

Forest Carbon Sequestration Incentive and Poverty: Evidence from Ethiopia

Zekarias Hussein and Terrie Walmsley

Much of the debate on climate change is now focused on finding ways to halt, and if possible, reverse the level of greenhouse gas (GHGs) emissions in the atmosphere. This has led to a plethora of policies designed as a mitigating strategy and for adapting to a world with warmer climate. Two sectors that have received considerable attention in this regard are agriculture and forestry. This is not without a reason. Land use change (18.2 percent) and agriculture (13.5 percent) together create nearly one-third of greenhouse gas emissions, globally, and the share of these kinds of emissions is far larger in developing countries (Baumert et al, 2009). It seems therefore that achieving significant GHG emission reduction will have to involve agriculture and land use change. The evidence suggests that the total potential savings from various agricultural and land use change activities is substantial and is achievable at a reasonable cost.

Coincidentally, rural poverty and remaining natural forests in developing countries tend to share overlapping space. The World Bank has observed that a large share of people suffering from extreme poverty live on or close to the forest ecosystems (World Bank, 2003). This presents a significant challenge to policy makers as there is a need to clearly understand and harness the interactions between climate change mitigation/adaptation efforts and poverty alleviation. The paper will examine the direct and indirect effects of climate change mitigation policies aimed at the agricultural and forestry sectors, and hence at the poor in Ethiopia. The policy examined assumes that wealthier nations provide Ethiopia with foreign aid in return for setting aside agricultural land. We use a global applied general equilibrium model (Walmsley and Minor, 2012) that facilitates more detailed analysis of household incomes and differential consumption patterns to examine the impact of the mitigation policy and to investigate options for distributing the foreign aid. The policy shock involves two components: (a) Sequestration incentive whereby foreign aid into Ethiopia increases in lieu of archived abatement; (b) Land use component: the foreign aid is then used to fund a sequestration subsidy that provides incentives to land owners to reduce the supply of land available for agricultural production and raises the availability of land for forestry. We then consider a number of possible scenarios where part of the inflow of financial resources (i.e., foreign aid) is used to fund the sequestration subsidy, while another part is kept by the government. In terms of data, households are grouped into poor and non-poor households, and separated into four rural agro-ecological zones, and small and large urban centers giving us a total of 12 household types. Zones 1 and 2 cover the humid cereal growing areas and they are located in the highland region. Rainfall is availability is reliable in these two zones. Zone 3 covers the drought prone region of the country. This zone covers a relatively large area but produces less output compared to Zone 1 (IFPRI, 2013). Zone 4 accounts for pastoralists. This region gets very little rain fall and not suitable for agriculture. We make few adjustments to the standard GTAP closure. The standard closure of the standard GTAP model assumes full employment of endowment commodities (land, labor, and capital), perfect competition (zero economic profits), mobile factors (except land which moves sluggishly between uses), a flexible trade balance and mobile capital between regions (which responds to variations in rates of return on capital). In this paper/chapter we make several changes to the standard GTAP closure to accommodate: (a) Unemployment of unskilled labor in Ethiopia and labor in the rest of Africa. The assumption of unemployment in the rest of Africa recognizes the high unemployment levels in Africa; (b) A fixed current account balance relative to regional

income in Ethiopia. The motivation behind fixing the trade balance in the GTAP model is that it is generally felt that developing countries, like Ethiopia, are unable to run any trade deficits (surpluses) beyond what they already maintain in the base database, due to the fact that foreign investment is unlikely to be forthcoming. In this model the inclusion of foreign aid and other foreign remittances means that it is the current account balance, as opposed to the trade balance, that should be fixed in order to fix foreign investment flows and reflect the fact that new foreign investment is unlikely to be forthcoming. This distinction is particularly important when changes in foreign aid are likely, as is the case in this chapter.

Our preliminary results indicate that the climate policies considered here results in farm output restriction and leads to substantial price changes. Price increases are beneficial to those households that are net sellers in the commodity market. We can therefore anticipate that the impact of the mitigation policy under consideration will differentiated impact across household types and scenarios. For example, households located in Zone 2 and Zone 3 of the country see their real income rise in almost all the scenarios. Both types of households in Zone 1 lose from all the three alternative transfer arrangements we considered in this chapter. Zone 1 represents the main cereal growing part of the country and setting land aside for forestry would leave farmers with little option for alternative gainful employment. The results also show that the urban poor has the worst of the two world i.e. they do not get any transfer as they do not have access to land for sequestration and they do not see the benefit of agricultural commodity price increase as they are mostly net buyers. As a result, the urban poor (both large and small) see their real income decline in all the three scenarios we considered. Another observation we can make from the preliminary results is that the land use change component of the policy shock is not always the main driver of change in real income. Land use changes are dominant factors for those residing in Zone 1 and Zone 4. This is not that surprising as farmers have little alternative source of income and the shift of land use to forestry is not substantially compensated by the amount of the subsidy received from the government.