

# Development Economics

Development Microeconomics

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Chapter 2

# Agricultural household

- Two household members
- Utility
  - Consumption:  $c_1$  and  $c_2$ ; Leisure:  $l_1$  and  $l_2$
- Household production
  - $F(A, L)$ ;  $A \equiv$  land,  $L \equiv$  household labour
- Endowments
  - $E_{i,L} \equiv$  person  $i$ 's endowment of time
  - $E_A \equiv$  household's endowment of land
- Prices
  - $p \equiv$  price of the good;  $w \equiv$  wage rate;  $r \equiv$  rental rate of land

# Optimisation problem

$$[1] \quad \text{Max } U(c_1, c_2, l_1, l_2)$$

Sub to

$$[2] \quad p(c_1 + c_2) + wL_h + rA_h \\ \leq F(L, A) + w(L_{1,m} + L_{2,m}) + rA_m$$

$$[3] \quad L = L_{1,f} + L_{2,f} + L_h$$

$$[4] \quad A = A_f + A_h$$

$$[5] \quad E_A = A_f + A_m$$

$$E_{i,L} = L_{i,f} + L_{i,m} + l_i, i \in \{1, 2\}$$

$$[6] \quad c_i, l_i, L_{i,f}, L_{i,m}, A_f, A_m \geq 0, i \in \{1, 2\}$$

# Add a little algebra

Substituting equations [3]-[5] in equation [2]:

$$[1] \quad \text{Max } U(c_1, c_2, l_1, l_2)$$

Sub to

$$[7] \quad p(c_1 + c_2) + w(l_1 + l_2) \\ \leq \Pi + w(E_{1,L} + E_{2,L}) + rE_A$$

$$[8] \quad \Pi = F(L, A) - wL - rA$$

$$[9] \quad c_i, l_i, L_{i,f}, L, A \geq 0, i \in \{1, 2\}$$

# And a small assumption

If  $U(\cdot)$  is characterised by *local non-satiation*, equation [7] is binding, and  $U(\cdot)$  increases in  $\Pi$ , such that:

$$[1'] \quad \text{Max } U(c_1, c_2, l_1, l_2)$$

Sub to

$$[7'] \quad p(c_1 + c_2) + w(l_1 + l_2) \\ \leq \Pi^*(w, r) + w(E_{1,L} + E_{2,L}) + rE_A$$

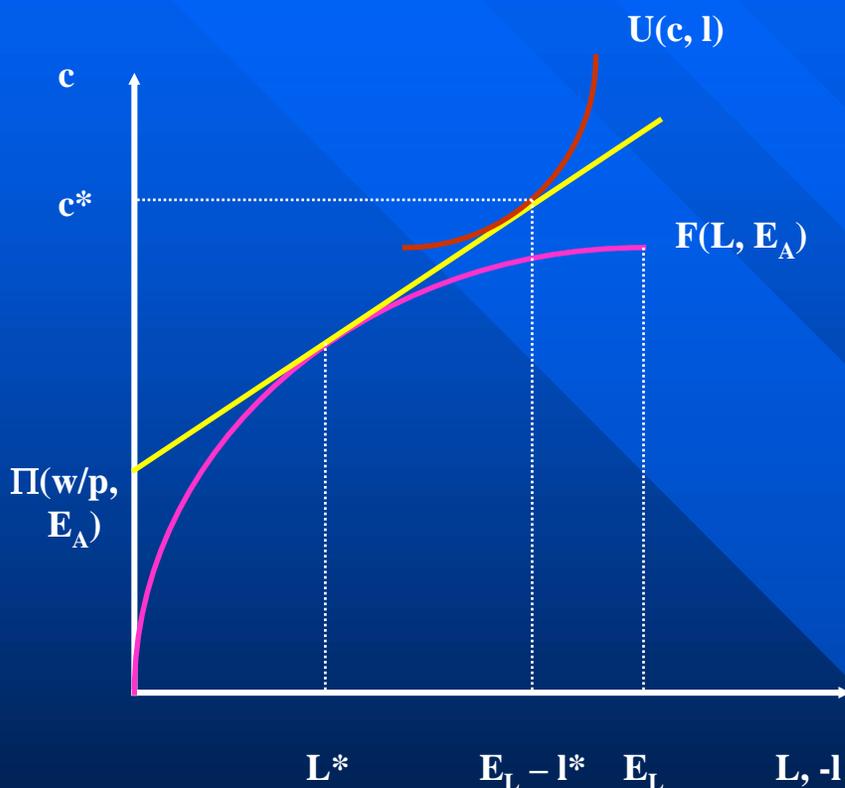
where

$$\Pi^*(w, r) = \text{Max} \{ F(L, A) - wL - rA \}$$

# The resultant simplification

- The household's consumption and production decisions are separable
- Given product and factor prices, the household chooses the level of inputs (and hence output) that maximises its profit
  - Output decisions are not influenced by endowments and preferences
- This level of profit then defines the budget constraint, and the household maximises its utility subject to this constraint

# The equilibrium in figures



## ■ Simplifications:

- There is no market for land
  - »  $A = E_A; r = 0$
- Identical preferences of household members
  - »  $c_1 = c_2 = c$
  - »  $l_1 = l_2 = l$

# Empirical evidence

## ■ Hypothesis

- Demand for labour by farm-owning households should not be dependent on demographic characteristics of the households that embody their endowment of labour power

## ■ Data

- 4117 rural households from rural Java
- 64 percent of households own land
- 50 percent of landed households engage in off-farm wage labour some time during the year

## ■ Result

- By and large, there is evidence supporting the separation principle

# Non-farm labour market [1]

## ■ Importance

- In China, growth of employment in the manufacturing sector during 1978-86 was 7.7 percent
- Growth of employment at TVEs during the same period was 12.7 percent
- Share of rural employment in non-farm sector rose from 12 percent in 1980 to 20 percent in 1986

## ■ Problems with measuring productivity

- (Own) capital may not have high opportunity cost even if credit is relatively expensive
  - » Choice of technology may deviate from the optimal
- Heterogeneity of people employed in the non-farm sector on account of difference between people who have no other choice and those that are more productive in the non-farm sector than in the farm sector

# Non-farm labour market [2]

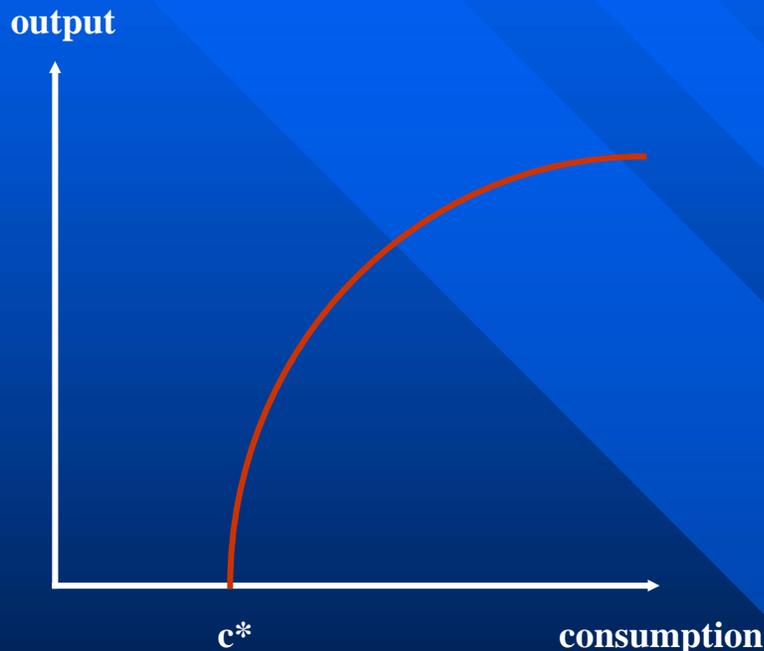
## ■ Poverty and income distribution

- *Japan*: Share of non-farm income low for farm households with the highest incomes
- *Botswana, Gambia, Kenya, Nigeria*: An equalising effect
- *India*: U-shaped relationship between non-farm income and total income (or assets)
- *Bukarina Faso, Java*: Richest households received the largest incomes from non-farm sources

## ■ Unemployment

- Evidence from India (c. 1984) suggests that rural **off-season** (**peak season**) unemployment was **23 percent** (**14 percent**) for men, and **42 percent** (**20 percent**) for women
  - » Why does the rural non-farm wage not decline to clear the market?

# Non-farm labour market [3]



- Labourer requires a minimum level of consumption to be productive
- This minimum level of consumption defines his reservation wage
- If the reservation wage is too high, he may remain unemployed
- Policy implication involves importance of non-wage income

# Non-farm labour market [4]

## ■ Women

- Significant source of employment for women for whom working away from home is often infeasible
  - » *Botswana, Burkina Faso, Malawi, Zambia*: Beer brewing
  - » *Ghana, Senegal*: Fish processing
  - » *Bangladesh*: Cottage industries

## ■ Diversification

- *China*: Most TVE workers retain right to work on agricultural land, and many work part time in farming
  - » Mixed evidence about correlation between farm- and (derived) non-farm income
- *Kenya*: Significant positive correlation between farm productivity and revenue, and non-farm income
  - » Mitigation of capital market failure

# Non-farm labour market [5]

## ■ Dynamic model

- Impact of Green Revolution in India raises agricultural productivity, and hence farm income
  - » Either labour is released or agricultural wage goes up, resulting in lower factor cost or more capital for non-farm sector
  - » Both forward (need to process agricultural good) and backward (agriculturists' demand for input) linkages with rural non-farm sector
  - » Consumption linkages raising demand for goods and services produced locally
  - » Increase in demand for non-farm goods and services results in qualitative change in the demand for agricultural products, and leads to higher investment in agricultural technology
- Empirical evidence indicates that a £1 increase in farm income usually results in a >£1 increase in non-farm income, as well as an increase in non-farm employment

# Non-farm labour market [6]

## ■ Policy response

- Targeted credit programmes
  - » Grameen Bank of Bangladesh has a default rate of less than 1 percent, but it cannot cover its operations costs even after charging a 16 percent interest rate
- Removing infrastructural and logistical problems that impede marketing
- Reservation policy
  - » The impact of reservation policy on employment generation by the textiles sector in India was muted on account of the rapid spread of power looms
- Public works schemes
  - » Reduced volatility of income
  - » Increased wages in other sectors
  - » Women participation rates as high as those of men

# Back to agricultural household

## ■ Assumptions

- No market for land
- Presence of involuntary unemployment

$$[10] \quad \text{Max } U(c, l)$$

Sub to

$$[11] \quad pc = F(L_f + L_h, E_A) - wL_h + wL_m$$

$$[12] \quad 1 + L_f + L_h = E_L$$

$$[13] \quad L_m \leq M$$

# Involuntary unemployment does not exist

- Equation [13] is not binding ( $L_m < M$ )

- Implication

[13']  $pc + wl = F(L, E_A) - wL + wE_L$

when

$L \equiv$  amount of labour used on the farm

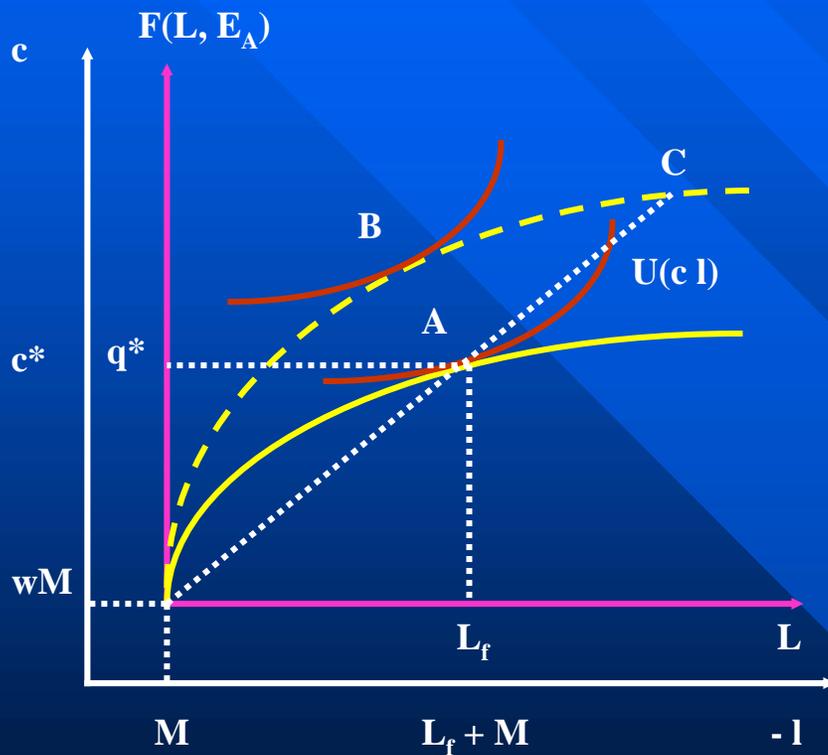
- Separation principle holds

- If farms have constant returns to scale technology, all farms facing the same wage would employ the same number of people
  - » Labour demand function:  $w = f'(L/E_A)$
- Each farm would have the same yield per hectare as well as the same output per labourer

# Involuntary unemployment exists

- Equation [13] binds ( $L_m = M$ )
- Implication
  - [14] Max  $U(c, l)$
  - Sub to
  - [15]  $c = F(E_L - M - l, E_A) + wM$ , i.e.,  $L_h = 0$
- Constrained optimisation
  - Three first order conditions
  - Optimal level of  $c$  and  $l$  jointly determined
    - » Separation principle no longer holds

# The graphical view



- Farm household supplies  $M$  units of labour in the non-farm sector and earns  $wM$
- It uses the rest of the labour on its own farm, and the equilibrium is  $A$ , where the non-separation principle is violated
- Empirical evidence about farm size and productivity
  - If a household with a larger farm were to work on its farm with the same intensity as that with a small farm, its equilibrium would be  $C$
  - If leisure is a normal good,  $C$  cannot be an optimum choice for the household with the large farm, and it will choose  $B$  instead

# Should we be content?

## ■ Unitary household model

- Can we assume that the decisions of household can be replicated by that of a single individual?
  - » Only if utility is transferable freely across household members

## ■ Testable hypothesis

- Ceteris paribus, a household's demand and supply should only be affected by the overall income of the household

## ■ Empirical evidence

- This is typically not the case
- For example, children typically do better in households where their mothers have control over a large proportion of household resources

# Intra-household resource allocation [1]

## ■ Paul Samuelson

- The husband and the wife will arrive at a consensus about the overall utility function of the household
  - » No explanation as to how they arrive at this consensus
- They will maximise this overall utility subject to the budget constraint based on the joint income of the husband and the wife
  - » The comparative static results will be the same as those of the unitary household model

## ■ Gary Becker

- A household comprises of an altruist parent and many “rotten kids”
- “The altruistic parent will adjust transfers so that each ‘rotten kid’ finds it in his or her interests to choose actions that maximise family income.”
- The final optimisation problem is very similar to that of a “consensus household”

# Intra-household resource allocation [2]

## ■ Alternative

- Bargaining power of individual household members depends on the share of the household resources over which they have control

## ■ Observation

- Households in which women have control over a large share of the pooled household income eat out more often

## ■ Problem

- It is tempting to argue that this is a reflection of the greater relative bargaining power of these women who have preference for less cooking and/or eating out more often
- But the two outcomes may be jointly determined
  - » If women have higher opportunity cost of their time, the household gains if she works and earns a wage, and part of this income is spent on eating out

# Intra-household resource allocation [3]

## ■ Natural experiment

- Taxing income of (largely) men of the households to provide child support to the women (in the UK, in the 1970s)

## ■ Empirical evidence

- Increase in consumption of women's and children's goods
  - » Rejection of “pooled income” hypothesis

## ■ Implication

- Tax-subsidy (and other similar) policies do indeed have an impact on the consumption and, hence, welfare of the targeted groups
  - » If income were pooled, this would not be the case

# Intra-household resource allocation [4]

## ■ Non-cooperative bargaining

- Household members bargain with each other, using their reservation utility as threat points
  - » The husband takes the amount of public good supplied by the wife as given, and decides his personal optimum for the private and public goods that he would supply, subject to his budget constraint; the wife behaves similarly
  - » Each person's threat point is his/her utility should they not live together
- The resultant allocation of resources within the household, derived from the two reaction functions, is Pareto efficient

## ■ Empirical evidence

- Resource allocation not always Pareto optimal
  - » Role of social norms