

Commercialization of smallholder agriculture in Ethiopia

Commercialization of smallholder farms is now viewed by the government as the focal point to the agricultural development of the country. This paper attempts to examine the feasibility of the proposition at the micro-level, in terms of the household, and at the meso-level, in relation to transaction costs. The macro-economic issues of domestic and foreign markets for agricultural output, and linkages between agriculture and non-agricultural sectors are not addressed. Section one discusses what is involved in commercialization of smallholder agriculture. Section two examines commercialization from the standpoint of the household model, and section three deals with transaction costs and the significance of institutional arrangements for cost reduction.

Section one

A. Commercialization and its entailment

At the farm household level commercialization is measured simply by the value of sales as a proportion of the total value of agricultural output. At the lower end, there would always be some amount of output that even a basically subsistence farmer would sale in the market so as to buy basic essential goods and services. For this reason the ratio of marketed output up to a certain minimum level cannot be taken as a measure of commercialization. If the cut-off level for Ethiopia is put at, say, 15 per cent, then it is the increase above this level that would be said to measure the extent of commercialization at the farm household level. As the proportion of the marketed output increases beyond this treshold, the household gets further removed from subsistence production and enters increasingly into commercialized farming. Then, again, at the higher end, there would be a certain minimum level of marketed output ratio that would mark a structural switch into commercialization. The floor for this could be put at, say, 75 per cent of the total agricultural output. Hence commercialization of smallholder agriculture entails a process of transition that could be divided into two stages.

The increase in the ratio of marketed output though simple as an indicator of commercialization, carries with it a deeper change in farm household decision-making behaviour. Household decision-making of production and consumption is non-separable in subsistence farming while it is separable in market-oriented farming. What to produce and how to allocate time between labour and leisure is differently decided upon in subsistence and commercialized farming.

The most common form in which commercialization occurs in peasant agriculture is through production of marketable surplus of staple food over what is needed for own consumption. Another form of commercialization involves production of cash crops in addition to staples or even exclusively. To have a marketable surplus over the cut-off ratio of, say, 15 per cent normally involves an increase of household output of staples. This can be attained with the same level of inputs through adoption of best practices (technical efficiency), or with the same production function but greater utilization of the existing family labour (allocative efficiency), or with new technology consisting of production technique or product variety (productivity gains). Similar improvements at the farm level also apply to the introduction of cash crops.

In the extreme instance where what is produced gets all consumed by the household itself, decision-making about production and consumption would be one and the same. The decision to be made about what crops to produce and how much with the given land and labour would simultaneously apply to both production and consumption. A step further from this extreme marks an instance where a small portion of what is produced emerges as a marketable surplus. Even here, one may conclude that decision-making does not distinguish between production and consumption, so long as the marketable surplus occurs as a residual outcome. This would be so if the surplus gets exchanged solely for other food items not produced by the household. As the marketable surplus increases further, however, decisions pertaining to production and consumption would begin to be separable in that they would have to be made partially independent from each other. Initially weak the degree of separability becomes stronger along with the

proportionate increase of the marketable surplus in the total output. Separability could then be said to start at the same moment as commercialization begins, which, in the Ethiopian case, is, for convenience, put at 20 per cent of marketable surplus.

Where decisions are non-separable between production and consumption the objective of the household is to maximize utility, and where it is completely separable it is to maximize profit. In the in-between situation, however, the household behaviour is guided by a mixture of two objectives directed at utility, on one side, and profit, on the other, with the former being dominant in the early phase of commercialization and the latter in the subsequent phase. Thus the behaviour of the individual farm family undergoes a paradigm shift, with an interregnum of a transition period in which it is critically important to avoid backsliding as well as quicken the pace of change.

On another front, commercialization entails widening and deepening the household's market transactions relating to inputs and outputs as well capital, land and labour. Initially, it will be in the product market that the household's transaction will preponderantly take place. Subsequently, as the marketed output proportion becomes larger, the household's engagements in the other markets will also increase in importance. But these processes by which the household integrates itself into product and factor markets is far from simple and straight forward due to the endemic problems of missing markets and market failures in developing countries.

Integration of the household into the market economy involves forging new links and deepening existing relationships between the household, on one side, and traders, micro-finance institutions, and other farmers willing to supply labour and rent land, on the other. Where markets are missing, it would require the intervention of non-market agents to put in place a mechanism of exchange. A good example of this is the scheme introduced in the mid-1990s of underwriting loans to farmers for the purchase of fertilizers by regional administrations. As to market failures it is the lowering of transaction costs that would be required. Viewed narrowly to exclude transport and communication costs, the transactions costs in smallholder agriculture arise essentially

from lack of information, contract enforcement, and coordination. Thus, commercialization entails improvements in all these three areas.

To conclude, commercialization entails separation of production and consumption in decision-making at the household level, and resolution of missing markets and reduction of transaction costs within the agricultural sector. For the process of commercialization to move swiftly and smoothly the requisite changes at the micro (household) level would need to be readily facilitated by changes at the meso-economic level. In particular, once production for the market begins to gather momentum, it becomes critical to tackle problems of transaction costs, which underlie missing markets and market failures.

B. The state of commercialization in Ethiopia

The status of smallholder commercialization in Ethiopia can be examined by looking at the extent of the integration of the HH into output and factor markets. Table 1 shows the proportion of the marketed output of grain crops produced by smallholders. For the country as a whole, 20.4 per cent of the output in 2001/02 was marketed, while 63.7 per cent was used for own consumption by the HHs, and 12.9 per cent was used set aside for use as seed input. A small fraction of 3 per cent was used for animal feed, payment of non-HH labour in kind, and other unspecified purposes. At a glance this demonstrates that Ethiopia is found at the first phase of commercialization. But there are significant variations within the country. At the high end there are many districts where the marketed output ranges between 30 and 35 per cent, and similarly many districts are found at the low end below 10 per cent.

Table 1

Crop utilization by HHs in 2001/02, in per cent

Crop Type	Own Consumption	Sale	Wages in kind	Seed	Others
Grains	63.7	20.4	0.01	12.9	2.99
Cereals	66.9	15.7	1.25	12.7	3.45
Oilseeds	61.0	21.6	0.95	14.4	2.05
Pulses	33.9	53.8	1.42	9.9	0.98

Source: CSA (2003), Ethiopian Agricultural Sample Enumeration, 2001/02, Part 1, P.215

In addition to grains, tree crops of coffee and chat, which are cash crops, and root crops mainly consisting of enset, which is a food crop, are widely cultivated in the country. It is estimated that 22.8 per cent of farming HHs in the country are engaged in coffee and 14.9 per cent in chat production, possibly with some significant overlapping between the two groups.

Table 2 indicates the extent of utilization of fertilizer in smallholder agriculture. In terms of numbers, out of a total of 10.33 million HHs engaged in farming 38.8 per cent were found to use fertilizer in 2001/02. Similarly application of fertilizer covered 38.6 per cent of the total area under peasant cultivation. By all counts this represents a fairly large proportion of HHs, all the more notable for its occurrence at a very low level of agricultural development even by the standards of developing countries. The explanation lies in the country's thin but broad market of fertilizer. Total consumption of fertilizer amounted to 227,854 tons in 2001/02 with input for grain production amounting to 218,482 tons. This averaged 23.4 kg per hectare of total cultivated area of the country, and 25 kg per hectare of land under grain production, which indicates low intensity of usage among the farmers who applied fertilizers. On the marketing side, retail trade was mostly conducted through regional administrations and cooperatives, rather than private traders, which must have reduced transaction costs for the farmer.

Table 2

Consumption of fertilizer in smallholder agriculture in 2001/02

Item	Holdings		Hectares		Volume
	Number		Number		Tons in'000
	in '000	Per cent	in '000	Per cent	
Total HHs	10,249	100	9,731	100	
Fertilizer users	3,974	38.8	3,755	38.6	218

CSA (2003), Ethiopian Agricultural Sample enumeration 2001/02,
Part 1, P.143 and Part 2, Pages 63, 103, and 211.

Closely connected with the input market is the credit market. In 2001/02 it is estimated that some 20 per cent of the total farm families in the country had obtained credit from the formal sector of commercial banks and micro finance institutions for the purchase of fertilizers. Problems of missing markets and market failures have been substantially circumvented to provide access to credit at affordable prices by maintaining a relatively low interest rate regime at the macro-level and by following innovative approaches at the micro level to reach smallholders. Without this combination of macro-and micro-policies provision of credit on such a magnitude would have been impossible.

Another factor market, which has a bearing on commercialization, is the land market. Given the land tenure system of Ethiopia, the applicable market is that of land-lease market. In 2001/02 the number of rented holdings amounted to 20.2 per cent of "owned" holdings, which is surprisingly high and gives a strong evidence to the permissiveness of the land tenure system to land-lease market. In terms of area of farmland, the rented holdings amounted to a much lower ratio of 11.4 per cent of the "owned" holdings, the

implication being that the size of the rented holding of an average farmer is about 55 per cent of the "owned" holding. Lastly, labour market is found to be negligible. Table 1 shows that the payment of wages in kind by farmers who bring labour from outside the HH, which is far more common than cash payment, accounts to a mere 0.01 per cent of the total crop output. Given that there is plenty of unused labour within the HH, it is self-evident that demand for hired labour is likely to emerge only after a considerable progress has been made in terms of commercialization. The fact that the HH has practically not entered the market to buy labour reflects that commercialization can be carried on a long way with HH labour itself.

Section two: The Household Model

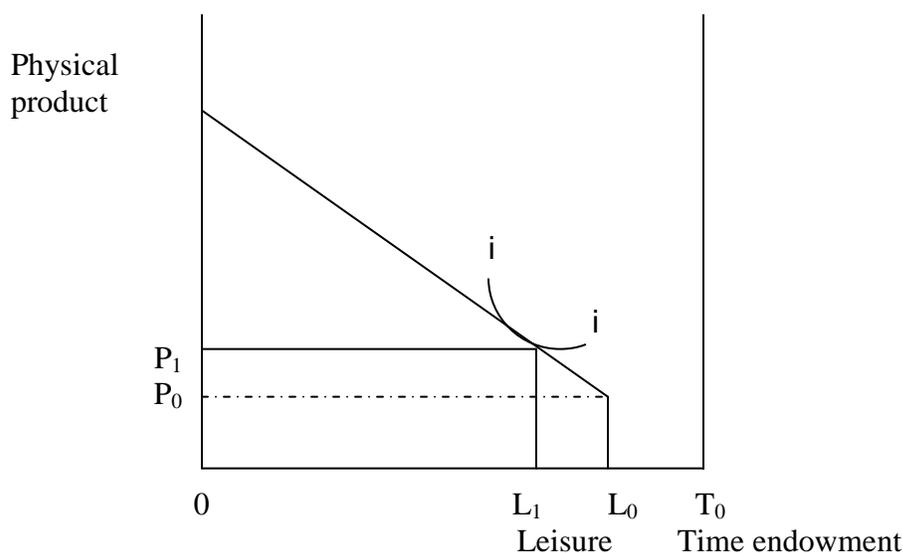
The usual path of commercialization of smallholder agriculture starts with growth in the marketable surplus of staples. This could continue until it becomes the dominant portion of the total output of the household, or, there could be a diversification of the marketed portion into staples and other food crops. Another route consists of combining production of staples for own consumption with production of cash crop for the market. Both, these routes, or, any variant of them, are the processes that took place in Asia's economic development. A third, and an unusual path is the replacement of subsistence production by cash crop production; a direct switch over from subsistence to market production.

Ethiopia is likely to follow a two-track approach in the commercialization of smallholder agriculture, covering the usual and an unusual route. In the food crop surplus producing areas of the country, households would follow the normal pattern of progressively increasing the portion of marketed surplus in the total output, while in the food deficit areas households would shift towards producing for the market and relying on cash income to procure food crops from the market. These are respectively designated track one and track two hereafter.

The household model explains the behaviour of the household as a producing and consuming unit simultaneously. It is a standard model for the analysis of agricultural households in developing countries and can be readily applied to discuss commercialization of smallholder agriculture in Ethiopia covering both tracks one and two.

The starting position of the model relates to subsistence farming. In this case, the household (HH) model takes land and capital as fixed and examines how the supply of HH labour gets determined. As the household increases its labour supply its marginal physical product decreases, while on the other hand, given that the endowment of the HH time is fixed, the available leisure time diminishes and its marginal value increases. Labour would then be supplied until the value of its physical product in terms of leisure is equated with the utility of the physical product in terms of leisure. This is demonstrated in fig.1, which brings together the indifference curve between consumption of physical products and enjoying leisure, and the slope of the budget line showing the trade-off between additional leisure time and physical product. The horizontal axis depicts the increase in leisure time when read from left to right, and, on the obverse, the increase in the labour supply when read from right to left. The vertical axis shows the physical product.

Figure 1

Household labour supply

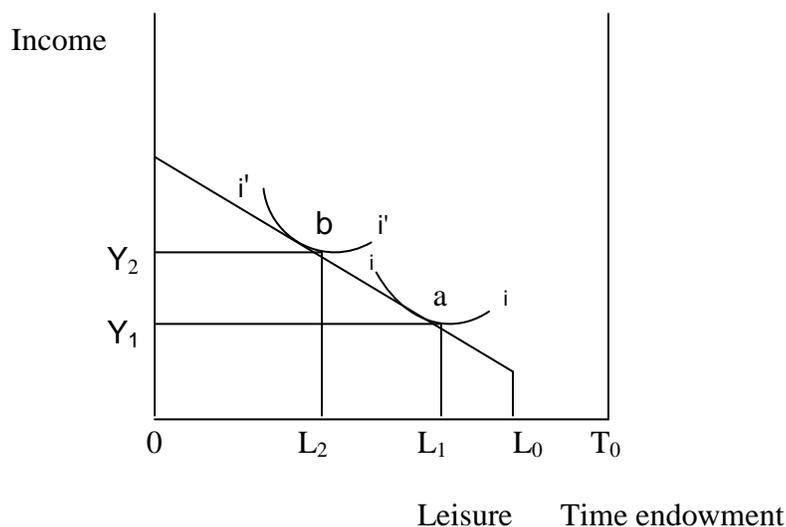
Since the household owns all the factors of production it uses, it is up to it to decide the division of the endowment of time between leisure and work. The decision would in turn depend on how much the HH wants to consume and the drudgery of labour. Up to a certain minimum the consumption level of the HH can be said to be determined exogenously reflecting the nutrient requirement for self-sustenance. In which case the drudgery of labour would have to be met, there being no option. It would be up to nature whether this necessary amount of labour supply is burdensome or not. Normally, however, subsistence production operates at a plane above minimum consumption level needed for survival, and it is at this plane that the HH model is constructed.

The HH model is unique in its theoretical construct in two ways. First, and most notable, it treats a situation where implicit transactions occur within the household rather than the market, and second it implies a line of causation between supply of labour and leisure time which runs from the latter to the former rather than the other way round. The

decisions that a subsistence farm family makes on what to consume and how much, and how much to work or rest, can, if desired, also be explicitly viewed as transactions between a notional entity called "Household" and members of the household collectively (or individually though that would make the transactions complex). One can envisage, for instance, the notional household hiring the real household putting them to work, and in return paying them in kind from its produce. As to labour supply, it is the HH's preference for leisure that drives labour supply, in turn determined by the indifference between consumption of food and leisure. Once the HH fixes its desired amount of consumption of food crops and the leisure time that it wishes to have, the supply of labour is simultaneously fixed (see appendix).

The transition process from subsistence to market-oriented production under track one can be divided into two stages. In stage one the HH has a significant amount of marketable surplus: (say, up to 50 per cent of total output), but engages in no other market transaction. Fig.2 sets the analytic framework. The vertical axis shows income instead of physical product, since part of the output, albeit a small portion is now in cash. Compared to fig.1 there are two different argumentations. One relates to the indifference curve and another to the unit of measurement of the equilibrium point. Although the vertical axis shows income, it can be viewed as a proxy for consumption with a somewhat convenient assumption that at this phase of commercialization peasants do not save in cash. Thus the indifference curve can be read as showing different combinations of consumer goods and leisure time. The difference is that this time consumer goods, though still dominated by food items, includes other non-food items as well. Another difference concerns the change in the measurement of HH output from in kind to cash. Although it is a small portion of the output that is marketed, the entire output of the HH can be considered as implicit wage. Consequently, the equilibrium level of labour supply by the HH is that at which the price of income in terms of leisure is equated to the utility of income in terms of leisure.

Figure 2

Household labour supply

The second stage in the process of commercialization is marked by the dominance of marketable surplus in the output of the HH. Commercialization now goes beyond quantitative change as it comes face to face with a critical qualitative change. Consider what happens to the indifference curve. It still defines the relationship between consumer goods and leisure, but quite importantly, the composition of consumer goods is weighted more by purchased goods compared to food items produced by the HH. Since well over half of the consumption of the HH has to be procured from the market, it is imperative that the HH supplies adequate labour to maintain the desired composition of consumption. As a result, for the first time in the HH model the line of causation between labour supply and leisure time flows from the former to the latter, and leisure comes to be determined by the disutility of labour in the regular fashion. The budget line now acts as a constraint on the indifference curve obligating the household to choose the combination of consumer goods and leisure time denoted by the point (b) at which two are in tangent. Labour supply will increase until there is equality between price and utility of income measured in terms of leisure.

Market failures on the output front should also be considered. The HH may want to optimize its income by increasing its marketed output of non-staple food crops or cash crops through allocating more resources, say, land for this purpose and, inversely lowering the allocation of resources for the production of staples below what is required to attain self-sufficiency. But there could be differences between the selling and buying price of staples in the same market at the same time. The buying price is likely to be higher due to market failures. If the extent of the price difference is significant, it could slow down the process of commercialization.

In stage two the problem of market failures becomes prominent, as the assumption that the HH does not enter into transactions in factor markets, which was appropriate for stage one, no longer holds. In rural areas the fact that labour markets are undeveloped pose problems of market failures to HH who wish to hire labour. Specifically, the price of labour is likely to be significantly higher than the marginal revenue it would fetch to its employer. Conditions of credit market would vary depending on whether it is the formal or informal market that prevails. But even where formal markets exist, interest rate are often excessively high unless heavily subsidised. Land markets are no less flawed either. The rental rate is not likely to be competitively determined since the market is highly localized. In the extreme instance, which is not uncommon, HHs wishing to expand their area of cultivation may be unable to do so for lack of availability of land that can be rented within manageable distance. Moreover, the long-term duration of rental would be indeterminate as contracts are informal, often made on annual basis.

Track two

Instead of an evolutionary process of commercialization, track two involves a breaking out of subsistence production. It takes place under an unusual condition in which a food-deficit HH abandons its focus on food production and switches to production of cash crop or livestock products for sale in the market. Under population pressure and soil degradation over decades, production of staples ceases to be a viable means of assuring food security, particularly when coupled with adverse rainfall conditions, to the point where further sustenance of life becomes dependent on the introduction of a new farming

system. Inevitably this requires adoption of a new technology by the HH with some kind of external intervention of government and /or private sector.

HH labour supply will be governed by similar conditions as pertain to the second stage of track one. If the entire output is directed at the market and the HH aims at obtaining all its food requirements from the market, then its indifference between consumer goods and leisure is defined in the same manner as that of an urban HH. Otherwise, some small amount of food crops may be produced by the HH. Whatever the case, the HH labour supply will continue, until there is parity between price and utility of income in terms of leisure.

Generally, different possibilities exist for changing the farming system of smallholder agriculture that is under practice. Constraints can arise from lack of rain, loss of soil fertility, or small size of landholding. In extreme instances any one of these, or in combination, could constitute a binding constraint that would make agriculture an unviable activity. These notwithstanding, the HH would have to adopt an optimal farming system out of various feasible systems, depending on the natural resource endowment and availability of labour, land, credit, technology, and market.

Section three: Transaction costs

Transaction costs consist of tangible and intangible costs. The former include marketing costs such as transport, handling, storage, communication, and bank loans, while the latter would typically arise from lack of contract enforcement, information and coordination, and are expressions of missing market and market failures. Transaction costs are discussed here in terms of intangible costs.

To start with it is instructive to note that it is only HHs that are engaged entirely in subsistence production and do not have any connection with either product or factor markets that do not encounter transaction costs. Once, HHs enter the market, however, they inevitably incur transaction costs. These costs tend to increase in complexity and amount, as the market integration of the HH gets intense along with commercialization.

Property rights and contract enforcements are also examined, as these are closely associated with transaction costs. Of the three causal factors that lie behind transaction costs in smallholder agriculture, comprising property right/contract enforcement, lack of information and coordination, perhaps the most important in Ethiopia today concerns coordination. Obviously all three factors are inter-related, and there would be some degree of arbitrariness in treating each separately. But, by doing so, there could be some gain in clarity.

The land tenure system, which defines property right among small farmers, is characterised by use-right. In recent years, the regional governments started issuing certificate of landholding to rural HHs, which assures the use right of the farmer against any incursion by any person or authority unless constitutionally provided for. This helps to remove ambiguities in the delineation of use rights. Furthermore, the certification of landholding opens the scope for the use-rights to be held for perpetuity and be passed on to future generations through inheritance, though regional governments would still have the de jure authority to redistribute land. Instead, should population pressure diminish land/labour ratio to below a certain minimum, the way out for the state would then be to open-up unoccupied land, particularly in the lowlands, for voluntary settlement. Access to credit is another issue that gets raised in relation to a land tenure system that does not allow rural land to be bought or sold, as in this instance it is not possible to collateralize land to secure credit. But this is not a serious impediment to accessing credit from the formal sector as demonstrated by the country's experience of MFIs and bank loans in making use of peer groupings to enforce loan repayment. The informal credit market, however, does get constrained. Land tenure aside, the issue that should be of primary is the pros and cons of formal and informal credit for agricultural development.

Contract enforcement has an important bearing, particularly in connection with contract farming and out growers scheme that could be deployed to promote commercialization. Indeed small farmers can individually produce identical products for sale to create the scale of output collectively that would be required by a given buyer and become part of the value chain of a given industry. While this route holds great potential for linking

commercialization with exports, and agro- industry, its success is critically dependent on contract enforcement. There are two pitfalls that have to be avoided up front. One is insufficient specification of contract, and another is weak contract enforcement. Having an effective external mechanism of contract enforcement establishes a fallback position for settlement of disputes that should normally be resolved by the two parties themselves, helping to reduce transaction costs and foster trust. Additionally government intervention is manifestly necessary to bring the potential buyer and sellers together for a continuing relationship as the arrangements of contract farming or out growers is new to the country.

Lack of information has a direct impact on transaction costs, as is well known. Prices of food crops and cash crops vary within a season, between seasons and between locations. Obtaining real-time price information at a primary market is extremely difficult for the farmer and perhaps no less so for the trader/agent who would need to be informed about prices in several primary markets. As to future prices, there is no information, since all the agricultural markets operate on spot prices. At the other extreme of food crops, for vegetables, price information is only of little significance to the small farmer who is more or less compelled to sell at the going rate within a few days of harvest. Irrigation would allow the farmer to play the market better by exploiting seasonal price variations, if reasonably informed about price trends in previous seasons. By comparison the fruit producer has a better opportunity to choose time and place of sale.

Information about quality is another problem; this time similarly faced by both buyers and sellers. The small farmer cannot be compensated for quality, as the trader who buys from the primary market would have to sell his supply in terms of the average standard of his stock. Neither the farmer nor the trader has an incentive to improve standards, for instance, for content of impurities, since the market would not pay premium to either. On the contrary, their incentives would be to cheat each other on quality.

A good part of the problem of high transaction costs which small farmers encounter is inherently bound with size of marketing operation. Keeping production in small units, at least above a certain minimum, has advantages for the maximizing output per unit of land under cultivation, which is the right objective in developing countries where labour is

relatively more abundant than land. Several studies have revealed that output per unit of land is negatively associated with size of farms. The disadvantage of smallholder agriculture, and by the same logic the advantage of large commercial farms comes not in production but in minimization of transaction costs. Cooperatives can markedly close the gap in transaction costs and make smallholder agriculture equally or more competitive with large -scale farming. The trick is to produce in small units and market in large volumes through service cooperatives.

Cooperatives perform a basic function of aggregation of output, which is instrumental for the commercialization of smallholder agriculture. For Ethiopia, and perhaps, most of the least developed countries, they offer the best chance for a quick transition from subsistence to commercial agriculture. Still, though cooperatives may be said to be necessary, they are not in themselves, a sufficient condition for the desired transformation of agriculture. There are three fundamental reasons for this, including agency problems, market risks, and price transmission of incentives for quality product.

Any organization consisting of principal and agents is bound to have agency problems of one type or another, big or small. Cooperatives are no exception to this as evidenced by the experience of several countries. The main sticking point concerns pricing of output. Given that the process of fixing the sales price of the output of a cooperative is subject to negotiation, there is ample scope for a manager of a cooperative to enter into a deal with the buyer for personal gain. Since both parties stand to benefit the incentives for making an insider deal are straightforward, and could be strong particularly where price information is patchy and number of buyers are small, which fits conditions of least developed countries.

Risks and uncertainties is another pitfall. Price variation, temporal and spatial, and inadequate specification of product are common problems of agricultural marketing that cannot be resolved by a cooperative on its own. Under conditions of spot market, the seller is uncertain whether better prices could have been obtained by transacting at a future date. Similarly the risk of transacting in one location instead of another is difficult

to judge. Again in the absence of a system of grading of products, cooperatives face price risks. Equally there is no incentive mechanism for improving quality of output by the farmer, and could have negative spillover effects on incentives to improve productivity of output. This, in turn, impacts negatively on exports and agro-industry, unless resolved through vertical integration or contract farming.

To capture the full potential of cooperatives an institutional innovation that creates a platform for a collective of sellers and buyers to transact face to face is required. This is none other than a commodity exchange. The agency problem gets tackled because with a commodity exchange the process of price determination is transparent. Risks and uncertainties are minimized through real-time information in different locations, while the constraints of spot markets can be substantially lifted through forward and futures market. Lastly, price incentives for improvement of quality, and in association improvement of productivity, get effectively transmitted to the small farmer because commodity exchange enables the creation of a system of grading and product differentiation.

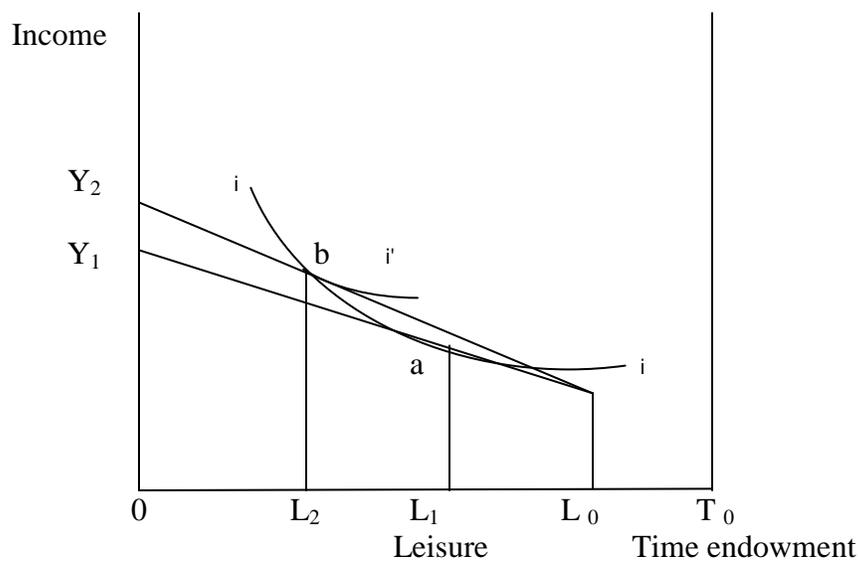
Appendix

The analytics of indifference curve and budget constraint is applied normally in the theory of consumer behaviour to demonstrate how a consumer can maximize utility given income and prices of goods. Its adoption in the HH model of labour supply is made possible by the fact that the household determines both its preferred combination of consumption of goods and leisure on one side, and income and leisure on another side. The choice of allocation of time to leisure simultaneously fixes how much to consume and produce. But this has an implication on the analytic framework of indifference curve and budget constraint as applied in the HH model, which needs to be explained.

In the consumer theory what has to be resolved is how to choose from a multiple combinations of two consumer goods that are equally preferred by an individual, subject to a given income and prices of goods. The solution is diagrammatically shown at the point of tangency between the indifference curve and the budget constraint line. Any other point on the indifference curve would be un-attainable requiring the consumer's choice to move towards the point of tangency.

There is no similar adjustment mechanism in the case of HH model. Instead, at any point on the indifference curve, tangency with the budget line is obtained automatically. For any movement on the indifference curve, there is a corresponding adjustment in the slope of the budget line. For instance, if the HH prefers to increase its consumption of goods and decrease its consumption of leisure, shown as a movement from (a) to (b) in fig. 3 below, it is at the same time deciding to increase the supply of labour, which implies a shift in the slope of the budget line so as to create tangency with the new point on the indifference curve.

Figure 3

Household labour supply

But changing the slope of the budget line also impacts on the income level. Unlike in the consumer theory where income is exogenously fixed, in the HH model income is endogenously determined. This is another point that needs to be considered in adopting the analytic framework of the consumer theory to HH model. Keeping the marginal rate of substitution between the two consumption goods constant, in the theory of consumer behaviour an increase in income gets reflected in an upward shift of the indifference curve from (c) to (d), whereas in the HH model the same event would have to be depicted as a sideways shift on the initial budget line from (c) to (e), with a change in the shape of the curve, as shown in Fig. 4 below. In the HH model the indifference curve and the budget line represent functions that are interdependent.

Figure 4
Household labour supply

