will undertake high-return/high-risk activities is given by:

$$\begin{aligned} \text{prob}(HRA_i = 1) &= \text{prob}(U'_i(HRA) - U'_i(LRA) > 0) \\ &= \text{prob}(\varepsilon_{Ci} > -\gamma' X_{Ci}) = 1 - F(-\gamma' X_{Ci}) \end{aligned} \quad (8)$$

$$\begin{aligned} \text{prob}(LRA_i = 1) &= \text{prob}(U'_i(HRA) - U'_i(LRA) < 0) \\ &= \text{prob}(\varepsilon_{Ci} < -\gamma' X_{Ci}) = F(-\gamma' X_{Ci}) = 1 - F(\gamma' X_{Ci}) \end{aligned} \quad (9)$$

where HRA_i and LRA_i are index of activity choices of higher return and lower return, respectively, F is the cumulative distribution function of e_{Ci} . In the probability models of (6), (8) and (9), the functional form of F will depend on assumptions made about the error terms. Assuming the cumulative distributions of the error terms (e_i) are logistic, we utilise logit models (Maddala 1983, 22) of subjective risk-aversion, technology adoption and entry into high-return/high-risk activities. For (8), for example, the logit probability model is given by:

$$\text{prob}(HRA_i = 1) = 1 - F(-\gamma' X_{Ci}) = \frac{\exp(\gamma' X_{Ci})}{1 + \exp(\gamma' X_{Ci})} \quad (9)$$

in which the parameters γ (α in the case of (6)) can be estimated using the maximum likelihood estimator (MLE).

The household welfare (C), measured as household consumption per adult equivalent is modelled as:

$$\log C_i = b_0 + \sum_{j=1}^6 b_j X_{ij} + u_i \quad (10)$$

where

C_i = natural logarithm of consumption per adult equivalent;³

X_{i1} = environmental factors (captured by site dummies);

X_{i2} = physical capital (livestock and farm implements), and physical capital squared;

X_{i3} = human capital (such as schooling, experience (age), and schooling and age squared);

X_{i4} = farm characteristics (such as farm size, farm size squared and use of new technology);

³ Adult equivalent family size is computed based on the calorie requirement given by the food composition table prepared by West (1987).

X_{i5} = household characteristics (such as the number of working male and female household members and the number of working male and female household members squared, the number of dependants and sex of the household head);
 u_i and v_i = error terms.

In all models, schooling is defined as average years of schooling of adults in the household. The use of individual education (such as that of the head or wife) may obscure the relationship between human capital, on the one hand, and technology adoption, risk-aversion, and activity choice, on the other.⁴ Owing to traditional ties and the lack of a highly developed division of labour, members of a household are likely to share ideas with each other. In addition, since farming is a family enterprise, it is likely that farm decisions are taken following discussion among household members.

If any of the explanatory variables in an econometric model are endogenous, they will be correlated with the error term, and the parameter estimates will be biased. Hence, the Durbin-Wu-Hausman test of endogeneity, tests for the relevance of instruments and a test of over-identification must be performed (Davidson and MacKinnon 1993, 209-242). For a continuous dependent variable, the test involves regression of each endogenous variable on the instruments and other exogenous variables in the model. Next, the original dependent variable is regressed on the original regressors, augmented by the residuals from the first stage instrumental variable regressions. Under the null hypothesis, the coefficients of the residuals are jointly zero and OLS estimation of the model yields consistent estimates. The alternative hypothesis is that the coefficients of the residuals are not zero and OLS estimation of the model will not yield consistent estimates. The test statistic is distributed as $F_{m, N-k}$, where m is the number of endogenous variables, N is the sample size, and k is the number of parameters estimated.⁵ The relevance of the instruments is tested by regressing each of the suspected endogenous variable on instruments and other exogenous variables in the model and performing F-tests of the joint significance of the instruments. The validity of the choice of instruments may be tested, at least to a limited extent, by an over-identification (OID) test. Following Davidson and MacKinnon (1993, 236), a regression of the instrumental-variables residuals on the full instrument matrix gives rise to a Lagrange multiplier test statistic (R-squared multiplied by N) for the joint null hypothesis that the equation is properly specified and the instruments are valid (i.e. uncorrelated with the error term). The test statistic, under the null, is distributed as

⁴ We have tried to use the schooling of the household head alone, but it was not significant in any of the estimations.

⁵ The same procedure can be used to test the endogeneity of explanatory variables in limited dependent models, such as logit, probit and tobit models (Smith and Blundell 1986).

$\chi^2(m)$, where m is the number of over-identifying restrictions. A rejection of the null hypothesis casts doubt on the validity of the instruments.

For all models, robust standard errors (from which the t-ratios are derived) are ensured by adjusting for the cluster effects (see Deaton 1997, 73-78 for a discussion and formulas used to derive standard errors). The ERHS used stratified random sampling in which Peasant Associations were first selected and farm households were then chosen randomly from each site. The peasant associations selected for the survey are widely separated geographically and may have distinct characteristics. There may be more homogeneity within peasant associations than between them. Hence, we control for cluster effects in the econometric estimation.

6. Estimation Results

6.1. Schooling and Technology Adoption

Equation of technology adoption is specified as a dichotomous variable set equal to one if a farmer has adopted at least one innovative input and at least one innovative crop and zero if the farmer did not adopt both an innovative input and an innovative crop. This fairly strict definition of technology adoption was chosen because many households have adopted either a new input or a new crop but adopting both is more rare and indicates a greater commitment to innovation than having adopted only one or the other.

Innovation adoption is assumed to be dependent on the sex and age of the household head, land owned per adult equivalent and schooling. Site-specific fixed effects are also expected to play an important role. Hence, we will control for these using site dummy variables. We do not control for other potentially relevant variables, such as household income and land quality, because of possible endogeneity and because current values of such variables may not reflect conditions at the time when the adoption decision was made. Land quality may have been improved but, since it cannot be bought or sold, land quantity is likely to be exogenous.

The Durbin Wu-Hausman test was performed to determine whether schooling is endogenous to the model.⁶ However, the null hypothesis that the suspected endogenous variables are at least weakly exogenous cannot be rejected. The *p-value* is very high (0.76). Hence, the logit model of technology adoption is estimated without instruments.

⁶ The instruments used are: the average age of adult members, the number of household members who can read and write, a dummy for whether the head of the household can read and write, and the number of extension visits.

The estimations result for equation (6) of our theoretical model with technology adoption as the dependent variable are given in Table 5. The probability of adopting new technologies increases with the age of the household head, but not statistically significant. The coefficient on the dummy for being a female-headed household is negative and significant. This suggests that female-headed households are less likely to adopt innovations than male-headed households. Land cultivated per adult equivalent does not show statistically significant effect on technology adoption. Once again, the site dummies are highly significant, indicating that there are important site fixed effects, which determine whether or not households will adopt innovations.

Controlling for other factors, which affect adoption, schooling has a statistically significant influence on the willingness of farmers to adopt new technologies. The higher is the average of years of schooling of adults in the household, the greater the probability of adopting innovations. Re-estimating the model with years of schooling replaced by a series of dummy variables to indicate whether average education in the household is between 1 and 3 years, 4 to 6 years or more than 6 years, we find that households where average education is at the secondary level are more than twice as likely to have adopted new technologies as are households where average education is at the primary level. The positive effect of education on technology adoption may be related to the existence of credit constraints which may be less binding for more educated people. Moreover, education is positively associated with technology adoption as educated farmers are less subjectively risk averse than the uneducated ones (Knight, Weir and Woldehanna, 2003),

Table 5: The effect of schooling on technology adoption (dependent variable = ADOPINCR, n=1043)

| ADOPINCR | Version one | | | Version two | | |
|-----------------------------|-------------|-----------------------------------|---------------|-------------|---------|---------------|
| | Coefficient | T-ratio | Marginal eff. | Coefficient | T-ratio | Marginal eff. |
| Fehhh | -0.788 | -2.940 | -0.197 | -0.710 | -2.579 | -0.177 |
| Agehead | 0.003 | 0.432 | 0.001 | 0.003 | 0.440 | 0.001 |
| School | 0.102 | 1.138 | 0.025 | | | |
| ed1_3 | | | | 0.591 | 3.713 | 0.148 |
| ed4_6 | | | | 0.440 | 1.110 | 0.110 |
| ed12 | | | | 0.965 | 1.663 | 0.241 |
| Tlandpa | -0.039 | -1.000 | -0.010 | -0.041 | -1.079 | -0.010 |
| Constant | -1.558 | -3.817 | -0.389 | -1.819 | -4.880 | -0.455 |
| Pseudo R2 | 0.469 | | | 0.725 | | |
| Log likelihood | -383.480 | | | -380.980 | | |
| Hausman test of endogeneity | | $\chi^2(1)=0.094$; p-value=0.759 | | | | |

There are 10 site dummies not shown here for the purpose of economising space. Site 14 drops because it predicts failure completely. Hence 113 observations were dropped.

6.2. Schooling and Activity Choice

Estimation results for equation (10) in our model (predicting the probability of growing white *teff* and participating in unskilled and skilled off-farm work) are presented in Tables 6 and 7. Since white *teff* commands one of the highest (but the most volatile) cereal prices and is highly associated with extension activities, schooling should influence the decision to grow this crop. If farmers are less educated, they can choose low-paying/low-risk activities. To test whether schooling is important to activity choice, we estimated logit models of growing white *teff* and of working in low-return and high-return activities.

In all three logit models, we use sex of the household head, age of the household head, the square of age, wealth, farm size, the square of farm size, the number of male and female working family members, the square of number of male and female working family members, the number of dependants, average years of schooling of adults in the household, and site dummies.⁷ In addition, the squares of wealth and schooling are included only in the logit model of growing white *teff*.⁸

The Durbin Wu-Hausman test of weak exogeneity was performed to test whether wealth, and schooling are endogenous to the models.⁹ F-tests reject the null hypothesis that the variables are jointly exogenous for the probability of participating in high-paying off-farm activities, but not for the probability of growing white *teff* and participating in low-paying off-farm activities. Hence, instrumental variables estimation is used for the logit model of high-return off-farm work participation. For the others, we use uninstrumented logit models.

The probability of growing white *teff* is estimated, and the results are presented in Table 6, female-headed households are significantly less likely to produce white *teff* than male-headed households. This indicates that households headed by women

⁷ Because *teff* (white *teff*) is not grown in Imdibir, this site is dropped from the estimation.

⁸ Preliminary regressions showed that the squares of wealth and schooling were not significant in the off-farm work participation equations.

⁹ Instruments include: the number of household members who can read and write, a dummy for whether the head of the household can read and write, the average age of adults in the household, the average age of the household's dependants, a dummy indicating whether or not the father of the household head was a farmer, a dummy for whether the household has a house made from cement and a metal roof, the amount of grazing land available to the household, and consumption per adult equivalent.

face constraints which are not encountered by male-headed households. Age of the head is not significant. Farm size and wealth, all influence the probability of growing white *teff* positively, but at a diminishing rate. Farm size has positively affects the probability of growing white *teff*, reaching a maximum at 2.8 hectares of land (above mean farm size). The positive effect of farm size and wealth might be due the fact that wealthy farmers are less risk averse and have the capacity to cope up with risk. Schooling affects the probability of growing *white teff* positively, but at a diminishing rate. However, the coefficient of the average years of schooling of adults is not statistically significant. Using a series of dummy variables do not affect the result either.

Table 6: The logit (probability) of growing white teff (dependent variable=wteffp, n=961)

| | Coef_OLS | T-ratio |
|---|---------------|---------------|
| Fehhh | -0.407 | -1.220 |
| Agehead | -0.041 | -1.017 |
| age2 | 0.001 | 1.357 |
| TOTLAND | 1.337 | 6.143 |
| totland2 | -0.114 | -4.638 |
| Numahh | -0.070 | -0.226 |
| Nufehh | -0.147 | -0.458 |
| numahh2 | -0.001 | -0.019 |
| nufehh2 | 0.029 | 0.514 |
| nudehh1 | -0.095 | -1.187 |
| School | 0.170 | 1.207 |
| School squared | -0.026 | -1.592 |
| Wealth/100 | 0.036 | 3.819 |
| Wealth/100 squared | -0.0001 | -2.017 |
| Constant | -0.233 | -0.230 |
| N | 961 | |
| Log likelihood | -318.233 | |
| Pseudo R ² | 0.484 | |
| Hausman test of endogeneity $\chi^2(4) = 2.03$; P-value 0.73 | | |

Estimation results for participation in low return and high return off-farm activities are given in Table 7. Female-headed households and those with lower adult household members have a lower probability of participation in these low-return off-farm activities than male-headed households and those with higher adults. Farmers with more land are expected to have a lower probability of working in low-return off-farm activities. This is found to be the case. However, the coefficient on farm size is not statistically significant. Not surprisingly, the site dummy variables are also important. This may reflect differences in opportunities or in the necessity for such activities

between the sites. Schooling is found to decrease the probability of entry into low-return off-farm work.

There are 10 site dummies not shown here for the purpose of economising space. Site8~=0 predicts failure perfectly, site8 dropped and 93 obs not used, site14~=0 predicts failure perfectly, site 14 dropped and 114 obs not used; site16~=0 predicts failure perfectly, site16 dropped and 62 obs not used; Note: site12~=0 predicts failure perfectly and site12 dropped and 63 obs not used

6.3. Human Capital and Household Welfare

To test the effect of schooling, wealth and other household and farm characteristics on household welfare, equation (10) is estimated with consumption per adult equivalent as the dependent variable. Consumption per adult equivalent is used as a proxy for welfare. The explanatory variables used are site dummies, age, the square of age, farm size, the square of farm size, the numbers of working male and female family members and the squares of the numbers of working male and female family members, the number of dependants, wealth, the square of wealth, schooling, the square of schooling, and a dummy variable for the adoption of new technologies.

Table 7: The logit (probability) of working in low and high paying off-farm activities (dependent variables = uoffp, soffp, n=1295)

| | UOFFP (ols) | | | SOFFP (IV estimator) | | |
|-----------------------------|-------------------------------|-----------------|---------|-------------------------------|-----------------|---------|
| | Coefficient | Marginal effect | T-ratio | Coefficient | Marginal effect | T-ratio |
| Agehead | 0.056 | 0.006 | 1.478 | 0.054 | 0.013 | 2.071 |
| age2/100 | -0.072 | -0.007 | -2.091 | -0.058 | -0.014 | -2.272 |
| Fehhh | -0.758 | -0.076 | -2.592 | -0.174 | -0.041 | -0.821 |
| Wealth/100 | -0.024 | -0.002 | -3.739 | -0.004 | -0.001 | -0.358 |
| TOTLAND | -0.090 | -0.009 | -1.048 | 0.026 | 0.006 | 0.337 |
| totland2 | 0.001 | 0.0001 | 1.202 | -0.0002 | -0.00004 | -0.352 |
| Numahh | 0.539 | 0.054 | 1.680 | 0.241 | 0.056 | 1.193 |
| Nufehh | 0.456 | 0.046 | 1.658 | 0.012 | 0.003 | 0.057 |
| numahh2 | -0.087 | -0.009 | -1.617 | -0.042 | -0.010 | -1.288 |
| nufehh2 | -0.064 | -0.006 | -1.150 | 0.034 | 0.008 | 1.494 |
| nudehh1 | -0.104 | -0.010 | -2.604 | -0.023 | -0.005 | -0.512 |
| School | -0.124 | -0.012 | -1.951 | 0.255 | 0.060 | 2.235 |
| Constant | -2.082 | -0.209 | -2.308 | -3.225 | -0.754 | -3.587 |
| Log likelihood | -473.751 | | | 693.524 | | |
| PseudoR2 | 0.242 | | | 0.294 | | |
| N | 1295 | | | 1455 | | |
| Hausman test of endogeneity | Ch(2)=3.743; P-value = 0.1589 | | | Ch(2)=9.139; P-value = 0.0104 | | |

There are 10 site dummies not shown here for the purpose of economising space.

Table 8: Determinants of welfare (dependent variable = natural logarithm of consumption per adult equivalent)

| Explanatory variables | Version 1 | | Version 2 | |
|--------------------------|---------------------------------------|--------------|----------------|--------------|
| | Coefficient | T-ratio | Coefficient | T-ratio |
| Agehead | -0.015 | -1.923 | -0.020 | -2.746 |
| age2/100 | 0.013 | 1.825 | 0.016 | 2.451 |
| Wealth/100 | 0.011 | 1.199 | 0.012 | 1.364 |
| Wealth/100 squared | 0.000 | -0.947 | 0.000 | -1.124 |
| School | 0.077 | 3.120 | | |
| School squared | 0.005 | 1.063 | | |
| ed1_3 | | | 0.090 | 2.856 |
| ed4_6 | | | 0.176 | 3.869 |
| ed7 | | | 0.623 | 4.601 |
| ed8 | | | 0.47875 | 2.882 |
| ADOPINCR | 0.157 | 2.199 | 0.150 | 2.097 |
| TOTLAND | 0.025 | 2.326 | 0.023 | 1.968 |
| totland2 | -0.0002 | -2.429 | -0.0001 | -2.054 |
| Numahh | -0.112 | -1.590 | -0.109 | -1.660 |
| Nufehh | -0.199 | -3.564 | -0.204 | -3.404 |
| numahh2 | 0.002 | 0.372 | 0.006 | 0.982 |
| nufehh2 | 0.028 | 3.387 | 0.029 | 3.132 |
| Nudehh1 | -0.098 | -3.184 | -0.100 | -3.328 |
| Constant | 4.898 | 7.915 | 5.001 | 8.561 |
| R ² | 0.297 | | 0.298 | |
| Durbin Wu-Hausman test | F(5,1207) = 2.95; P-value =0.012 | | | |
| Over-identification test | $\chi^2(1) = 1.806$; P-value = 0.179 | | | |

The effect of technology adoption, area of land cultivated, and labour endowments on household income (welfare) are positive, and statistically significant. The effect of wealth is not found to be statistically significant, possibly due to multicollinearity. Controlling for other factors, schooling significantly explains the variation in the welfare level of households in rural Ethiopia. Schooling significantly increases household income and hence welfare. On the average one year of schooling is calculated to increase household welfare by 8.5 percent. The possible mechanism for schooling to increase household income (and hence welfare) is by enabling household to adopt new technologies and to enter into profitable off-farm activities.

7. Conclusions

Using data from the Ethiopia Rural Household Survey, we have been able to assess the effects of schooling and innovative behaviour upon household consumption per adult equivalent (a proxy for household welfare and poverty) are considered. We found evidence to suggest that human capital have both direct and indirect effects on income poverty (household welfare). Schooling affects poverty indirectly through its effects upon increasing the adoption of innovations. The other mechanism by which schooling reduces poverty is by enabling farmers to enter into profitable non-farm activities. In total, an extra year of schooling raise household welfare (income per adult equivalent and hence reduce poverty) by 8.5 percent. Furthermore, strengthening the extension system, increasing endowment of quality of labour and assets might help to reduce income poverty.

Given the evidence on the role of schooling on entry into higher-return/high-risk investment activities and the adoption of technologies, education will have far reaching effects in rural Ethiopia. By investing more in human capital, farmers become more willing and more able to adopt technology and consequently earn higher income and escape out of income poverty. Hence expansion of education can be used a mechanism to reduce rural poverty in Ethiopia. These findings may provide an incentive to governments and donor organisations to expand rural schooling and encourage parents to send their children to school as a means of reducing material deprivation (income poverty).

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Concepts of Social Time and Their Socio-Economic Implications

Tadesse Biru Kersmo*

Abstract

“Time” is an important socio-economic concept. Different societies perceive time differently. Within any given society, groups may differ one from the other on the way how each perceives time. Further more, the same individual may conceive time differently under different situations. These differences may have far reaching socio-economic consequences by shaping attitudes towards work, leisure and planning. Therefore, understanding how people in different cultures reckon time may serve as a foundation to study the socio-cultural factors of development. This article tries to explore different conceptions of social time and their possible socio-economic implications.

Introduction

Throughout this article, the term *time* is defined as “internal, ontological property of social events and processes (Sztompka, 1993: 45)”. Thus we are dealing with time, not as it is measured by clocks or calendars, but by events. Our focus shall, therefore, be on the *qualitative* aspect of time (time in terms of events), and not on the *quantitative* aspect (time in terms of measurements).

The concept of *time* is one of the most important sociological concepts. Each academic discipline defines it in its own way. Economics, for example, defines *time* as duration needed for making business decisions. Therefore, it acknowledges the existence of overlapping business cycles like the Kitchen (inventory) cycles, Juggler (Kuznet’s) cycles, and Kondratef’s cycles. Archaeology, on the other hand, conceives *time* differently; it takes the life cycle of certain elements (especially Uranium) as a means for measuring archeological time. Political history, in turn, has its own way of understanding time: major uprisings, conflicts, wars, periodic elections in democratic societies, etc., may be considered as reference points to reckon historic time. Likewise, physics, astronomy, biology, chemistry, etc. have their own way of perceiving and interpreting *time*.

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Different societies, as a consequence of differences in their cultures, perceive time in different ways: such as a linear continuum, or as a cycle of events. Moreover, within any given society different sub-groups may conceive of time differently: the younger generation, for example, may conceive time differently than the older generation; the employed may have a dissimilar perception from the unemployed, intellectuals from manual laborers, etc. Furthermore, the same individual may conceive of time differently under different situations. For instance, an hour spent on public act is seldom considered to be equivalent to an hour spent on a private affair. "There are various kinds of temporality and duration, not all measurable in the modern (clock) sense (Oster 1993: 11)."

Although different conceptions of time exist at the same time, one or few of them may dominate the others at a community level. It is only in this sense that one can talk about African, Asian, European, or Judeo-Christian and Islam, Confucian or Hindu concepts of time.

The objectives of this article are, therefore,

- a) formalizing concepts of social time so as to make value-neutral analysis possible; and
- b) pave the road for further investigations for value-loaded analyses concerning the implications of the dominant conceptions of time in determining the socio-economic development of community or nation.

The article discusses seven models of concepts of social time with greater emphasis on five on them; then it deals with the possible socio-economic implications of the dominant conception of social time.

Models of Conception of Social Time



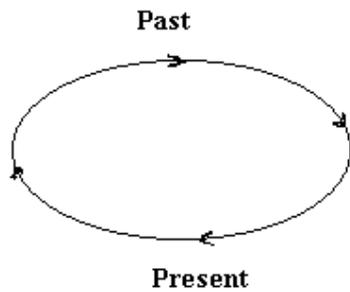
1. *Line-Segmental Conception of Time*



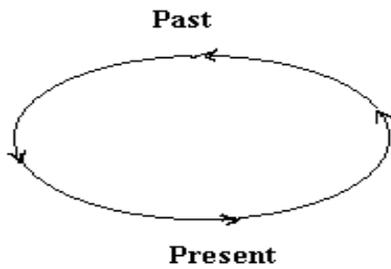
2. *Linear Conception of Time*



3. *Linear with Limits on Both Sides*



4. *Circular Clockwise Conception of time*



5. *Circular Anticlockwise Conception of Time*

1. Line-Segmental Conception of Time

"When you are dead, you're dead and that is the end of you."
A Baka pygmy (Woodburn, 1986: 195)

Anthropologically, the line-segmental conception of time seems to be the oldest; although it still exists in different forms. According to this conception of time, neither the past nor the future is relevant. Events that occurred in the far past are either unknown or unimportant for today's life; and, therefore, they do not constitute social time. Events that are going to take place in the distant future are also unknown and unpredictable; and, therefore, they do not constitute social time, either. According to this conception, the only relevant dimension of social time is the present.

The cultural perception of life and death of the Baka pygmies of Cameroon may help us to understand the peculiarity of this mode of conception of time. The Baka pygmies are hunter-gatherers with highly distinct culture; and constitute a minority of the population of Cameroon. Robert Dodd, an anthropologist, said (as reported by Woodburn, 1986: 195):

The Baka do not traditionally believe in a life after death; nor do they have concept of ancestors, ghosts or human spirits. When a person dies, there is an immediate period of personal grief and a sense of great loss, and then life continues as before. When questioned what happens to an individual when he is dead, conservative or 'traditional' Baka, like those with whom most of the research was done, reported that, 'when you are dead, you're dead and that is the end of you'.

According to Colin Turnbull (1965: 47), a hunting minority in Zaire-Mbuti also avoids speculation about whether there is life after death and their response to the villagers, missionaries or any one who claim a knowledge of the after life is to say, "How do you know? Have you died and been there?"

It should be clear that the statement: "They do not have any concept of ancestors, ghosts or human spirits" does not necessarily mean that children do not know their parents, grandparents, or great-grand parents. They would certainly know them as long as they are in "NOW" time. They may even experience "immediate sense of great loss" when their parents die. What is actually absent here is the concept of ancestors, ghosts or human spirits; (the vital concept in all "modern" thinking) that the dead determine current events; that they are still "living" somehow. "If you are dead, that is

the end of you" implies that if you are dead, you cannot affect future events in anyway. Even the event in which you had a central role in shaping and realizing it while you were alive will "die" with you; that is the end of you! Note that "the immediate sense of great loss" has nothing to do with awareness of the past or the future. It has neither to do with the fate of the dead nor with that of the livings. It is the living (now) that experiences (now) personal grief and a sense of great loss of their beloved (now). The above line of argument is fully bounded by the "NOW" time. The absence of the concept of ancestors symbolizes the absence of linkage between the past and the present, and between the present and the future. Simply put, both the past and the future are void.

The line-segmental concept of time have existed and continued to survive in preliterate societies probably due to lack of the means and knowledge for keeping records of the past and limited capacity of predicting the future. In such communities, life is dominated by meteorological and biological events that are largely beyond human control.

However, this concept has revived with some modifications and it still exists in the modern societies including the Western civilization. Its reappearance takes the form of "**presetivism**", as is the case of linear, with limits on both sides, conception of time, which will be discussed in section III.

2. Linear Conception of Time

Strictly speaking, there is no present, because social processes are continuous, and at every conceivable moment they are incessantly passing from the past to the future, they are already in the past, or no longer in the future, (Sztompka, 1993: 43).

According to the linear conception of time, events and even life itself, are passing away. What has already passed and gone by is already out of our influence. We may learn from the past, but we cannot effectively change events that have already occurred. Thus, time has only two dimensions: the *past* and the *future* while the "present" is a matter of blind conviction, which actually does not exist.

From such a conception, one could arrive to a conclusion that people have only two tasks to perform: *evaluating the past* and *planning the future*. Implementation of plan occurs somehow automatically and subconsciously. For a simple analogy, assume a

person walking. He or she evaluates the distance covered and “plans” how to cover the remaining distance by determining his/her speed while, however, each step is taken subconsciously. This analogy is valid for more important events as well because implementation of grand plans demands planning how that plan may be executed.

Linear conception of time seems to be an optimistic understanding of the world. It conceives history as moving “forward” - towards a future climax. Further more, the past represents primitiveness, imperfections, lack of knowledge and poverty of various types. The future, on the other hand, represents promises for modernity, perfection, the fullness of knowledge, and happiness. Hence, each action should be judged according to its expected future value.

This conception has two dramatically opposite effects. On the one hand, it helps people behave in certain ways that benefit the future generation. It makes people wish to sacrifice their present well being in favor of the future. James Buchanan, the 1986 Nobel Prize laureate in economics, after delivering his Nobel lecture was asked the following question by Gunner Eliason:

The conclusion of your talk is that modern governments are not really taking responsibility for the long-term. And if everybody that is operating in the market are also myopic, as we know that we are, who is going to take care of the long term? (Buchanan, 1987)

J. Buchanan (1987) acknowledged that it is probably the most serious problem of all. He went further on describing that many of the current economic problems, including inflation and deficits, are associated with the declining awareness about the future well being.

The Victorians knew that they were not going to live always, but they acted as if they were going to live always and created institutions for the purpose of being permanent institutions. I think we are living on a capital value of that heritage (Buchanan 1987).

On the other hand, this conception may cause dangerous effects. Since the past is associated with primitiveness and imperfections, people will wish to preserve *only the best of what they have inherited*. Who is going to choose the best? Who is going to tell what is best for the well being of the future? The answer for both questions is obvious - leaders and, with a lesser success, intellectuals. Genetic, cultural, economic,

political, and social “engineering” of various sorts are some of the possible outcomes. Hitler’s eugenics program, the holocaust, African slave trade, apartheid, ethnic cleansing are only some of the many examples that have been justified on the basis of preserving only the best of the heritage.

People who conceive time in this way are generally unaware of the present. For them the present actually does not exist; it is only a superficial fabrication. They are ready to pay huge sacrifice for the well being of the future. They may accept current mass sufferings as a necessary price, if they believe that the future generation will live a better life. Charismatic leaders of all times and places and western and west-oriented intellectuals seem to favor this conception. The “pure model” charismatic leader, Jesus Christ, said: “If any man comes to me and hates not his father, and mother, and wife, and children, and brethren, and sisters, yea, and his own life also, he cannot be my disciple (Luke, 14:26).” The minimum requirement for giving one’s service to a charismatic leader has always been to ignore the present and look toward to the future in order to attain positive results, whatever they may be, through sweeping transformations regardless of the risks that might be involved in the present.

Historically, Judeo-Christian and Islamic religions are believed to have played vital roles in forming such a conception of time. God existed, exists and will exist. The universe was created some time in the past; and will come to an end sometime in the future, resulting into two dimensions of time, the past and the future. Beyond the future, after the universe has come to an end, time enters into a qualitatively new and different dimension where eternity is guaranteed. Thus, a righteous and holy person would ignore the present; willfully curtail the effects of his/her environment and altogether reject the present in favor of eternal life in the hereafter. *There is, therefore, no “present” for the true Christian and Islam.* This might explain why the followers of the two religions are often depicted as being the most militant as compared with others. Fascism, communism, and fundamentalism of various sorts have all emerged from cultures dominated by these two major religions of the world. This does not look as if it were a chance occurrence; on the contrary, a linear conception of time and the perception of history with futuristic direction and orientation seem to have much to do with it.

3. Linear with Limits on Both Sides Conception of Time

Time is the social interpretation of reality with respect to the difference between past and present (Luhmann, 1987: 274).

According to this conception, there is no fixed moment where the past begins and the future ends. Actually, neither of them ever began nor ended. The past and future are temporal horizons; one may approach them, but never touch or surpass them. The essential characteristics of a horizon is that although we can never touch it or never surpass it, it nevertheless contributes to the definition of our situation (Luhmann, 278). What is meant by the "past"? The "past" as such is mythical time. For any past there is past; for any past of past, there is past. We do not know when the past started and we do not know when it ended. When we talk about events that took place in the past, we are talking about events that were present then, or we are expressing our present interpretation of events we think were present then. In both cases, the past does not stand independent of the present.

What is meant by the "future"? The "future" as such is also a mythical time. For any future, there is future; for any future of future, there is future. Neither do we know where the future begins, nor where it ends. When we talk about the future, we are talking about events that are likely to be present then, or we are expressing our current interpretation of events we think will be present in the future. In both cases, the future does not stand independent of the present.

Therefore, the real social time is the present time. It is in between the two mythical times: the past and the future. It "moves" bi-directionally, the past and future being its limits. This means that we must conceive both the future and the past as 'temporal horizons' of the present. The present thus receives a special status by virtue of its function. It interrelates time and reality and represents a set of constraints on the temporal integration of the future and the past (Luhmann, 278).

The *present* may be classified as follows:

1. Present-Present – the time span in which events occur. It is now, today, this week, this year and so on. We are living in the *present-present*; we are experiencing events that are occurring in it.

2. Present-Future – our present *vision* of the future. This is the future in our consciousness, in our mind, in our contemporary plans, and dreams. It is shaped by our hopes and fears. Almost all societies have their own present-future. For the optimists, it is prosperity, liberty, fraternity, equality, stability, unity and peace. For the pessimists, it might be hunger, ecological catastrophe, inequality, conflicts or war. For the optimists, it is heaven on earth; while for the pessimists, it is hell on earth. Even

within the optimists, for some, it is communism; for others - market-democracy. Individuals too have their own present-futures: to be a successful entrepreneur, president, manager, professor, or what ever. Present-day vision of the future is very important because it shapes the behavior of the actors in the present-present. Political and religious activities are among those that are highly influenced by actors' contemporary vision of the future. We behave according to our present-future and this, to a considerable extent, determines events in the present-present. Further more, the present-future is in constant change. It is, therefore, possible to change the present by changing the present-future.

3. Future-Present – set of events that are going to take place in the future. The degree of certainty that these events will take place is crucial. People are certain that they will die some time in the future; and this is probably the most important knowledge about the future that has already shaped human behavior. If a bit more information was available (for example, if people knew the exact date of their death, or if they were to die at a certain age), the behavior of humankind would have been radically different. If it is certain that an event will occur sometime in the future, it will affect the present as if the event itself is in the present. Assume, for example, that it is known that a volcano will definitely erupt in a certain city ten years from now. Evidently, planning, thorough and meticulous preparations, followed by energetic and enthusiastic actions to save the city and its inhabitants will certainly be taken as of the present moment. (Interestingly, the future-present may pass to the past without being in the present-present. In the example of imminent volcano eruption, scientists might workout methods that could neutralize the volcano, and therefore avoid the destruction of city. Thus, the event, which was certain to occur, may be made to pass to the past.) The future-present does not solely consist of events with a hundred per cent probability. It is composed of all events whose probability of being real is greater than zero percent, although most people conceive of it as a set of events whose probability of occurrence is quite high. Technological forecasting and controls enable us to incorporate part of the future with the present to form the future-present. The future, which is not integrated with the present either as present-future or as future-present is irrelevant; it is mythical time because it never begins, as Luhmann said (1997). This classification is different from the more popular notions “short-term” and “long-term”. If it is not integrated with the present, the future is irrelevant independent of the term. An event anticipated to occur in 100 years from now is in the future-present (actions will be taken to control that event), whereas much of tomorrow is irrelevant; surely, we can neither visualize the whole of tomorrow, nor can we plan for every second of it.

4. Present-Past – present vision of the past. The present-past is our interpretation of events that occurred in the past; it is the past in our consciousness, i.e., in our mind, or what we understand when we read history. Almost all societies have their own present-past: for some it is perfect (the “golden-age” was in the past), for others the opposite. Likewise, individuals do have their own present-past, as well. The present-past is important because it shapes events in the present-present. It is not a novel fact that events occurred in the past can be interpreted in dramatically different ways by different people and groups. When a certain political group announces that it stands for the restoration of the country’s “glorious history”, it deals with its own interpretation of that history. However, if the interpretation is attractive, it might be sufficient to create serious events at the present. The birth of *Jesus*, *Mohammed*, or *Buddha* and the associated activities are believed to be events occurred in the past; but the interpretations of those events are in the present and they are still shaping the present. Thus, what is really important is not the event that occurred then but our present understanding concerning that event. For instance, it makes little difference, if any, if scientifically proved that neither *Jesus*, nor *Mohammed*, nor *Buddha* has ever existed.

5. Past-Present – set of events that occurred in the past but that are still influencing events in the present. It can be said it is what is *written* in history books. For example, World War II is an event that occurred in the past. It was in the present-present then; today, however, it is in the past-present because it is still actively shaping events (e.g. changes that have taken place in political restructuring of Europe). The past that is not integrated with the present, either as a present-past or as a past-present, is irrelevant. Again, this classification is different from the notions “near-past” and “distance-past”.

Linear with limits on both sides conception of time seems to be the prominent type of conception in the modern societies. In Neoclassical economics, for example, investment, employment, education, and other private economic decisions are based on *the present value of expected future returns*. *Permanent-income theory* and *Life-cycle theory* of Milton Friedman and Franko Modigliani, for example, describe how anticipated changes in future incomes influence the current consumption behaviors of the household. If a household anticipates (permanent) future changes in its dispensable income, it will start to adjust by increasing its expenditures, according to the above theories. Such an outcome cannot be expected from a society with a different concept of time. The concept of “time value of money” is a derivation of this concept. It is due to this conception that Franklin’s dictum, “time is money”, makes

sense. Under this conception, time is a private property, a private good that can be sold or purchased.

Although it is debatable, one may argue that this conception has served to the development of competitive market economy. However, there are several negative side effects as well. When time becomes a commodity which is subject to exchange, "commodity fetishism" may take a form of "time fetishism", becoming a master, King or Queen, even God. Since time is conceived as a vital scarce economic resource, problems of scarcity will manifest themselves in relation to time management as well. Whether or not the phenomenon of scarcity has helped people to work harder remains to be studied.

Another side effect associated with this conception of time is age. In societies in which such conception of time is dominant, "the aged become a social problem because they are not economically productive (Oster, 70)." They cannot serve the younger generation in anyway, even as advisors, because their knowledge soon becomes outdated. It is a society in which parents learn from their children and not the other way round.

4. Circular-Clockwise Conception of Time

Generations come and generations go, but the world stays the same. What has been done before will be done again. There is nothing new in the world. "Look," they say, "here is something new!" But no, it has all happened before, long before we were born. Whatever happens or can happen has already happened before. God makes the same thing happen again and again (Ecclesiastes I: 4,9; II: 15 [Modern English Version].

According to this conception of time, contemporary events are repetitions of events that took place some time in the past. Events that are occurring now will certainly reappear sometime in the future. Thus, the future, what lies ahead of us, is composed of events experienced by our ancestors. Days, weeks, seasons are passing away but certainly they will return back.

Probably, the most interesting thing in this model is that time "moves" first backwards from the present (if the present is taken as a starting point) to the past, and then forward from the past to the future to form a full cycle. However, there seems to be no convincing

reason to consider the present as a starting point since time is cyclical, with neither a beginning nor an end.

To illustrate the point, let us examine the life of an individual. According to this conception, birth is a *reincarnation*, a process by which the dead “return back”; a re-unification of the spirit of the dead with a new physical body. Thus, birth is not a one-time act, but that which starts long before fertility; and lasts long after birth. An infant, for example, is a yet not-fully-born person. A child needs to go through several stages and rituals to be considered as a fully born man or woman. Likewise, death is a long process through which the person “changes” his current physical body. It starts long before and lasts long after the physical death. The process of death starts at birth; the process of birth starts at death.

The Hindu conception of life and death is an example. As Shulman (90) has said,

The Hindu universe is a closed circuit: nothing new can be produced except by destroying or transforming something else. To attain more life ... the life of the victim must be extinguished. Life and death are two facets of a single never-ending cycle.

The Hindus cremate the corpse of the dead in order to be sure that the dead will be restored to life. “Cremation is cosmogony, and an individual’s death is assimilated to the process of cosmic regeneration. It, therefore, represents a renewal of time (Parry, 76-7).” In some texts the dead is described as rising in the form of smoke from the pyre, turning into clouds, rain and then vegetables, which when eaten are transformed into semen (81). An alternative explanation is that the world was created by fire and flood; so is “the dead is cremated and his ashes immersed in water in order that he is restored to life (76)”. The funeral processes of an old person, for example, is described as a second marriage party and is accompanied by dancing. Although the explanations differ one for the other, the time concept behind them is the same: cremation is an act of creation; destruction of the corpse is a source of future life. If we follow this line of argument, then death regenerates life and regeneration of life causes death (81). Not only life and death, but also all other events pass away to the past only to return back in future.

What, then, might history mean under such a conception of time? What is the role of people in making history? As it is clear from the above discussion, cosmic law governs history, which is circular. However, life is not passive, as it might seem. There is

enough room for people living in the present to influence history in the long run. They may accommodate or deform the cosmic, circular course of history. If, for instance, Hindus do not cremate the dead, a tiny trend in the grand cosmic cycle will be deformed creating a new cycle for an inferior "strange creature." When the ancient Hindus and Chinese built castles, it seems, they were less aware of whether or not they were going to complete the project during their physical lifetime. The most important thing for them was that such actions accommodate the cosmic cycle, and hope that they would be reborn in the already built and completed castles.

Under this conception, current actions may be judged as effective only after a long period of time, when a full circle has been achieved. Sharp turns and "social engineering" are unacceptable since they destroy the cosmic law and time, regardless of whether or not the proposed radical ideas are attractive at the moment, because in the long-run the result of such actions may be dangerous since the cosmic law has not been preserved.

Under this conception, time is not a private property; rather, it is a public good like the air in the atmosphere. People may take care of it or neglect it, as they would take care of the atmospheric air, or pollute it. Traditional practices like Yoga can be understood as means of effective control against "evil" attempts of destroying the circular cosmic law and consequently the public time stock. This is why, the highest achievement in Yoga is to approximate the absolute - *Brahma* (Kapten, 1991). Of course, such cultural practices and norms instigate conservatism; but conservatism of this type is very different from conservatism based on past-orientation. This can be explained by the fact that despite the conservative attitude discussed above, the ancient east, where circular clockwise conception of time has clearly been dominant in the past, was striving to get control of time and therefore it was a very active society in terms of invention but relatively inactive in terms of implementing them in practice. That is why many of the major European innovations are results of the ancient Asian inventions.

5. Circular Anti-clockwise Conception of Time

The crucial difference between this conception and the previous one is the direction of the movement; and it is so important as to make this conception distinct.

There are some common characteristics between the circular anti-clockwise and the linear conceptions of time. First, in both, the *present* is a cumulative effect of the *past*; and secondly, contemporary events define or limit the future. However, there is a third,

and seemingly paradoxical point in the circular anti-clock wise model, according to which the future defines or limits the past.

To illustrate the idea, let's take a farmer watering the young plants and clearing the weeds. The fact that he is doing these things today are caused by the legacy of the past that he has planted them in the past and that yesterday was not yet the right time to water and weed them. What he is doing today will, in turn, determine future events such as harvesting. It is, therefore, the existence of the harvesting period (which is in the future) that determined the planting period (which was in the past). But, how the farmer happened to know that there will certainly be (in the future) harvesting period that engendered all the activities of the past and the present? He learned this from experience; not from his own experiences alone but largely from those of his ancestors. It is, therefore, the knowledge of the past that has determined all of his past, present as well as future activities. Thus, the past is a source of all knowledge. He, who knows the past best, knows the future best. Societies with this conception of time are said to be past-oriented.

The concept of ancestors in such societies illustrates how vital is *past* for them. A child grows and become a man and then dies. But the *activities* of the man do not end at death, nor do people believe that he will be reborn again. Rather, he will join the "*pool*" of the *spirit of ancestors*. Then, the spirit of the dead, in collaboration with the spirits of all other dead members of the family and/or the community, as the specific case may require, continues its active participation in all major affairs of the family and/or the community. The dead, mainly as a group, not only share their wisdom and experiences with the living but also have unquestionable authority to pass decisions on essential problems faced by the living. The living also may seek the help of the spirits of the ancestors, through some appropriate rituals, whenever they face problems. The very existence and well being of the community depends on the general mood of the spirits of the ancestors. Among many other things, the spirits of the ancestors are the ones who determine the rate of birth in the community. "*Things Fall Apart*", the novel by the famous Nigerian writer Chinua Acheibe (1958) excellently illustrates the role of the spirits of the ancestors in the life of a pre-colonial African village community. It explains how *things fell apart* when the Europeans came with their own concept of time and God and challenged and ridiculed the previously unquestioned authority and wisdom of the spirits of the ancestors and abandoned the associated rituals and practices.

According to the circular anti-clockwise conception of time, people (the living as well as the dead) are masters of time; they can create it or destroy it. However, the role of each individual is not equal, which indicates the status and the importance of the person. If the chief, for instance, wants to dance or just wants to watch people dancing, he will beat the drum to set the event in motion. If many other members of the community and the spirits of the ancestors feel the same, then time for dancing is created and everybody is free to enjoy it. Furthermore, if today's dancing was successful, the probability that it will be repeated tomorrow at approximately the same time is quite high. Thus, in the long run, time for dancing will be one of the established times, such as days and nights.

Often, even in the modern societies in which this concept of time is not dominant, festivals act as boundary-markers by which duration are divided.

We talk of measuring time, as if time were a concrete thing waiting to be measured; but in fact we create time by creating intervals in social life (Haris: 1986: p. 135).

The Lamis in Bolivia, an agrarian community, have two major sessions: the session of work and the session of rest. Festival for all saints and for all souls mark the sessions. During half of the year, the livings are at work, while the ancestors are on holidays in the world of the livings. During the other half of the year, beginning with the harvesting season, the ancestors return back to their land "over the sea" to cultivate red chili, while the living are liberated from their labors for a period of leisure and conviviality (Harris: 1986, p. 74-110).

According to this conception of time, people are masters of time; they can create as much time as they wish and whenever they wish. Once created, some events will soon become stable and established. The cost of destroying an established time may often be too high even for the important persons. A village market is an example. Time for a village market is, in most cases, set by the chiefs of the community, however it become independent of the will of its "creators." In some mythological stories men created days, nights and seasons in a similar way, as time for the village market. Once created, the cost of destroying such a time is so high as to make it impossible to be destroyed by an individual without the consent of others. However, apart from major events like seasons, village market days and festivals, which serve as references to "macro" time, there are also events that serve as references to "micro" times that can be relatively easily created or destroyed, even by ordinary people.

In communities where the circular anti-clockwise conception of time is dominant, any activity begins because it is judged and felt to be the right time to start it; otherwise people will simply wait for the right time to come. Waiting is not wasting time; time can never be wasted under this conception. *Waiting is an act of creation.* Time can be created actively as in the dancing and village market examples, or passively by waiting. For such tasks, calendars and diaries are useless. The most important knowledge is the one that refers to the experience of elders and ancestors. Oral literature has sufficiently served this task. Such a society is highly attached with the past; and elders are considered to be the wisest. This makes the society conservative. However, conservatism of this type is different from that of a society that conceives time to be a clockwise cycle. In the latter case, the society tends to be conservative because of uncertainty about the long run effects of current changes. Here, the society is conservative because the past is considered to be better than the future since it is a source of wisdom and happiness. The past represents the “golden age”; while the future is associated with troubles and challenges. This conception seems to be the most pessimistic.

6. Time as a Pendulum

Time may be conceived as a pendulum that swings, to the right and left, i.e., to the past and then to the future. Thus, night and day, death and birth, failure and success, sadness and happiness occur one after the other. In this case, events occur depending on the position of the “pendulum.” Even in periods of deepest sorrow, people remain hopeful because they *know* that the “pendulum” will certainly swing back to the other direction to bring happy events into existence.

7. Time as a Spiral

Time may also be conceived as a spiral. The conventional wisdom: “history repeats itself but not in the same way,” is a product of spiral conception of time. There are several types of spirals: clockwise and towards the center, anti-clockwise and towards the center, clockwise but off the center, and anti-clockwise and off the center. Although, each type has its own distinct characteristics, all spiral conception of time share the belief that an event that has occurred in the past may occur at the present or in the future but in a different way or in a different circumstance; or the event itself may have some unique characteristics. According to the spiral concept of time, although it is important, knowledge of the past is not sufficient to solve current problems.

Constitution of Coexistence and Implications

The fact that different conceptions of time coexist within a society; and even within one and the same individual person may be taken as an indication that at least some of the conceptions are not mutually exclusive. However, the other equally vivid fact that there is a lot of misunderstanding between people may be taken as an indication that some of the conceptions are probably mutually exclusive, or, at least that they are highly competitive. This may lead to the kinds of argument discussed below that may have far-reaching political, social and economic consequences.

On the one side, one may argue that, thanks to globalization, the existence of clocks and calendars, time has become measurable; and, thus, an hour is an hour wherever in the world and in whatever way one 'spends' it. From this point of view, in today's world, there is no such thing as African, Asian or European time; there is only one *global* time. Therefore, the academic discussion on social time, which might have been important in the past, cannot serve any relevant and useful purpose today other than mental exercise; the distinction between *qualitative and quantitative* time cease to have any practical importance.

On the other side, one may argue that we, *Earthans*, are living in so different "worlds" (each with its own distinct dominant concepts of time) as to make us poorly comparable and compatible. From this point of view, it is not and cannot be easy for us, people from different *worlds* of the same planet, to have common visions, aspiration, goals and plans because we may understand and interpret the same events in dramatically different ways. Even if we may assume that it might be possible to design some common goals based on the narrow common denominators, attainment of the goals at the same time using the same amounts and quality of resources is unlikely because of the simple reason that the *rhythms* in which events occur "here" and "there" are different.

A totally different line of argument such as the one that follows is also possible. Yes, there are different concepts of time; however, the very fact that many of them simultaneously coexist in the same society and within the same individual is a strong proof that not only many of them are *not* mutually exclusive but also that a good number of them are complimentary to each other. Therefore, academic research on social time is relevant and it should be directed towards the search for easily adaptable by all of us and "appropriate" pure or hybrid model so that, at least in long-

run, we can have common understandings, goals, visions, aspiration, and plans, values that are extremely important for the very survival of human being.

Another important dimension of academic inquiry on social time may lead to investigation the practical implication of different concepts on political, social and economic development of a society, and whether designed corrective measures are possible and advisable.

Do differences in “dominant” conceptions of time really affect politico-socio-economic development of a society, and/or that of an individual? Or, to put it in more blatant way: Is there any specific type of conception of time (“pure” or “hybrid”) that can be described as the most “development friendly”?

On the one hand, it seems to be obvious that the way people conceive time shapes their behavior, especially their attitude towards work, leisure and planning. This seems to indicate strong cause-and-effect relationship between the dominant concept of time in a given society and the level of development of that society. On the other hand, question like: are the very meanings and desirability of “*development*” same or at least comparable and compatible in every society? Are the underlining visions and objectives of each society similar or at least compatible and comparable? Last, but not least: are conscious and pre-planned corrective measures possible and desirable? These and similar problems indicate that the problem of social time requires more complete and rigorous multi-and-interdisciplinary investigation.

Conclusion

Social concept of time is one of the crucial elements in understanding social changes. How people conceive time determines their behavior including their attitudes towards life and work. Since all social changes occur in time, students of social change, or transformations could not avoid looking into the conception of time by different societies and cultures

If it is true that people conceive time differently, then they conceive social changes differently as well. Nevertheless, different conceptions of time exist in the same society and at the same time. The analysis of the nature and relationships between different conceptions time needs further and deeper inquiry. However, we can safely conclude this stage that different conceptions of time are neither mutually exclusive, nor are their relationships smooth.

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