# 14.74 Foundations of Development Policy
Spring 2009

# Nutrition and productivity

## 14.74, Spring 2009, Lecture 3

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# 1 A simple theory of nutrition and productivity

The capacity curve (fig 1)

- The capacity curve: It relates income and work capacity (productivity)
  - Higher income $\longrightarrow$ better nutrition.
  - Better nutrition: first used by the body for the basic metabolism. Then only it translates in higher capacity.
  - As a result, the work capacity is convex, and it intersects the 45 degree line from below.

The Piece-wage schedule (fig 1)

- The piece wage schedule
  - The amount of income you get for each task you perform
  - : $v_1 > v^* > v^3$
  - There is a wage $v^*$ at which the body "breaks even" $\longrightarrow$ it creates a discontinuity in the labor supply.

Discontinuous labor supply (fig 2)

- The individual labor supply jumps
- We can now draw the *aggregate* labor supply.

Equilibrium (fig 3)

- Introduce a *labor demand* curve.

- What happens if the labor supply cross the labor demand in the gap?

- There is *involuntary unemployment*
  Definition= A person is involuntarily unemployed if he cannot find employment in a market which does employ a person very similar to him and if the latter person, by virtue of his employment in this market is distinctly better off than him.

- The vicious circle is complete: low wage leads to reduced work capacity, which closes access to employment.

## 1.1 The effect of non-labor income (fig 4)

- In what direction do assets move the capacity curve?

- Who is more likely to be employed: the rich or the poor?

- Who earns a larger wage income if both are employed?

The vicious circle of inequality: the functioning of the labor market magnifies assets inequality.

## 1.2 The effect of redistributing wealth

- Imagine individuals are ranked by land holding (fig 5)

- $\overline{m}$ have no land.

Who will work (fig 6)

Definition: Minimum wage such that an individual *can* or *want* to work.

- Capacity curve and labor supply.
  - what is the minimum wage at which someone *can* work?
  - Labor supply for capacity to work: the minimum wage necessary decreases with wealth
- Willingness to work and labor supply
  - The willingness to work is smaller for richer people
  - Labor supply for willingness to work: the minimum wage necessary increases with wealth.

Labor Supply (fig 7)

- Combine the two: labor supply.
- How does redistributing land frm the rich to the poor affect labor supply
- what happens to wages, production.

## 1.3 Dynamics

- Assume now that work capacity today is a function of last period's nutrition:

$$workcapacity_t = f(n_{t-1}), f' > 0$$

- To simplify the analysis, let us assume away all the labor market issues–everyone works on his own and gets an income equal to his work capacity. Furthermore nutrition is an increasing function of income.

- Therefore

$$n_t = g(workcapacity_t) = g(f(n_{t-1})).$$

Implications

- Poverty trap (fig 1 , 2 , 3).
- Reinforces the lack of a equity-efficiency trade-off
- What if poor people could enter into long term employment contracts?
- What would be the effect of providing free meals?
- What would be the effect of providing access to credit?
- What would be the effect of an employment guarantee scheme?
- How much does an improvement in a household's income increase investments in human capital?

## 1.4 Looking at the evidence

- Observe that the model, in order to generate a poverty trap, requires that over a range, the $f(g(\cdot))$ curve intersects the 45 degree line from below.

- A poverty trap will emerge if $f'g' > 1$. Let's denote income by $y$ and do some algebra:

$$f'g' = gf' * \frac{g'}{g} = \frac{f'}{f}g * \frac{g'}{g}y * \frac{f}{y} \qquad (1)$$

  The expressions $\frac{f'}{f}g$ and $\frac{g'}{g}y$ are called "elasticities".

- On the 45 degree line, $f = y$. Expression 1 tells us that there can be a nutrition-based poverty trap *only* if the product of the elasticities of the income-nutrition and nutrition-productivity relationships is greater than 1. It gives us a clear empirical fact to look for.